THE CENTRE FOR MARKET AND PUBLIC ORGANISATION

Jumping over a low hurdle: Personal pension fund performance

Anastasia Petraki and Anna Zalewska

May 2013

Working Paper No. 13/305

Centre for Market and Public Organisation
Bristol Institute of Public Affairs
University of Bristol
2 Priory Road
Bristol BS8 1TX
http://www.bristol.ac.uk/cmpo/

Tel: (0117) 33 10952
Fax: (0117) 33 10705
E-mail: cmpo-admin@bristol.ac.uk

The Centre for Market and Public Organisation (CMPO) is a leading research centre, combining expertise in economics, geography and law. Our objective is to study the intersection between the public and private sectors of the economy, and in particular to understand the right way to organise and deliver public services. The Centre aims to develop research, contribute to the public debate and inform policy-making.

CMPO, now an ESRC Research Centre was established in 1998 with two large grants from The Leverhulme Trust. In 2004 we were awarded ESRC Research Centre status, and CMPO now combines core funding from both the ESRC and the Trust.

ISSN 1473-625X

CMPO Working Paper Series No. 13/305

Jumping over a low hurdle:

Personal pension fund performance

Anastasia Petraki[1] and Anna Zalewska[2]

[1] *CGR and School of Management, University of Bath, UK*
[2] *CGR and School of Management, University of Bath, UK*
CMPO, University of Bristol, UK

May 2013

Abstract
This study analyses a sample of 8,255 UK personal pension funds operated by 60 providers over a 30 years' period (1980 – 2009) in order to assess their short- and long-term performance and argues that it is inappropriate to evaluate pension funds using methods applied to evaluate mutual funds. We find strong evidence that pension funds outperform their Primary Prospectus Benchmarks (PPBs). However, we argue that this is because the PPBs are not challenging, and pension funds invest outside the PPBs, giving the funds the opportunity to better diversify risk. We also find that pension funds outperform T-bills in the long run, but not in the short run. We argue that this is a 'statistical' consequence of pension funds short-term tracking of the PPBs, which are more risky than T-bills. We discuss policy implications of our findings.

Keywords: pension funds, portfolio performance, Sharpe ratio, benchmark selection, portfolio risk
JEL Classification: G11, G18, G20, G23

Electronic version: www.bristol.ac.uk/cmpo/publications/papers/2013/wp305.pdf

Acknowledgements
The authors would like to thank an anonymous sponsor for funding Dr Anastasia Petraki's post-doctoral position at the Centre for Governance and Regulation (CGR), University of Bath which has made this research possible. We would also like to thank Morningstar for granting us access to their Morningstar Direct™ database.

Address for correspondence
CMPO, Bristol Institute of Public Affairs
University of Bristol
2 Priory Road
Bristol BS8 1TX
cmpo-admin@bristol.ac.uk
www.bristol.ac.uk/cmpo/

Jumping over a low hurdle:
Personal pension fund performance

Anastasia Petraki

CGR and School of Management, University of Bath, UK

Anna Zalewska[1]

CGR and School of Management, University of Bath, UK

CMPO, University of Bristol, UK

March 2013

Abstract

This study analyses a sample of 8,255 UK personal pension funds operated by 60 providers over a 30 years' period (1980 – 2009) in order to assess their short- and long-term performance and argues that it is inappropriate to evaluate pension funds using methods applied to evaluate mutual funds. We find strong evidence that pension funds outperform their Primary Prospectus Benchmarks (PPBs). However, we argue that this is because the PPBs are not challenging, and pension funds invest outside the PPBs, giving the funds the opportunity to better diversify risk. We also find that pension funds outperform T-bills in the long run, but not in the short run. We argue that this is a 'statistical' consequence of pension funds short-term tracking of the PPBs, which are more risky than T-bills. We discuss policy implications of our findings.

Acknowledgement: The authors would like to thank an anonymous sponsor for funding Dr Anastasia Petraki's post-doctoral position at the Centre for Governance and Regulation (CGR), University of Bath, which made this research possible. We would also like to thank Morningstar for granting us access to their Morningstar Direct™ database.

Keywords: pension funds, portfolio performance, Sharpe ratio, benchmark selection, portfolio risk

JEL Classification: G11, G18, G20, G23

[1] Corresponding/presenting author: School of Management, University of Bath, Bath BA2 7AY, UK, phone: +01225 384354; email: a.zalewska@bath.ac.uk

"Wealth Manager 1: Last year was easy for us wealth managers...

Wealth Manager 2: Yes. Equities looked risky so we put our clients' money on deposit in the bank meaning we got paid fees for doing nothing ….. but since then stock markets have powered ahead and interest rates on bank accounts have dwindled to almost zero, ….. so this year we're back to actively investing our clients' funds. One's got to bear in mind that cash in the bank now earns so little that once you factor in inflation the returns on it are negative…

Wealth Manager 1: Indeed, which makes it a handy benchmark to compare our investment performance against; One we can easily be seen to beat…"

Transcript from Alex Cartoon

The Daily Telegraph, Business Section, May 1, 2013

1. Introduction

The above transcript is taken from a daily U.K. cartoon, Alex, which basis its humour on portraying the selfish and cynical attitudes of fund managers in the City of London. The absence of the cartoon characters in the above quote diminishes somewhat the humour of the cartoon, but it still depicts the important issues investors depositing their savings with wealth management companies face, i.e., how is performance measured and are their savings really performing? These questions are particularly important for pension investments given that the reforms undertaken by numerous governments to induce personal responsibility of individuals for old-age provision, combined with the steady move of the pension industry towards an asset-backed structure and defied contribution nature of the pension investments make ordinary investors vulnerable to low income at retirement.

Sadly for contributors the existing evidence on pension funds' performance does not look particularly optimistic. Numerous studies document that pension funds do not perform well (e.g., Ippolito and Turner, 1987; Lakonishok et al., 1992; Thomas and Tonks, 2001; Blake et al., 2002), and that pension fund managers have poor investment skills (e.g., Coggin et al., 1993; Blake et al. 1999). This evidence places pension funds and their managers in a rather unfavourable light, as they seem to perform worse than mutual funds and their managers (e.g., Henriksson, 1984; Coggin et al., 1993; Daniel et al., 1997; Bollen and Busse, 2005; Cuthbertson et al., 2008). Is it however fair to compare the short-term performance of pension funds against that of mutual funds? Campbell and Viceira (2002) make a clear argument that long-term strategies may not

be characterised by short-term gains. This paper builds upon this argument and takes another look at the pension fund performance using a sample of 8,255 personal pension funds operating in the UK between 1980 and 2009. It makes a first step towards documenting differences in compounded and annual average returns of pension funds across a wide range of investment styles, and pension fund ability to outperform T-bills and prospectus benchmarks.

The creation and transformation of the non-state pension industry has been a focal point for many countries around the world for the last few decades. The U.K. is no exception, even though the British non-state pension industry is one of the oldest and biggest in the world. Indeed, in the U.K., occupational pension provision has a longer history than state pension. Individual cases of an early form of occupational pensions have been recorded in the 13th and 14th centuries, although the first funded occupational pension was set up in 1743 to provide for widows of the Church of Scotland ministers. By the 19th century individual companies (e.g., East India Company) had started to introduce occupational pension schemes for their employees. Personal pension plans are a more modern phenomenon. They were set up by the 1986 Social Security Act and became available from July 1988. In 2001 the Welfare Reform and Pensions Act 1999 introduced stakeholder pension schemes.

In spite of the well rooted history of non-state pension provision, the occupational and the personal pension industries seem to be in distress. Participation rates have been in decline and according to the Office for National Statistics (2012) occupational pension funds had only 8.3 million and personal pension schemes had only 6 million active members in 2010.[2] This might be a temporary decline, but this also might be an indication of a deeper issue, i.e., the sensitivity of potential contributors to risks passed onto them by the defined contributions (DC). The fact that it is contributors who bear the consequences of potential bad performance by pension funds (the last few years seem to be particularly bad for the pension industry) may contribute to many individuals restraining from joining DC pension schemes.

Indeed, the pension industry has rather bad press both in the U.K. and abroad. Its performance has not been particularly impressive over the last few years[3] but research based on longer samples also shows that pension funds are not making money (e.g.,

[2] Office for National Statistics, Pension Trends, Chapter 6: Private Pensions, 2012 Edition.
[3] "US pension insurer warns of rising deficit" by Norma Cohen, Financial Times, January 30, 2013; "Pension schemes hit record £332bn deficit" by Norma Cohen, June 12, 2012.

Thomas and Tonks, 2001; Blake et al., 2002; Coggin et al. 2003; Antolin, 2008; Hinz et al., 2010). In the light of this, it is interesting to ask whether the performance is really that bad.

Previous research on pension fund performance is split between papers using asset pricing based models as the method of valuation (e.g., Ippolito and Turner, 1987; Lakonishok et al., 1992; Brown et al., 1997; Blake et al., 1999; Thomas and Tonks, 2001; Blake et al., 2002), and those using the Sharpe ratio and related measures (e.g., Antolin, 2008; Hinz et al., 2010). Asset pricing based valuations explicitly assume that there are good proxies for the market portfolio against which funds are assessed. Sharpe ratio based valuations are typically used in cross-country comparisons as the standard deviations of returns are potentially more informative than beta related measures. Both approaches have their shortcomings.

A commonly discussed problem with asset pricing based valuation is the lack of a unique market portfolio (e.g., Jensen et al., 1972; Modigliani and Pogue, 1974; Blume and Friend, 1975; Roll, 1977; Roll and Ross, 1994; Ferson et al., 1999). In the case of pension funds, however, there is an additional obstacle - traditional market indexes may not be appropriate proxies for the market portfolios because pension funds' portfolios contain assets that are not included in these indexes. For instance, using a FTSE index to assess the performance of all UK pension funds may not be very informative for the whole industry because only about 20% of UK personal pension funds specialise in domestic equities, and even these UK-equity funds can invest up to 20% of their assets outside the London Stock Exchange and still be classified as UK Equity funds. Consequently, using an asset price based valuation with the FTSE as a proxy for the market portfolio is not suitable for the vast majority of funds. There is also another issue that has been commonly overlooked in the literature – in the case of pension funds it is the long-term performance, rather than average monthly, quarterly or even annual performance that matters. Asset price based models are based on arithmetic averages, and as such do not provide a correct tool to assess compounded returns.

It is not easy to address these shortcomings, but the Sharpe ratio (Roy, 1952; Sharpe 1966) seems a good candidate for a portfolio measure in spite of its own numerical issues (e.g., Lo, 2002). It definitively avoids the above mentioned problems and provides a tool that allows comparison of a broad range of investment styles (e.g., Antolin, 2008, Hinz et al, 2010).

In this paper we assess the performance of personal pension funds operating in the UK in the period 1980-2009. We analyse 8,255 funds grouped in 30 investment sectors according to a classification of the Association of British Insurers (ABI). To provide a deep and informative analysis of the performance of the UK personal pension fund industry we apply Sharpe ratios and the related Modigliani-Modigliani (M^2) measures (Modigliani and Modigliani, 1997). Using M^2 gives extra depth to the analysis. Although there are no credible proxies for the market portfolio for each fund or a group of funds, there is information about individual funds' prospectus benchmarks. Primary Prospectus Benchmarks (PPBs) cannot act as the market portfolios, but they offer an opportunity to assess pension funds' performance in relation to an objective, relevant, and exogenously (from the researcher's perspective) chosen benchmark used to advertise individual funds, in communication with existing contributors and to assess pension fund managers.[4] Based on available information we collected data for 369 different benchmarks. As far as we are aware, this is the first study that utilises prospectus benchmarks to assess pension fund performance and addresses the question of how challenging these benchmarks are.

Another novelty of this research is the distinction between compounded and annual returns used to assess performance. In the case of mutual funds, and other investments with easy exit, there is no immediate need to account for long-term returns. However, the situation is different when it comes to pension funds. Here the distinction between the short-term performance and the long-term performance is vital. This distinction may be further enhanced by a potential conflict of interest between fund managers (high short-term returns for the purpose of periodical reviews) and contributors (long-term savings). In this study the analysis of 'short-term' performance is based on a panel of annual observations, and of the 'long-term' performance on a cross-section of annualised compounded returns.[5]

We argue that if fund managers are focused on delivering good short-term performance (we use annual frequency), differences between performance based on annual and compounded returns may be observed. In particular, we conjecture that,

[4] The importance of using the right benchmark has been long debated in the literature (e.g., Lakonishok et al., 1992; Blake et al., 1999; Dor and Jagannathan 2005; Chan et al., 2009). Prospectus benchmarks have also been used by Sensoy (2009) in a study of mutual funds' performance.

[5] We write short-term and long-term in inverted commas, because some funds in our sample operate for a short period only. To simplify notation in the rest of the paper we refer to the performance based on annual averages as 'short-term' and on compounded returns as 'long-term'.

given that the PPBs are benchmarks of the funds' choice and funds can invest outside their PPBs, it is likely that some statistical evidence that pension funds outperform their PPBs can be found. We also argue that if a desire to outperform the PPBs ties pension funds' short-term risk-return characteristics to those of the PPBs, then pension funds may not be able to statistically outperform low volatility portfolios (e.g., T-Bills) on an annual basis. In particular, this could be expected if the PPBs are 'easy' benchmarks, i.e., they are characterised by high risk but not particularly high returns. This would also explain the weak performance of pension funds documented in the previous research based on average short-term returns. However, the situation might look different when compounded returns are used to assess performance over the funds' operational life. Given that the last two years of the sample (i.e., 2008-2009) were particularly difficult for investors and that many funds were created during that period, we perform the analysis (i) using all the available data, i.e., the whole period 1980-2009, (ii) after the exclusion of the years of the financial crisis, i.e., using the period of 1980-2007, and (iii) over the crisis period of 2008-2009 alone.

As predicted we find that funds outperform their PPBs. We show that PPBs are not challenging benchmarks because they perform poorly in comparison with T-bills in the long-run. They also have unsatisfactory poor performance on an annual basis. We argue that the pension funds outperform their PPBs because the funds invest in assets not included in their PPBs which gives an opportunity to better diversify risk.

Even though pension funds outperform the PPBs they are not so uniformly good at outperforming T-bills and earning risk adjusted returns (measured by the Sharpe ratio) when annual average returns are used. Indeed, only funds specialising in emerging markets equities have statistically positive Sharpe ratios. This result is preserved when the analysis is restricted to 1980-2007. Using the compounded returns gives a more optimistic picture. Here, funds of all investment styles save for those specialising in UK equity have statistically significantly positive excess returns and Sharpe ratios. These results are largely confirmed when the financial crisis period is excluded from the analysis. The biggest difference is detected for the UK equity funds, who this time outperform T-bills and have statistically significant Sharpe ratios, and fixed income funds, who on average perform worse than T-bills in nominal and risk adjusted terms.

The analysis of the period of the financial crisis, i.e., 2008-2009, confirms big differences between the performance based on the annual returns and on the

compounded returns. None of the performance measures based on annual returns are statistically different from zero, while the vast majority of the performance measures based on the compounded returns are statistically significantly different from zero at 1%. There are, however, strong differences across the performance measures, investment styles, and cohorts. Interestingly, it seems that the UK-equity funds perform worse.

These results have important implications for future research, pension contributors and policy design. The paper opens a new and fresh look at the pension industry, and, in particular, on the complexity of the assessment of performance and choice of benchmarks. It also offers the first rigorous assessment of the performance of the personal pension industry. It assesses the performance of a broad range of investment styles, including fixed income investments, which are commonly included in pension saving portfolios, and fast growing overseas equity investments. The research documents the importance of benchmark choice and its potentially misleading role in achieving good long-term performance. It brings to the fore the question of greater scrutiny of the process of opening new pension funds and monitoring their subsequent performance evaluation.

The rest of the paper is structured as follows. Section 2 summarises the literature and formulates hypotheses for the empirical analysis. Section 3 describes the dataset. Section 4 provides basic descriptive statistics of risk – return characteristics of the pension funds, PPBs and T-bills. Section 5 presents and discusses the results of the regression analysis. It defines and discusses funds' performance measures and presents the results of the cross-section and of the panel analyses. Section 6 concludes and outlines a few directions for future research.

2. Literature review and hypotheses

Pension fund performance seems to be more widely discussed in practitioners' circles than among academics. Understandably, practitioners, both regulators and funds themselves, are very interested in assessing how the industry evolves, develops and performs. On one hand such assessment is crucial in evaluating the existing regulatory regimes and investment practices to inform on directions and scale of future reforms. On

the other hand, fund managers' remuneration and, potentially career, may hinge on how funds perform and how the industry develops. All this is particularly stimulated by the fast paced process of the industry becoming asset-backed.

The academic world seems more focused on assessing performance of the mutual fund industry than of the pension fund industry. Being less regulated than the pension fund industry, the mutual fund industry offers rich material to assess the investment skills of fund managers (e.g. Henriksson, 1984; Coggin et al., 1993; Daniel et al., 1997; Bollen and Busse, 2005; Cuthbertson et al., 2008), test for potential departures from the EMH (Brown and Goetzmann, 1995; Carhart, 1997; Blake and Timmermann, 1998; Davis J.L., 2001; Bollen and Busse, 2005; Cuthbertson et al., 2008), and examine practices of wooing investors (Cooper et al., 2005; Massa, 2003; Sensoy, 2009).

These dynamics and ease with which individual investors may terminate investment or switch between mutual funds, if unhappy with their performance, seem to make the research on mutual funds' capital flows and investment strategies appealing. In contrast, pension funds may seem less vibrant as (due to restrictions imposed by providers on contributors) there is little movement between funds and providers, providers are more regulated, etc. In addition, empirical evidence consistently shows that pension funds' performance is rather poor (e.g., Ippolito and Turner, 1987; Lakonishok et al., 1992; Ambachtsheer et al., 1998; Blake et al., 1999 and Blake et al.; 2002), and pension funds' managers are not particularly skilled (Coggin et al., 1993; Blake et al., 1999; Thomas and Tonks, 2001).

It is interesting, however, that all the assessment of the pension industry is conducted using the same statistical and econometric methods that are used for assessing mutual fund performance. This is surprising because, as Campbell and Viceira (2002) point out, even within the risk-return framework of Markowitz long-term and short-term optimal portfolios do not have to be the same. Consequently, short-term performance of long-term optimal portfolios may be quite unflattering, even if their long-term performance is good.

Therefore, to give pension funds fair assessment and pension fund investors informative appraisal of the value of their contributions it is important to assess pension funds' performance over the long horizon. This, however, does not mean that annual performance of pension funds' investments is irrelevant, e.g., pension fund managers are subject to frequent reviews, which may potentially result in a conflict of interest between

short-term oriented managers and long-term oriented contributors. Therefore, assessing short-term performance may shed some lights on our understanding whether pension managers' investment practices benefit them, contributors or both. In other words, evaluation of both the long-term and the short-term performance is important. Hence, statistical techniques which allow for such valuations and a meaningful comparison are needed.

Asset pricing methods are not suitable for assessing long-term performance as they operate on arithmetic (average) and not geometric returns. Moreover, a high proportion of pension funds are multi-asset class investments. While it is common to focus on mutual funds investing in domestic equities, restricting an analysis to pension funds only investing in domestic equities would be a strong limitation and, indeed, a mistake. This is because 'pure' equity pension investments are rare. For instance, the U.K.'s NEST programme promotes portfolios that combine fixed income security investments with higher risk asset classes as a default option which is set universally with expectations that individuals will hardly ever change them themselves, but the proportions of portfolios' invested in fixed income securities will be 'automatically' modified with age of contributors.[6] In addition, even if contributors deliberately choose to invest in equity funds only, it does not mean that 100% of contributors' monies will be invested in equity. According to the ABI classification of investment styles funds are classified as equity if at least 80% of their AUM are allocated in equity. In other words, an equity fund can have up to 20% of their assets allocated outside the main ABI classification asset class.

Given that CAPM-like techniques of performance assessment are not suitable for the pension industry alternative measures are required if one wishes to obtain a full and comprehensive picture of its performance. The Sharpe ratio, and related to it the M^2 measure, are natural candidates. However, M^2 requires a 'reference point' against which the performance is to be assessed.

When issuing prospectuses to attract contributors the UK pension funds specify the, so called, Primary Prospectus Benchmark (PPB), which is subsequently used as a reference point when reporting their performance. Although PPBs cannot act as the market portfolios, they offer an opportunity to assess pension funds' performance in

[6] For very young contributors assets are invested mostly in money market instruments so that a pool gets accumulated, then they go over to a growth portfolio that invests more in equity, and as the contributor gets close to the retirement age the allocation shifts once more to less risky assets.

relation to an objective, relevant, and exogenously (from the researcher's perspective) chosen benchmark.

Given, that PPBs are used in short-term portfolio evaluations, it can be expected that funds will have a strong incentive to outperform them.[7] Preferably, the outperformance would be achieved by high investment skills, e.g., good selection, timing, etc. However, the past research suggests that this may not necessarily be the case (e.g., Henriksson, 1984; Coggin et al., 1993; Daniel et al., 1997; Bollen and Busse, 2005; Cuthbertson et al., 2008). Therefore, if managers have any say in what they wish their fund performance to be compared against, they may choose an 'easy' benchmark. If this is the case, the outperformance of the benchmarks could be achieved by: (i) constructing portfolios more risky than their PPBs and/or (ii) diversification using assets external to the PPBs.

Without detailed information about portfolio allocation it is impossible to test which of the above possibilities is true, however a comparison of the pension fund performance against the T-bills could potentially shed some light on the issue. If the PPBs are challenging, then pension funds' performance measured against the T-bills should be better than when measured against the PPBs in the long-run, i.e., when the compounded returns are used in the performance analysis. The short-term performance, i.e., based on annual returns, may not be informative. This is because if pension funds are focused on outperforming their PPBs in the short-run, and their risk is at least as big as that of their PPBs, the differences between the returns on funds and on the T-bills may have high volatility. Consequently, obtaining statistical significance for these differences may be hard, or even impossible in the short-run. In other words, it is the long-term, not short-term, performance analysis that can inform whether the PPBs are tough or easy benchmarks.

3. Data

We have collected data for 10,086 funds operated by 63 providers from the UK Life and Pension database by Morningstar Direct™ which include the fund's inception date,

[7] At this point we do not discuss whether pension funds outperform benchmarks because they choose successful strategies to beat PPBs or whether the choice of PPBs is endogenous to a chosen investment strategy.

provider, classification of its investment sector according to the ABI, and monthly returns from January 1980 till December 2009.[8]

The ABI classification defines over 30 different sectors. To simplify the analysis we group these ABI sectors into six investment styles: allocation (ALC), fixed income (FI), emerging markets equity (EM-E), international equity (I-E), UK equity (UK-E), and other (Other). Funds are classified as ALC if they invest in a mix of asset classes (e.g., 60% in equity of any category and 40% in FI). Other category is created out of the following ABI sectors: commodity/energy, money market, global property, UK property, specialist, and protected/guaranteed funds. These sectors are put together because there are relatively few funds in each of these categories (all together they form only 8.6% of the sample), and to focus our attention on the main investment styles. Details of the grouping are provided in Appendix 1. It should be mentioned at this point, that the ABI sector classification is based on the, so-called, primary investment focus. For example, a fund classified as I-E may still invest up to 20% of its assets outside its primary classification group i.e., I-E funds can invest in the UK-E, FI, EM-E, etc.

Table 1 Panel A shows how many funds and fund-year observations there are for each of the six investment styles with the EM-E, I-E, and UK-E grouped together in a category called 'Equity'. It is clear that the Equity funds are by far the largest group accounting for about half of the sample. Within this category the I-E and UK-E are most numerous accounting for 28.4% and 19.9% of funds respectively.

********** insert Table 1 here **********

To provide a better feel of the sample, Figure 1 shows the numbers of funds in each of the six investment styles (with EM-E, I-E and UK-E combined into Equity) that opened in the period 1980-2009. The statistics for the first 20 years, i.e., the period of 1980-1999 are presented on a five-year basis, i.e., up to 2000 each bar represents the total number of funds opened in each five-year window. The statistics of the last ten years, i.e., 2000-2009 are annual. Figure 1 shows a strong increase in the number of new

[8] According to Morningstar information less than 5% of funds are missing at any given time so this database covers almost the entire personal pensions market.

funds offered to the public after 2000. It also shows that the Equity funds are most numerous. In spite of the sharp decline of stock markets in 2008, many funds started to operate during this and the following year. In particular, 918 new Equity funds started to operate in 2008. This is the highest number of funds opened in a single year in the whole history of the personal pension industry in the UK. Given that the financial crisis (high stock market fluctuations, decline in economic growth, etc.) extended beyond 2008, and the sample ends in 2009, we treat these last two years with some caution. The effects of 2008-09 may be more pronounced in our dataset than other stock market and economic turbulences because the high proportion of funds opened during and immediately before the crisis started. Therefore, in addition to the whole sample of funds operating in the period 1980-2009 we consider a sub-sample of funds that opened in the period 2008-2009 and a sample of funds that opened in the period 1980-2007. The 2008-2009 sample consists of 1959 funds of which 962 are the Equity funds (this is before matching with PPBs).

********** insert Figure 1 here **********

The sharp increase in the numbers of offered funds after 2000 is not associated with an increase in the numbers of providers. At the end of 2009 there were 63 pension providers in the personal pensions market which is a moderate increase from 58 in 2000. Almost half of these institutions started offering personal pension funds in the 1980s and by the early 1990s 45 out of the 63 were already active.

In addition to information about the characteristics of the funds we have also collected information on the Primary Prospectus Benchmark (PPB) for individual funds. Having the information about the PPBs is essential for evaluation of performance and understanding the informative power of the PPBs.

This however comes at a price. Out of the 10,086 funds that report monthly returns only 8,255 have information for at least six months which we take as a minimum amount of observations to assess performance. Table 1 Panel B shows the numbers of funds and observations for this sample. We refer to it as the 'PPB-Unrestricted' sample to contrast it with the 'PPB-Restricted' sample, summarised in Table 1 Panel C. The

PPB-Restricted sample consists of funds, for which complete information about the PPB was available, i.e., it consists of funds for which we were able to reconstruct the PPB, and collect monthly prices to calculate relevant statistics. All PPB price information has been collected from DataStream. Out of 515 different benchmarks appearing in the PPB-Unrestricted sample we were able to reconstruct and calculate monthly performance for 369 benchmarks.[9] This reduced the sample to 4,531 funds with (unbalanced) monthly returns in the 1980-2009 period. The representation of each investment style is very similar between the basic sample (Panel A), and the PPB-Unrestricted sample (Panel B). However, the PPB-Restricted sample (Panel C) has a greater proportion of Equity funds, and a reduced proportion of ALC and Other styles. Table 1 panels D and E show the statistics for the 2008-2009 sample.

In addition, we have also collected from DataStream a monthly time series of UK T-bills for the period 1980-2009. We use the T-bills as a proxy for the risk free return.

4. Risk – return characteristics

The first issue is how to measure multi-period fund returns. This supposedly trivial question has been long debated since both using arithmetic and geometric (compounded) returns have merits as well as short-comings.

From a contributor's perspective it is important how much money has been earned over the period of contribution, especially since pension funds, in contrast with other common forms of investment, make earlier withdrawals costly.[10] Given the reinvested nature of the pension investments the compounded returns seem most suitable. However, because the operational lives of the pension funds included in the sample differ significantly (some funds operate for over 20 years, some for two years only), the total compounded return cannot be compared across funds. Therefore, the 'long-term' returns are calculated as the annualised geometric mean of monthly returns, and are

[9] Among 515 benchmarks 389 were individual market indexes and 126 were composite benchmarks. Most commonly we could not reconstruct benchmarks because the weights of composite indexes were not provided, and/or their names were not recognised by DataStream.

[10] Blake (2003) claims that if a personal scheme was terminated after only one year, a contributor might lose as much as 90% of his/her contributions.

referred to as annualised compounded returns (ACRs). The annualised standard deviation of the monthly returns is used as a measure of risk.

Unlike contributors, fund managers may be more interested in short-term performance given that their performance and remuneration are typically reviewed on a short-term basis. To account for it we also calculate yearly returns (YRs) as compounded monthly returns over each calendar year. If a fund operated for less than six months in a given calendar year (i.e., opened in a period July-December), these first few months are not included into the analysis. First year returns of funds opened between January-June are annualised. The focus is on yearly (not quarterly) returns, because annual reports carry more weight than quarterly reports, to avoid further annualisation, and to minimise issues with time-series properties in the panel analysis.[11] Risk of the YRs is calculated as the standard deviation of monthly returns in the corresponding calendar year.

Table 2 summarises the basic statistics of ACRs and YRs for the pension funds, their PPBs, and the T-bills for the PPB-Restricted sample over the periods 1980-2009, 1980-2007, 2008-2009, and when only those funds created in the 2008-2009 period are taken into account.

********** insert Table 2 here **********

These simple statistics show that on average pension funds' YRs are over 2% higher than the YRs of their PPBs in every period and sample considered. At the same time on average the YRs of the PPBs tend to be lower than YRs of the T-bills. The ACRs' statistics also show that the pension funds on average earn higher returns than their PPBs, but the PPBs do not consistently outperform T-bills.

In more detail, in the 1980-2009 period the difference between the funds' average YRs and the average T-bills' YRs was only 0.39%, and this is before risk (much higher for the funds than for the T-bills) is accounted for. Slightly better results are obtained

[11] There are strong time-series properties (e.g., long memory) in the higher frequency data (e.g., monthly, and even quarterly) which raised a question on stationarity. We use yearly data, and consequently, a yearly panel. This gives first order autocorrelation in the residuals i.e. we have effectively "shortened" the memory effect.

when the two years of the financial crisis are excluded from the analysis. Here funds outperform the T-bills by 3% in ACRs and 2.38% in YRs. These differences are also statistically significantly different from zero at 1%. However, the returns of the PPBs are not particularly impressive. Although, the PPBs' ACRs are 6.15% in comparison with 5.33% of the T-bills (the difference is statistically significant at 1%), their YRs are only 0.07% higher than the YRs of the T-bills.

To assess the performance during the 2008-2009 period the sample is further split up into funds that were in operation before the crisis started (i.e., in years 1980-2007) and funds that were created in the years 2008-2009. Here once more, the weak performance of funds, and, in particular, of their PPBs is observed for funds opened before 2008. A contrasting picture emerges for funds created during the crisis: here both the funds and their PPBs comfortably outperform the T-bills. This is also the only time when the funds are less risky on average than their PPBs.

To further understand the risk – return characteristics of the sample, Figure 2 shows the ACRs versus their corresponding standard deviations for the funds and their PPBs, separated for individual investment styles for the four combinations of the samples and the periods as presented in Table 2.[12]

********** insert Figure 2 here **********

The separation into the investment styles shows that the statistics reported in Table 2 are not driven by any particular style. With an exception of the 1980-2007 period it is common for funds of all the investment styles to have the higher average return than their PPBs but very similar risk, i.e., the diamonds indicting the location of the funds' averages are practically vertically above, and occasionally to the left of, the dots of the PPBs' averages.[13] The crisis period is no exception. Whether the funds are created

[12] We do not present the corresponding YRs graphs to save space. They are twin-similar to the presented ones.

[13] T-tests for the hypothesis that the population of the standard deviations of the funds and of their PPBs have the same mean could not be rejected for the entire sample and for all ABI investment styles but the FI and the I-E funds. However, although the I-E and the FI funds were statistically significantly more risky than their PPBs, the differences themselves were very small: σ(I-E) = 103.28% while $\sigma(PPB_{I\text{-}E})$ = 101.78%, and σ(FI) = 37.52% while $\sigma(PPB_{FI})$ = 34.66%.

before 2008 or during and after 2008 has an impact on their average returns and risk (the younger funds are on average less risky and more profitable than the old ones), but not on their relative position against their benchmarks. This means that judging with a naked eye, funds may statistically outperform their benchmarks in absolute and relative terms, i.e., fund managers beat the 'market' at a quite comfortable margin.

In contrast, the exclusion of the 2008-2009 period shows a more familiar picture, that is the funds earn, on average, higher returns but they also risk more (except for the FI funds). To gain further insight into the performance of the funds we now compare various performance measures.

5. Performance measures

The performance of pension funds, as with any other funds, is always relative to some benchmark. However, what the appropriate benchmark should be is not always easy to answer. It is common in the literature to measure funds' returns in relation to returns on a leading stock market index (Lakonishok et al., 1992) or construct benchmarks using indexes for asset classes included in the portfolios (Blake et al, 1999). The first method is not appropriate for funds investing outside the domestic equity market. The second method requires detailed information about asset classes included in the portfolios, and additional testing to ensure that those constructed benchmarks satisfy the requirements of the market portfolio (they are at least efficient) if to be used in a CAPM-like setting. None of these approaches is suitable for our data, first because funds investing in other asset classes than UK-listed equity constitute a high proportion of funds under consideration, second, no information about asset classes is available, and third, the interest is in compounded returns.

The first benchmark we use is a T-bill rate. Short-term interest rates are not risk free for long-term investments because of uncertainty of reinvestment rates, but truly long-term investment rates are not available to 'ordinary' individual UK investors. Average retirement savings last about 40 years, with a further 20 years of cashing them through retirement, yet the supply of 40 years' bonds to individual investors is practically close to zero. Moreover, unlike in many countries in Continental Europe it is very rare for British individual investors to purchase government bonds. Therefore, although not

totally risk-free, we compare pension fund performance with 'rolling-over' investments in UK T-bills. More precisely, the first measure is the excess return over the T-bill, hereafter denoted as R-Tbill. This measure, does not control for risk of any type, and therefore can be criticised for its simplicity. However, given that many investors may not understand the importance of risk adjustment and it is 'bare' returns that they appreciate, we include this measure in the analysis.

The second measure is the difference between the fund return and that of its PPB, hereafter denoted as R-PPB. This measure is not risk adjusted either, but provides a relevant comparison with the benchmark of the fund's choice for comparison in performance reports.

The third measure is the M^2 introduced by Modigliani and Modigliani (1997). It adjusts the fund's return to the benchmark's risk. Although the M^2 is not without criticism (Goetzmann et al., 2007) it serves well as the direct risk-adjusted comparison of the fund performance against the performance of its PPB.

The last measure is the Sharpe ratio, denoted later as SR, which has widespread applications in fund industries (Goetzmann et al., 2007; Eling, 2008; Antolin, 2008, Hinzetal et al, 2010) and directly adjusts funds' returns for their volatility and the risk-free rate (here proxied by the T-bills). Given that T-bills are not totally risk free we also defined the Sharpe ratio using standard deviation of R-Tbills rather than of R (e.g., Lo, 2002). The results are practically identical which is consistent with the fact that the volatility of the annual fund returns is much higher than the annual volatility of the T-bills. We do not present these results, but they can be obtained from the authors on request. The distributions of the M^2 and the two Sharpe ratios have been 0.5% winsorized at both tails (Wilcox, 2005) in order to deal with outliers for observations where the denominator was close to zero.

We start the analysis from a series of simple regressions, i.e., for each of the six investment styles each of the four performance measures is run against a constant.[14] Table 3A Panels A and B show the results for the ACRs (cross-section regressions) and Panels C and D show the results for the YRs (panel regressions) over the 1980-2009

[14] All the cross-section regressions presented in the paper are clustered by provider to control for heteroscedasticity and the Hoechle method (Hoechle, 2007), which calculates Driscoll-Kraay standard errors (Driscoll and Kraay, 1998) for unbalanced panels, is used in the fixed-effects panel regressions to control for heteroscedasticity, autocorrelation, and spatial correlation.

period. The results shown in Panels A and C are based on the PPB-Restricted sample, and Panels B and D show the results using the PPB-Unrestricted sample. Each panel shows the results for all the funds pooled together (ALL), and then for each investment style separately.

********** insert Table 3 here **********

First, it is clear that whether the PPB-Unrestricted or the PPB-Restricted samples are used the results are very similar when all the funds are pooled together (ALL), and when the sub-samples of the individual investment styles are analysed. The only exception is the Other category for which the statistically significant outperformance of R-Tbills and of SR disappears once the PPB-Unrestricted sample is used for the ACRs. They also have statistically significantly lower SR when the YRs are used. However, given that this group is a mix of very different kinds of funds, it is hard to interpret these results.

Interestingly, there are substantial differences between the estimates obtained for the ACRs and for the YRs. When the fund performance is measured by the YRs, on average funds outperform their PPBs, i.e., R-PPB and M^2 are positive and statistically significantly different from zero at 1%. The only exception is the EM-E funds for which there is some evidence that they have statistically significantly positive SR (10% and 5% for the PPB-Restricted and the PPB-Unrestricted samples respectively), and outperform T-bills at 10% in the PPB-Unrestricted sample. In contrast, the ACR regressions show that all investment styles, but UK-E, outperform both their PPBs and T-bills. The UK-E funds are the only investment style which does not outperform T-bills in nominal and risk adjusted terms.

It is important to notice that the coefficients estimated for R-PPB and for M^2 are practically identical in magnitude within each ABI investment style. This confirms the earlier observations (Figure 2) that the funds lie vertically above their PPBs on the risk – return "Cartesian" plane.

The lack of outperformance reported for the YR regressions for the R-Tbill and SR seems to be driven by the size of the estimated standard errors and not by the size of the coefficients. All the estimated coefficients are positive and similar to those estimated in

the ACR regressions. To focus our attention let us concentrate on the estimates of the R-Tbill coefficients for the ALL funds sample. The coefficients estimated for the YR and for the ACR regressions are 2.691 and 2.206 respectively, yet the first coefficient is not statistically significant and the other one is 1% significant. Clearly the difference is in the size of the standard errors. The lack of significance of the average annual R-Tbills is driven by their high volatility, and given that the T-bill returns are quite similar across years, it is the volatility of the average returns, R, that results in the large standard errors and lack of significance. At the compounded returns level, however, the volatility of R declines. The effect of compounding is strong enough to bring statistical significance to the estimated coefficient.

These results suggest that, in contrast with previous research, we find evidence of outperformance. This is, however, in the long run. The size of these returns differs significantly across the investment styles, but on average it is about 2.2% above T-bills and their PPBs, which is still better than annual fees.[15] There are two issues, however, that seem potentially controversial, one is the poor performance of the funds specialising in UK equity, and the second one is the consistent outperformance of PPBs. We discuss them in turn.

5.1. UK Equity Funds

To some extent the poor performance of the UK-E funds in comparison with the potentially more diversified equity portfolios such as I-E and EM-E could be expected. However, it seems a bit puzzling that the UK-E funds cannot outperform T-bills. One could suspect that the meltdown of the London Stock Exchange at the end of the sample period could contribute to this weak performance. To test whether this is the case we repeat regressions dropping the last two years of observations, i.e., the performance of funds is measured over 1980-2007. Table 3B shows the results (the format of Table 3A is preserved). The general pattern of statistical significance is preserved, i.e., with an exception of the EM-E funds, the YR coefficients are positive and statistically significant for R-PPB and M^2, and the coefficients estimated for R-Tbill and SR are not statistically significant but those for EM-E. The ACR regressions' coefficients are

[15] Typical fees are in order of 1%-1.8%.

statistically significant (with a few exceptions, and occasional significance dropping to 10%) for all four performance measures.

The major difference is in the size and sign of the estimated coefficients, and the significance of the coefficients estimated for T-bill and SR for the UK-E funds on the compounded basis. When the 2008-2009 period is excluded from the estimations, the UK-E funds outperform T-bills by 2.848% per annum. This is still less than the outperformance of the I-E funds and the EM-E funds that on average outperform T-bills by 4.338% and 26.69% respectively. The EM-E funds also have SR over four times the size of the SR estimates for the I-E and the UK-E funds.

Given that the 2008-2009 period is so detrimental for the overall performance the regressions are repeated for that period only. To make the comparison of the performance across the periods meaningful the regressions are first run on the sample of funds used for the regressions presented in Table 3B, i.e., funds opened in the period 1980-2007, and then for the remaining funds, i.e., funds opened during the financial crisis 2008-2009. The results are presented in Tables 3C and 3D respectively.

Now the differences between the YR and the ACR regressions are even more pronounced. The outperformance of the PPBs observed previously for the YR regressions has disappeared. The statistical significance observed for the ACR regressions is preserved, although several of the estimated coefficients become negative when the funds created before the current financial crisis are focused on.[16] In particular, these negative coefficients are obtained for all the R-Tbill and SR regressions for all the investment styles but FI. Interestingly, although funds beat their PPBs, they fail to earn the T-bills' rate of return. The UK-E funds stick out again. Those created prior to 2008 (Table 3C) have the highest underperformance of T-bills (-8.7% per annum), and those created during the crisis (Table 3D) also struggle to outperform T-bills (R-Tbill is statistically significantly different from zero at 10%, and SR is the lowest among all the investment styles). The UK-E are also the only investment style which failed to outperform their PPBs.

This evidence indicates that, funds specialising in UK equity may have been the least attractive form of long term investment.

[16] The better performance in years 2008-2009 of funds created in the 2008-2009 period than funds created prior to 2008 is driven by the fact that many of these funds were created when the London Stock Exchange and other major international markets were bouncing back in 2009, and therefore these 'young' funds have not suffered from huge loses of the late 2007- 2008.

5.2. The PPBs

The presented evidence seems to suggest that pension funds are good at outperforming their PPBs. Whether the average annual or compounded returns are analysed the pension funds of every investment style earn statistically higher returns their their benchmarks do. How is it possible? Is it a sign of violation of market efficiency? Before we discuss potential explanation of how it may be happening that pension funds outperform their PPBs, we look at the performance of the PPBs. Are these benchmarks challenging? Do they promise the contributors some positive returns if pension funds simply mimic their allocation?

Table 4 shows results of regressions similar to those presented in Table 3 but this time the returns on the PPBs are used to calculate the ACR and the YR. More specifically, Table 4 shows the results of regressions using the difference between returns on PPBs and on the T-bills (PPB-Tbills), and the Sharpe Ratios (SR) calculated for the PPBs as the dependent variables. The performance of the PPBs is assessed over the whole period under the consideration, i.e., 1980-2009, and for the sub-periods 1980-2007 and 2008-2009. The 2008-2009 period is not divided into young and old benchmarks because all the PPBs have been constructed based on indexes that existed before 2008.

********** insert Table 4 here **********

The results of Table 4 are quite surprising. One could expect that if funds have any say on what benchmarks they choose, they would pick up easy ones, but having benchmarks that practically do not perform better than T-bills does not seem fair on contributors. The only benchmarks that systematically outperform T-bills are those chosen by funds investing in emerging markets equity. Their performance measures based on ACRs are statistically positive over the whole period and when the years of the financial crisis are excluded. Also the benchmarks of the funds investing in international equities statistically significantly outperform T-bills in 1980-2007, but the statistical

underperformance during 2008-2009 results in statistically insignificant performance over the whole period under consideration.

As argued the performance of funds should be assessed using compounded returns, not the annual averages. The same applies to the PPBs. Therefore, the lack of statistical significance reported in Table 4 Panel B can be expected given that the PPBs are typically more risky than T-bills. However, the statistically significant underperformance of the fixed income benchmarks is concerning. The fixed income benchmarks can be expected to have low risk, and among all the investment styles to be closest to T-bills in their risk-return characteristics. Yet, they statistically significantly underperform. All this evidence suggests that the PPBs can hardly be classified as challenging. Yet, the question remains, how is it possible that the pension funds systematically outperform them?

In Section 2 we proposed that the pension funds may successfully outperform their PPBs because they are more risky than PPBs and/or invest in assets not included in their PPBs. Figure 2 shows average standard deviations and average ACRs for ALL funds and each of the investment styles, and their corresponding PPBs. It is apparent that the differences between the average risk of the funds and of the PPBs are very small in the 1980-2009 period, i.e., the diamonds indicating the location of the funds averages are practically vertically above, and often to the left of, the dots of the PPBs' averages.[17] This, however, seems to be driven by the years of the financial crisis (Panels C and D), because the exclusion of the two years of the financial crisis (Panel B) shows a more 'diagonal' position of the funds in relation to their PPBs (the funds have on average higher return than their benchmarks, but their risk exposure is also larger).

So what has happened during 2008-2009 that the relative risk of the funds decreased but the level of benchmark outperformance has been maintained? There seem to be two possible explanations: (i) funds became better in diversifying within asset classes defined by their PPBs, and/or (ii) the risk diversification is achieved by investing in assets external to the PPBs.

[17] T-tests for the hypothesis that the population of the standard deviations of the funds and of their PPBs have the same mean could not be rejected for the entire sample and for all ABI investment styles but the FI and the IE funds. However, although the IE and the FE funds were statistically significantly more risky than their PPBs, the differences themselves were very small: $\sigma(IE) = 103.28\%$ while $\sigma(PPB_{IE}) = 101.78$, and $\sigma(FI) = 37.52\%$ while $\sigma(PPB_{FI}) = 34.66\%$.

There is no information about individual assets allocation, asset classes or even markets the funds invest in, so it seems impossible to test which of these hypotheses, or both, are correct. However, the UK-E funds can help shed some light on investment practices that allow pension fund managers to maintain an average 2% or so outperformance of their PPBs.

The UK-E funds have to invest at least 80% of their AUM in equities listed on the LSE, and the fact that their PPBs are LSE equity indexes (about 86% of the UK-E funds are benchmarked to the FTSE ALL Share Index) suggests that the funds portray themselves as investors specialising in the LSE-traded equity. Figure 2B shows that on average, the UK-E funds were more risky than the PPBs before 2008. The average annualised standard deviation of the funds was 50.45%, while that of the PPBs was 46.25% (the difference is statistically significantly different from zero at 1%). However, during 2008-2009, the corresponding statistics for the same group of funds were 118.9% and 117.44% (not statistically different from each other). The standard deviations doubled, but the difference between them disappeared. The same phenomenon is observed for all the investment styles.

Based on this evidence we cannot categorically prove that the UK-E funds' ability to outperform the FTSE results from investing outside FTSE or not. However, one could argue that even if the FTSE does not satisfy all the theoretical assumptions of the CAPM market portfolio, it is rather unlikely that it is on average at least 2% below the efficient frontier on which the market portfolio should sit. Therefore, it is more likely that the UK-E funds invest a considerable fraction of the AUM in assets other than stocks listed on the LSE, and this diversification outside the main ABI specialisation classification allows them to formally outperform the PPB.

Whether this explanation is correct or not, the implication of funds having statistically insignificantly different risk from the FTSE but earning higher returns is that having the FTSE as the proxy for the market portfolio while assessing fund performance using a CAPM-based approach is inappropriate.

5.3. Robustness Tests

To complete the analysis we test whether providers' characteristics explain some of the observed outperformance, i.e., whether within each investment style providers are relatively homogeneous. The Morningstar Direct^{TM} database provides information on who is the provider of each fund. Using this information we constructed the following provider characteristics on a monthly basis: size, share in each ABI sector, and degree of specialisation in each ABI sector.

The providers' size (denoted later by Size) denotes the number (in 100's) of funds the provider operates (across all the ABI investment sectors) at the end of the calendar year for panel data regressions and as the average of the end of year statistics for the cross-section regressions.[18] For every provider we also calculate their share in each individual ABI sector, Share-in-ABI, as the ratio of the number of funds within this ABI sector operated by the provider to the total number of funds within this ABI sector operating in the market. The degree of specialisation, ABI-share, of each provider in any of the ABI sectors is calculated as the ratio of the number of funds within this ABI sector to the number of all funds that the provider operates at the end of a previous calendar year in the panel, and the average of yearly statistics in the cross-section.

The previous calendar year statistics (i.e., a first lag) of the Size, Share-in-ABI and ABI-share variables in the panel regressions are adopted to side-step a potential problem that funds' performance over a given period of time may be related to the absolute and relative size, and/or specialisation of the provider.

Tables 5 and Table 6 show the regression results for each investment style using performance measures based on the ACRs and the YRs respectively. Each Table consists of two panels, Panel A shows the results for the whole period of 1980-2009 and Panel B for the 1980-2007 period.

Controlling for providers' characteristics makes a few constants statistically insignificant in the ACRs regressions meaning that the outperformance we observed is not uniform. Interestingly, it is more common for funds of all the investment styles to outperform their PPBs than the T-bills. Indeed, out of the six investment styles it is only EM-E that have positive and statistically significant constants for R-Tbill and SR. This

[18] We have also calculated the log of the size, but given that the results for the log and the 'linear' size were practically identical, but the fit was greater for the linear specification, we focus on the 'linear' size.

result is preserved when the shorter time period is used in the analysis, i.e., financial crisis is excluded, (Panel B). It is not however entirely clear what provider characteristics are associated with good performance. The key controls switch sign depending on whether the performance is measured over 1980-2009 or over 1980-2007. For instance, the results presented in Panel A suggest that bigger and more specialised providers perform better, and also more competition is beneficial. In contrast, Panel B regressions show that these results are not stable, e.g., several regressions have statistically significantly negative coefficients for Size, but positive for Share-in-ABI.

********** insert Table 5 here **********

The regressions estimated for the annual performance measures once more confirm that size, concentration and specialisation have some explanatory power within each investment style. Again the results are very sensitive to whether the financial crisis is included in the analysis or not indicating that more research is needed to understand the link between fund providers' characteristics and performance.

********** insert Table 6 here **********

6. Summary and Conclusions

This paper provides an analysis of the performance of 8,255 personal pension funds operating in the UK in the 1980-2009 period. The study covers all ABI investment sectors, including fixed income and foreign equity, using annual returns and compounded returns. Fund performance is measured by ordinary excess returns over UK T-bills, and over Primary Prospectus Benchmarks (PPBs), as well as the Sharpe ratio and the Modigliani-Modigliani measure (M^2). Using the PPBs restricts part of the analysis to 4,531 funds for which PPBs can be fully identified, but allows measuring performance against benchmarks of the funds' choice.

The results reveal an interesting picture. In contrast with the previous research, we find that pension funds may be performing better than previously reported. We document that on average pension funds outperform their PPBs in nominal and risk adjusted terms both on an annual basis (short-term) and in the long-run (compounded returns). We also find that on average pension funds outperform T-bills (in nominal and in risk adjusted terms) in the long-run. On average, on an annual basis pension funds' compounded returns are 1.822% higher than those of T-bills with funds specialising in emerging markets equity earning as much as 14.807% above the T-bill rate. This means that if annual fees are about 1%-1.5% contributors are still left with a bit more than an investment in T-bills would deliver.

The short-term performance analysis based on annual returns shows that on average pension funds outperform their PPBs but do not outperform T-bills, except for funds specialising in emerging markets equity for which we obtain statistically positive Sharpe ratios,. This is an important result. It shows that the analysis of the performance of pension funds using average annual returns may be misleading and even unfair. This is because if in the short-run pension funds target to be at least as good as their PPBs, i.e., to some extent mimic risk-return characteristics of their assigned benchmarks, then the lack of statistical significance of the annual excess returns will result from high risk differentials between the PPBs and the T-bills. However, in the long-run, i.e., when compounded returns over the period of pension fund's operation are accounted for, these differences in risk get diluted and pension fund performance in comparison with T-bills may improve. Therefore, only a long-term performance analysis can show whether the pension funds, as long-term investors, earn positive excess returns or not.

The long-term analysis is also essential for assessing how challenging the PPBs are. Given that pension funds can diversify outside their PPBs may help them with little effort to deliver superior outperformance of their benchmarks on an annual basis. This would not be an issue itself if the long-term performance of the PPBs was good. However, if the long-term performance of the PPBs is poor, then outperforming them in the long-run may still make the pension funds look poor in comparison with T-bills. Our analysis shows that the compounded returns of the PPBs, before and after risk adjustment, do not outperform T-bills, across all investment styles but emerging market equity and, to a weaker extent, international equity. This suggests that the PPBs are not a real challenge in the long-run, as they are not in the short-run.

To test the robustness of our findings we split the sample into the pre financial crisis (1980-2007) and the financial crisis (2008-2009) periods. The results are confirmed, i.e., the pension funds are better in outperforming their PPBs than the T-bills, and it matters whether performance is assessed using annual or compounded returns.

The analysis also shows relatively poor performance of funds specialising in UK-equity. They are the only group which did not outperform T-bills in the 1980-2009 period. They also were the only investment style which did not manage to outperform their benchmarks, and had the weakest outperformance of T-bills in nominal terms among funds opened in years 2008-2009. Their average Sharpe ratio, although statistically significant at 5%, is the lowest across all investment styles.

Although this is not the main focus of the paper we also address the question of whether within each investment style pension funds are uniform in their performance, and whether some providers' characteristics can, at least partly, explain differences in performance. When controlling for provider characteristics we find, once more, that it was more common for pension funds of all investment styles to outperform their PPBs than the T-bills, but it is unclear which providers' characteristics are unambiguously linked to good performance. Although providers' size and specialisation matter, as does the level of competition, their individual impact is positive or negative depending on whether the financial crisis is included in the sample or not. This indicates that more research is needed to understand the issue.

So what are the implications of this research? First, regulators should pay greater attention to what and how performance targets are set. It seems that the current PPBs are not very challenging both in the short and the long run. Second, because pension funds report their performance relative to their PPB's annual returns and the PPBs are not challenging, insufficient attention is paid to long-term returns. Third, our results have wide implications for research on pension fund performance. We deliver convincing evidence that finding an appropriate and relevant benchmark against which the performance should be assessed may be a more difficult task than has been recognised. This is because neither traditional market indexes nor fund chosen benchmarks satisfy the criteria of the market portfolio that are necessary to provide a meaningful calculation of Jensen's alphas, and because the assessment of long-term performance (compounded returns) and not short-term annual averages should be conducted.

References

Ambachtsheer, K., R. Capelle, and T. Sheibelhut 1998. "Improving Pension Fund Performance." Financial Analysts Journal 54(6): 15-21.

Antolin, P. (2008). "Pension Fund Performance." OECD Working Papers on Insurance and Private Pensions.

Blake, D. (2003). "Pension Schemes and Pension Funds in the United Kingdom" Oxford University Press.

Blake, D., B .N. Lehmann, and A. Timmermann (1999). "Asset Allocation Dynamics and Pension Fund Performance." The Journal of Business 72(4): 429-461.

Blake, D., B. N. Lehmann, and A. Timmermann (2002). "Performance clustering and incentives in the UK pension fund industry." Journal of Asset Management 3(2): 173.

Blake, D. and A. Timmermann (1998). "Mutual Fund Performance: Evidence from the UK." European Finance Review 2(1): 57-77.

Blume, M. E. and I. Friend (1975). "The asset structure of individual portfolios and some implications for utility functions." The Journal of Finance 30(2): 585-603.

Bollen, N. P. B. and J. A. Busse (2005). "Short-Term Persistence in Mutual Fund Performance." Review of Financial Studies 18(2): 569-597.

Brown, S. J. and W. N. Goetzmann (1995). "Performance Persistence." The Journal of Finance 50(2): 679-698.

Brown, G., P. Draper, and E. McKenzie (1997). "Consistency of UK Pension Fund Investment Performance." Journal of Business Finance & Accounting 24(2): 155-178.

Campbell, J. Y. and L. M. Viceira (2002). "Strategic asset allocation: portfolio choice for long-term investors", Oxford University Press, USA.

Carhart, M. M. (1997). "On Persistence in Mutual Fund Performance." The Journal of Finance 52(1): 57-82.

Chan, L., S. Dimmock, and J. Lakonishok (2009). "Benchmarking money manager performance: Issues and evidence." Review of Financial Studies 22(11): 4553.

Coggin, T. D., F. J. Fabozzi, and S. Rahman (1993). "The Investment Performance of U.S. Equity Pension Fund Managers: An Empirical Investigation." The Journal of Finance 48(3): 1039-1055.

Cooper, M.J., Gulen, H. and Rau, P.R. (2005) "Changing names with style: mutual fund name changes and their effects on fund flows." Journal of Finance, 60(6): 2825-2858

Cuthbertson, K., D. Nitzsche, and N. O'Sullivan (2008). "UK mutual fund performance: Skill or luck?" Journal of Empirical Finance 15(4): 613-634.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers (1997). "Measuring Mutual Fund Performance with Characteristic-Based Benchmarks." The Journal of Finance 52(3): 1035-1058.

Davis, J. L. (2001). "Mutual Fund Performance and Manager Style." Financial Analysts Journal 57(1): 19-27.

Dor, A. and R. Jagannathan (2005). "Understanding mutual fund and hedge fund styles using return based style analysis." The world of hedge funds: characteristics and analysis 1(1): 63.

Driscoll, J. C. and A. C. Kraay (1998). "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data." Review of Economics and Statistics 80: 549–560.

Eling, M. (2008). "Does the Measure Matter in the Mutual Fund Industry?" Financial Analysts Journal 64(3): 54.

Ferson, W. E., S. Sarkissian, and T. Simin (1999). "The alpha factor asset pricing model: A parable." Journal of Financial Markets 2(1): 49-68.

Goetzmann, W., J. Ingersoll, and M. Spiegel (2007). "Portfolio Performance Manipulation and Manipulation-proof Performance Measures." Review of Financial Studies 20(5): 1503-1546.

Henriksson, R. D. (1984). "Market Timing and Mutual Fund Performance: An Empirical Investigation." The Journal of Business 57(1): 73-96.

Hinz, R. P., R. Heinz, and P. Antolin (2010). "Evaluating the financial performance of pension funds." Washington, D.C., World Bank Publications.

Hoechle, D. (2007). "Robust standard errors for panel regressions with cross-sectional dependence." Stata Journal 7(3): 281-312.

Ippolito, R. A. and J. A. Turner (1987). "Turnover, Fees and Pension Plan Performance." Financial Analysts Journal 43(6): 16-26.

Jensen, M. C., F. Black, and M.S. Scholes (1972). "The capital asset pricing model: Some empirical tests." Michael C. Jensen, Studies in the Theory of Capital Markets, Praeger Publishers Inc., 1972.

Lakonishok, J., A. Shleifer, R.W. Vishny, O. Hart, and G.L. Perry (1992). "The Structure and Performance of the Money Management Industry." Brookings Papers on Economic Activity. Microeconomics 1992: 339-391.

Lo, A. W. (2002). "The Statistics of Sharpe Ratios." Financial Analysts Journal 58(4): 36-52.

Massa, M. (2003). "How do family strategies affect fund performance? When performance-maximization is not the only game in town." Journal of Financial Economics 67(2): 249-304.

Modigliani, F. and G. A. Pogue (1974). "An introduction to risk and return: Concepts and evidence." Financial Analysts Journal 30(3): 69-86.

Modigliani, F. and L. Modigliani (1997). "Risk-adjusted performance." The Journal of Portfolio Management 23(2): 45-54.

Office for National Statistics (2012). Pension Trends. URL: http://www.ons.gov.uk/ons/rel/pensions/pension-trends/chapter-6--private-pensions--2012-edition-/art-pt2012ch6.html#tab-abstract [22 March 2013]

Roll, R. (1977). "A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory." Journal of Financial Economics 4(2): 129-176.

Roll, R. and S. A. Ross (1994). "On the Cross-Sectional Relation between Expected Returns and Betas." The Journal of Finance 49(1): 101-121.

Roy, A. D. (1952). "Safety First and the Holding of Assets." Econometrica 20(3): 431-449.

Sensoy, B. A. (2009). "Performance evaluation and self-designated benchmark indexes in the mutual fund industry." Journal of Financial Economics 92(1): 25-39.

Sharpe, W. F. (1966). "Mutual Fund Performance." The Journal of Business 39(1): 119-138.

Thomas, A. and I. Tonks (2001). "Equity performance of segregated pension funds in the UK." Journal of Asset Management 1(4): 321.

Wilcox, R. R. (2005). "Winsorized Robust Measures." Encyclopedia of Statistics in Behavioral Science.

World Bank (2008). "Pension Lending and Analytical Work at the World Bank: FY2002-07." Discussion Paper No. 0811, Social Protection and Labor Group

Figure 1. Number of funds opened in the period 1980-2009 per investment style.

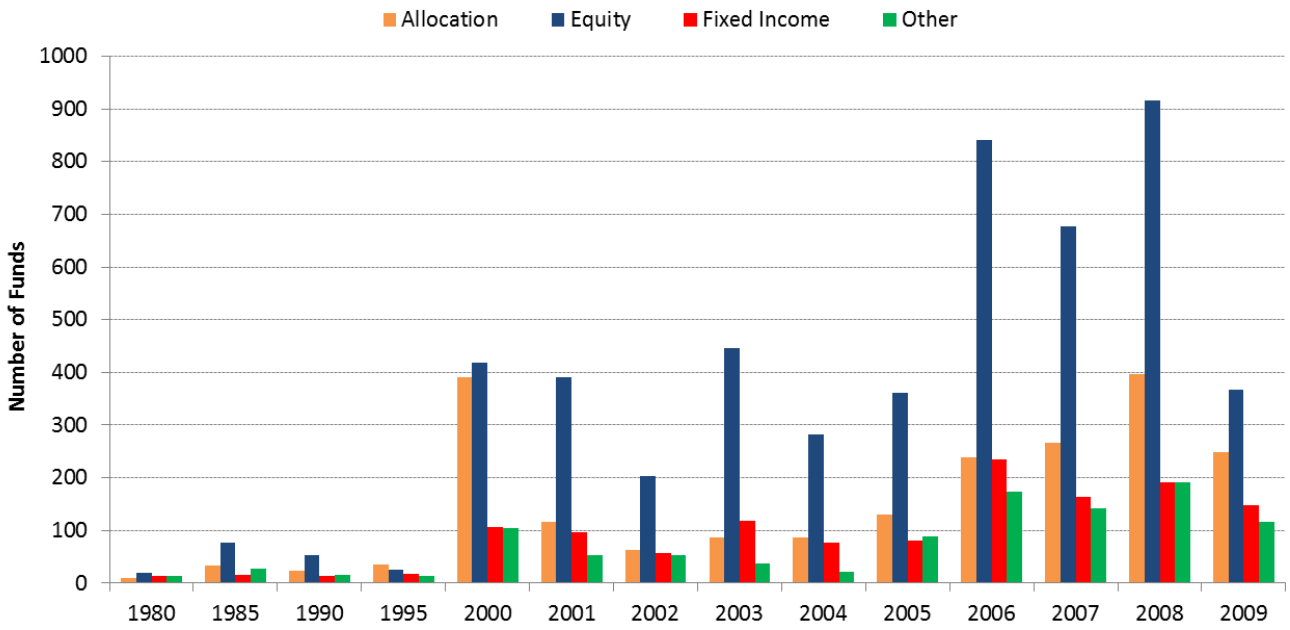
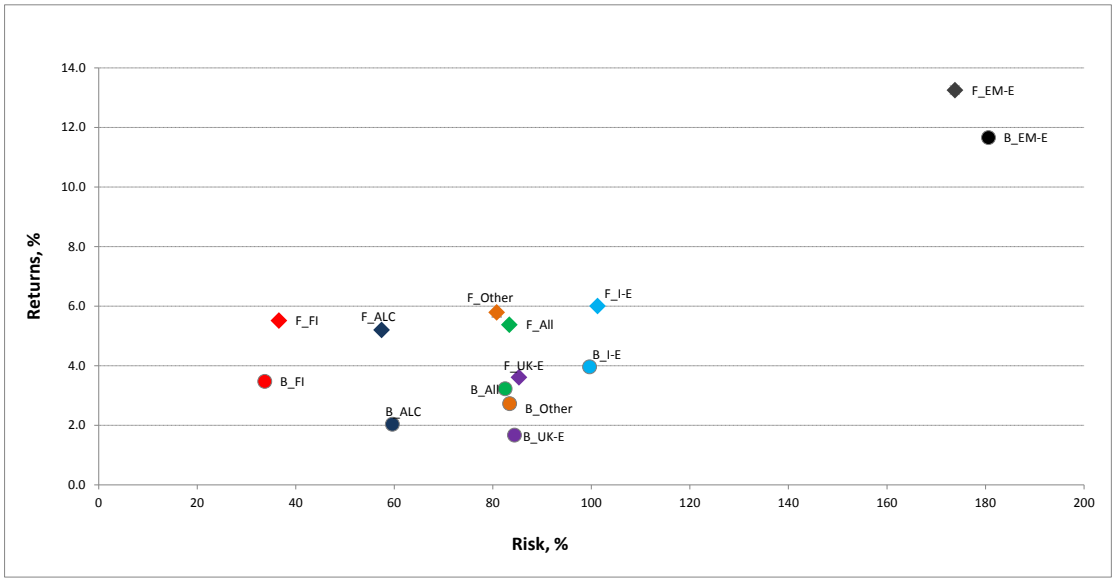
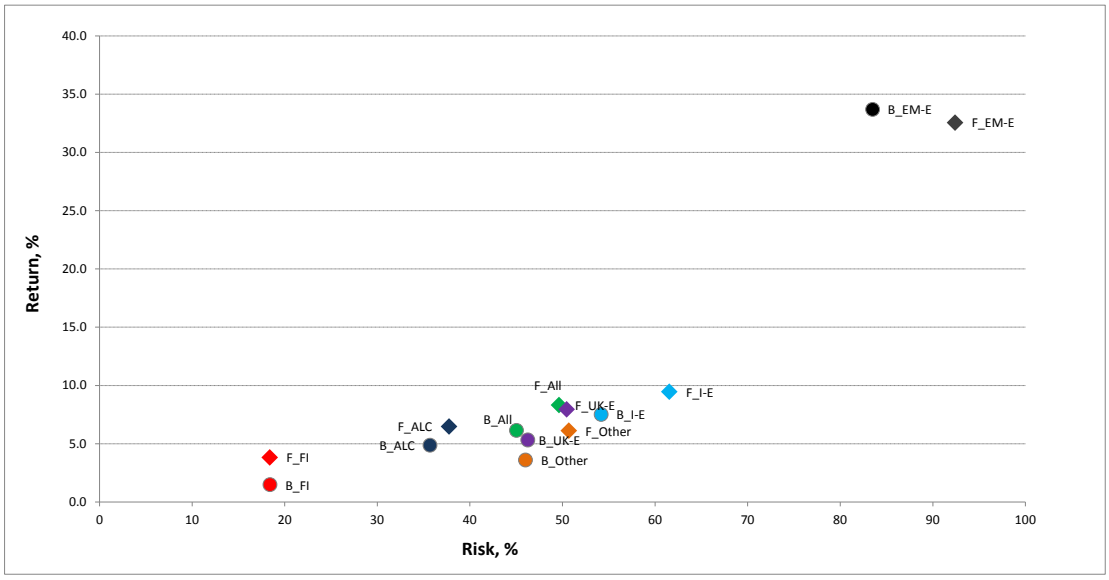


Figure 2. Average risk-return characteristics of funds (denoted by F_ and the abbreviation of the investment style name; diamond shapes) and their PPBs (denoted by B_ and the abbreviation of the investment style name; circle shapes) based on ACRs. Investment styles: ALC – allocation, FI – fixed income, EM-E – emerging markets equity, I-E – international equity, UK-E – UK equity, and Other – all other styles as defined in Appendix 1.

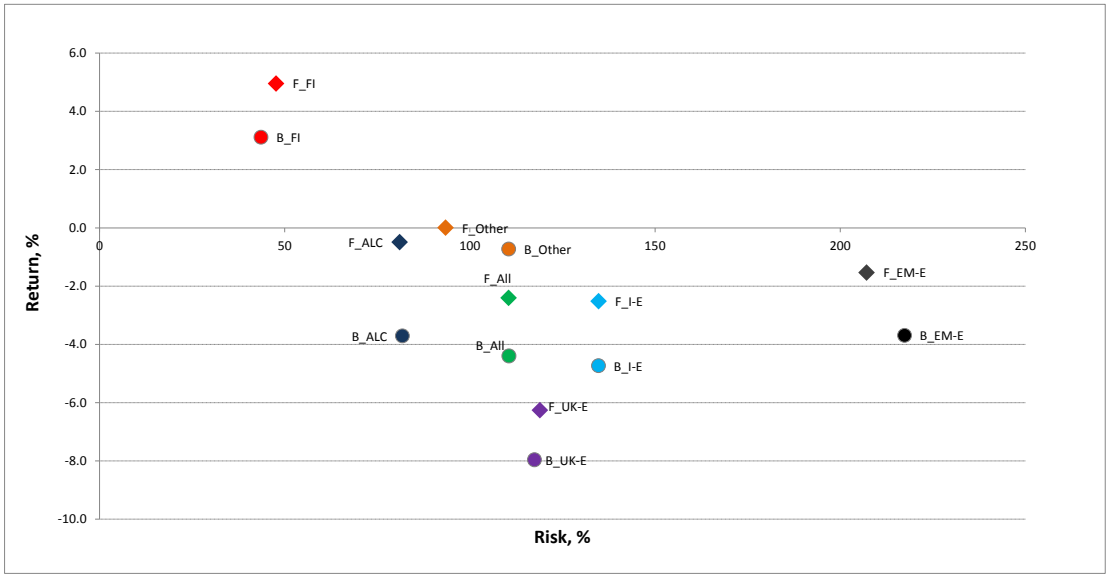
Panel A. Performance in 1980-2009



Panel B. Performance in 1980-2007



Panel C. Performance in 2008-2009 of the funds created in 1980-2007.



Panel D. Performance of the funds created in 2008-2009.

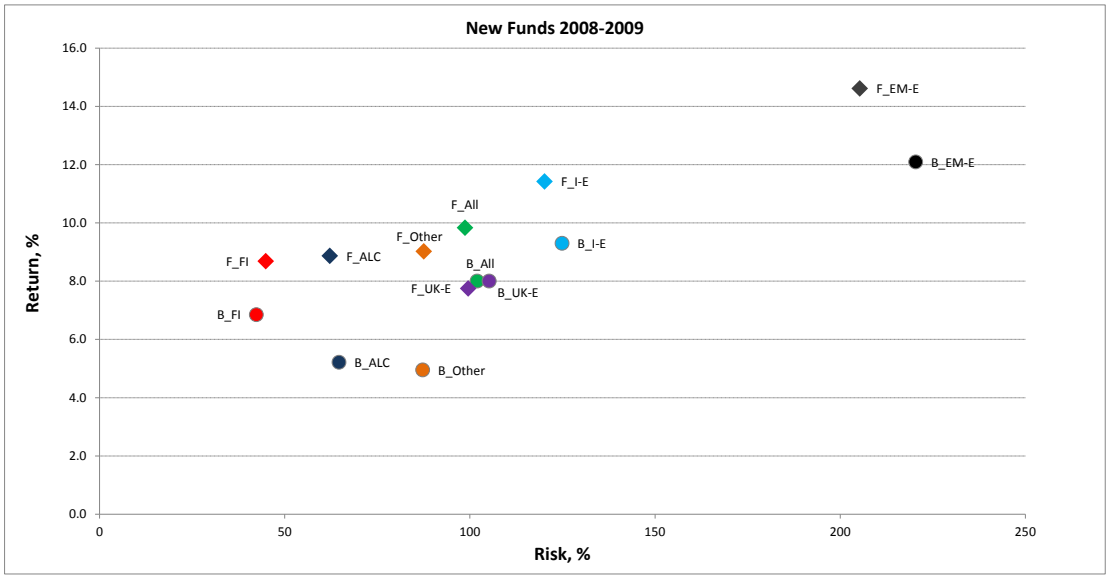


Table 1. Summary statistics for all funds (ALL) and in separation for individual investment styles (ALC-allocation; FI-fixed income; EM-E-emerging equity; I-E-international equity, UK-E - UK equity; Other-denotes all styles not included in the above styles). Panel A: shows statistics for all funds downloaded from the Morningstar Direct™. Panel B: PPB-Unrestricted sample shows the statistics for all the funds for which information on returns for at least six months was available. Panel C: PPB-restricted sample shows the statistics for all the funds for which information on their PPB returns was available.

	Panel A: Initial sample		Panel B: PPB-Unrestricted sample		Panel C: PPB-Restricted sample		Panel D: PPB-Unrestricted sample 2008-09		Panel E: PPB-Restricted sample 2008-09	
Style	Funds	Obs.	Funds	Obs.	Funds	Obs.	Funds	Obs.	Funds	Obs.
ALL of which	10086	75638	8255	58852	4531	25292	8250	15593	4530	8536
ALC	2043	15021	1643	11487	337	1814	1639	3070	337	643
FI	1427	10844	1165	8567	630	3586	1165	2202	630	1179
Equity, of which	5135	36135	4342	29626	3230	18340	4341	8277	3229	6126
EM-E	259	1056	217	880	158	590	217	388	158	286
I-E	2864	21451	2397	17608	1708	10061	2396	4566	1707	3233
UK-E	2012	13628	1728	11138	1364	7689	1728	3323	1364	2607
Other	1481	13638	1105	9172	334	1552	1105	2044	334	588
ALL of which	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
ALC	20.3%	19.9%	19.9%	19.5%	7.4%	7.2%	19.9%	19.7%	7.4%	7.5%
FI	14.1%	14.3%	14.1%	14.6%	13.9%	14.2%	14.1%	14.1%	13.9%	13.8%
Equity, of which	50.9%	47.8%	52.6%	50.3%	71.3%	72.5%	52.6%	53.1%	71.3%	71.8%
EM-E	2.6%	1.4%	2.6%	1.5%	3.5%	2.3%	2.6%	2.5%	3.5%	3.4%
I-E	28.4%	28.4%	29.0%	29.9%	37.7%	39.8%	29.0%	29.3%	37.7%	37.9%
UK-E	19.9%	18.0%	20.9%	18.9%	30.1%	30.4%	20.9%	21.3%	30.1%	30.5%
Other	14.7%	18.0%	13.4%	15.6%	7.4%	6.1%	13.4%	13.1%	7.4%	6.9%

Table 2. Summary statistics of the return and risk characteristics of pension funds' portfolios (Funds), their primary prospectus benchmarks (PPBs), and T-bills. ACR denote annualised compounded returns and YR denote yearly returns.

	Panel A: ACR					Panel B: YR				
Variable	Obs.	Mean	σ	Min	Max	Obs.	Mean	σ	Min	Max
Funds created in the 1980-2009 period; statistics for the 1980-2009 period										
Returns										
Funds	4531	5.38	9.97	-22.80	110.76	25292	5.00	24.73	-82.03	268.13
PPB	4531	3.22	10.40	-22.24	116.98	25292	2.71	22.81	-71.11	127.76
Tbill	4531	3.61	1.35	0.47	8.22	25292	4.61	2.45	0.66	18.30
Risk										
Funds	4531	83.35	27.32	0.63	486.95	25292	68.48	32.79	0.01	785.74
PPB	4531	82.54	29.51	0.06	623.00	25292	66.65	33.46	0.09	1763.56
Tbill	4531	1.85	0.63	0.03	3.94	25292	0.42	0.32	0.06	1.85
Funds created in the 1980-2009 period; statistics for the 1980-2007 period										
Returns										
Funds	3383	8.32	9.55	-32.63	76.95	16756	8.01	18.56	-59.69	268.13
PPB	3383	6.15	8.89	-36.94	89.05	16756	5.70	16.82	-71.11	127.76
Tbill	3383	5.33	0.67	4.56	8.62	16756	5.63	1.99	3.75	18.30
Risk										
Funds	3383	49.62	19.27	0.60	232.23	16756	53.66	26.54	0.01	785.74
PPB	3383	45.04	18.72	0.21	282.54	16756	50.34	26.39	0.09	1763.56
Tbill	3383	0.70	0.71	0.03	3.76	16756	0.31	0.28	0.06	1.85
Funds created in the 1980-2007 period; statistics for the 2008-2009 period										
Returns										
Funds	3383	-2.41	6.45	-31.00	20.14	6766	-2.10	32.10	-61.19	104.50
PPB	3383	-4.39	6.14	-29.62	21.28	6766	-4.13	31.13	-56.53	78.52
Tbill	3383	2.76	0.01	2.64	2.86	6766	2.76	2.08	0.66	4.90
Risk										
Funds	3383	110.45	27.89	0.01	380.41	6766	102.70	30.75	0.01	542.16
PPB	3383	110.54	30.11	2.20	437.08	6766	104.42	30.38	0.29	653.99
Tbill	3383	2.24	0.00	2.21	2.24	6766	0.65	0.30	0.35	0.96
Funds created in the 2008-2009 period; statistics for the 2008-2009 period										
Return										
Funds	1147	9.84	16.66	-18.79	110.76	1770	4.86	37.28	-82.03	110.76
PPB	1147	8.00	18.24	-21.15	116.98	1770	1.73	29.65	-57.88	78.52
Tbill	1147	1.71	0.82	0.47	2.76	1770	2.14	1.99	0.66	4.90
Risk										
Funds	1147	98.69	37.23	0.63	486.95	1770	96.75	37.19	0.01	762.45
PPB	1147	101.95	40.53	0.06	623.00	1770	99.94	35.29	0.29	653.99
Tbill	1147	1.48	0.83	0.03	2.24	1770	0.56	0.29	0.35	0.96

Table 3A. Regressions on constant of PPB-restricted (Panels A and C) and PPB-unrestricted (Panels B and D) samples. Period 1980-2009. ACR denote annualised compounded returns and YR denote yearly. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	ACR						YR					
	Panel A				Panel B		Panel C				Panel D	
	R-Tbill	R-PPB	M^2	Sharpe	R-Tbill	Sharpe	R-Tbill	R-PPB	M^2	Sharpe	R-Tbill	Sharpe
ALL	2.206***	2.225***	2.665***	0.523***	1.822***	0.496***	2.719	2.691***	3.299***	0.711	2.116	0.110
	(0.005)	(0.000)	(0.000)	(0.002)	(0.005)	(0.004)	(0.548)	(0.000)	(0.000)	(0.426)	(0.549)	(0.889)
Funds	4531	4531	4531	4531	8255	8255	4531	4531	4531	4531	8255	8255
Obs.							25292	25292	25292	25292	58852	58852
ALC	1.745*	3.164***	3.662***	0.666**	1.946***	0.890***	1.975	3.083***	3.882***	1.072	1.672	0.884
	(0.051)	(0.000)	(0.000)	(0.027)	(0.005)	(0.002)	(0.669)	(0.000)	(0.001)	(0.380)	(0.634)	(0.367)
Funds	337	337	337	337	1643	1643	337	337	337	337	1643	1643
Obs.							1814	1814	1814	1814	11487	11487
FI	2.011***	2.104***	2.741***	0.894***	2.118***	0.933***	1.290	3.480***	3.546***	0.251	1.258	0.374
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.447)	(0.002)	(0.000)	(0.759)	(0.442)	(0.622)
Funds	630	630	630	630	1165	1165	630	630	630	630	1165	1165
Obs.							3586	3586	3586	3586	8567	8567
EM-E	11.098***	1.577**	2.769***	1.395***	14.807***	1.777***	17.832	1.872***	4.457**	2.635*	17.746*	2.642**
	(0.000)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)	(0.118)	(0.007)	(0.045)	(0.057)	(0.084)	(0.040)
Funds	158	158	158	158	217	217	158	158	158	158	217	217
Obs.							590	590	590	590	880	880
I-E	2.818***	2.056***	2.537***	0.488***	2.490***	0.435***	2.866	2.360***	2.918***	0.707	2.799	0.716
	(0.002)	(0.000)	(0.000)	(0.005)	(0.001)	(0.002)	(0.503)	(0.000)	(0.002)	(0.314)	(0.475)	(0.288)
Funds	1708	1708	1708	1708	2397	2397	1708	1708	1708	1708	2397	2397
Obs.							10061	10061	10061	10061	17608	17608
UK-E	0.393	2.068***	2.301***	0.192	0.112	0.131	2.353	2.813***	3.583***	1.034	2.362	1.012
	(0.647)	(0.000)	(0.000)	(0.285)	(0.889)	(0.423)	(0.709)	(0.000)	(0.000)	(0.432)	(0.682)	(0.406)
Funds	1364	1364	1364	1364	1728	1728	1364	1364	1364	1364	1728	1728
Obs.							7689	7689	7689	7689	11138	11138
Other	3.107***	3.314***	3.610***	0.798***	-0.001	-0.098	2.013	2.265**	2.667	-0.957	0.363	-3.607***
	(0.004)	(0.000)	(0.000)	(0.006)	(0.999)	(0.819)	(0.585)	(0.035)	(0.118)	(0.249)	(0.862)	(0.000)
Funds	334	334	334	334	1105	1105	334	334	334	334	1105	1105
Obs.							1552	1552	1552	1552	9172	9172

Table 3B. Regressions on constant of PPB-restricted (Panels A and C) and PPB-unrestricted (Panels B and D) samples. Period 1980-2007. ACR denote annualised compounded returns and YR denote yearly. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	ACR						YR					
	Panel A				Panel B		Panel C				Panel D	
	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR
ALL	3.247***	2.145***	1.848***	0.635***	2.221***	0.301*	3.637	2.502***	2.067***	0.893	2.696	0.109
	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.073)	(0.200)	(0.000)	(0.000)	(0.207)	(0.264)	(0.856)
Funds	3383	3383	3383	3383	6291	6291	3383	3383	3383	3383	6291	6291
Obs.							16756	16756	16756	16756	43259	43259
ALC	1.310*	1.595***	1.517***	0.358	1.354***	0.450**	2.801	2.603***	2.208***	1.252	2.343	1.036
	(0.061)	(0.001)	(0.000)	(0.245)	(0.001)	(0.012)	(0.412)	(0.000)	(0.001)	(0.218)	(0.389)	(0.196)
Funds	263	263	263	263	1179	1179	263	263	263	263	1179	1179
Obs.							1171	1171	1171	1171	8417	8417
FI	-1.476***	2.366***	2.300***	-1.280***	-1.068***	-0.983***	-0.147	3.581***	3.431***	-0.255	0.188	0.046
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.869)	(0.000)	(0.000)	(0.725)	(0.842)	(0.947)
Funds	465	465	465	465	913	913	465	465	465	465	913	913
Obs.							2407	2407	2407	2407	6365	6365
EM-E	26.690***	-0.746	-2.579*	4.425***	27.730***	4.369***	19.778***	1.653***	0.644	3.250***	18.193***	2.853***
	(0.000)	(0.464)	(0.051)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.239)	(0.000)	(0.000)	(0.000)
Funds	91	91	91	91	125	125	91	91	91	91	125	125
Obs.							304	304	304	304	492	492
I-E	4.338***	1.925***	1.642***	0.969***	3.692***	0.879***	4.193	1.894***	1.285***	0.951	3.813	0.902
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.234)	(0.000)	(0.000)	(0.152)	(0.272)	(0.174)
Funds	1286	1286	1286	1286	1862	1862	1286	1286	1286	1286	1862	1862
Obs.							6828	6828	6828	6828	13042	13042
UK-E	2.848***	2.599***	2.258***	0.963***	2.556***	0.860***	4.313	3.046***	2.522***	1.682	4.121	1.550
	(0.002)	(0.000)	(0.000)	(0.001)	(0.004)	(0.002)	(0.218)	(0.000)	(0.000)	(0.102)	(0.231)	(0.113)
Funds	1076	1076	1076	1076	1392	1392	1076	1076	1076	1076	1392	1392
Obs.							5082	5082	5082	5082	7815	7815
Other	1.251	2.636***	2.357***	-0.181	-0.666	-1.363***	1.499	1.396***	2.081***	-1.984***	0.676	-4.148***
	(0.217)	(0.000)	(0.000)	(0.598)	(0.197)	(0.000)	(0.350)	(0.004)	(0.003)	(0.001)	(0.557)	(0.000)
Funds	202	202	202	202	820	820	202	202	202	202	820	820
Obs.							964	964	964	964	7128	7128

Table 3C. Regressions on constant of PPB-restricted (Panels A and C) and PPB-unrestricted (Panels B and D) samples of funds created in the 1980-2007 period. The performance is measured over the 2008-2009 period. ACR denote annualised compounded returns and YR denote yearly. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	ACR						YR					
	Panel A				Panel B		Panel C				Panel D	
	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR
ALL	-4.864***	2.238***	2.372***	-0.681***	-4.667***	-0.770***	-0.842	2.774	5.028	-0.010	-1.104	-0.323
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.956)	(0.202)	(0.143)	(0.997)	(0.937)	(0.905)
Funds	3384	3384	3384	3384	6296	6296	3383	3383	3383	3383	6291	6291
Obs.							6766	6766	6766	6766	12592	12592
ALC	-3.107***	3.468***	3.587***	-0.560***	-4.392***	-0.840***	-0.454	3.875	6.383	0.467	-1.759	-0.124
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.973)	(0.134)	(0.119)	(0.878)	(0.897)	(0.968)
Funds	263	263	263	263	1183	1183	263	263	263	263	1179	1179
Obs.							526	526	526	526	2366	2366
FI	2.262***	1.927***	2.641***	0.744***	1.927***	0.627***	3.638	2.897	3.001	0.869	3.555	0.891
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.473)	(0.491)	(0.377)	(0.603)	(0.562)	(0.638)
Funds	465	465	465	465	913	913	465	465	465	465	913	913
Obs.							930	930	930	930	1826	1826
EM-E	-3.856***	2.381***	2.852***	-0.314***	-3.283***	-0.280***	10.238	2.738*	8.170	1.529	10.603	1.709
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.764)	(0.098)	(0.189)	(0.717)	(0.756)	(0.691)
Funds	91	91	91	91	125	125	91	91	91	91	125	125
Obs.							182	182	182	182	250	250
I-E	-5.042***	2.412***	2.492***	-0.713***	-5.014***	-0.714***	-1.767	2.762	5.309	-0.109	-1.728	-0.109
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.903)	(0.282)	(0.203)	(0.958)	(0.906)	(0.959)
Funds	1287	1287	1287	1287	1863	1863	1286	1286	1286	1286	1862	1862
Obs.							2572	2572	2572	2572	3726	3726
UK-E	-8.694***	2.000***	2.029***	-1.352***	-8.842***	-1.368***	-2.915	2.379	5.541*	-0.467	-3.089	-0.474
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.886)	(0.127)	(0.065)	(0.890)	(0.879)	(0.889)
Funds	1076	1076	1076	1076	1392	1392	1076	1076	1076	1076	1392	1392
Obs.							2152	2152	2152	2152	2784	2784
Other	-2.464***	1.447	1.017	-0.506	-4.741***	-1.411***	0.288	3.256	1.989	-0.276	-2.343	-2.500
	(0.004)	(0.311)	(0.482)	(0.115)	(0.000)	(0.000)	(0.980)	(0.314)	(0.687)	(0.909)	(0.810)	(0.487)
Funds	202	202	202	202	820	820	202	202	202	202	820	820
Obs.							404	404	404	404	1640	1640

Table 3D. Regressions on constant of PPB-restricted (Panels A and C) and PPB-unrestricted (Panels B and D) samples of funds created in the 2008-2009 period. ACR denote annualised compounded returns and YR denote yearly. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	ACR						YR					
	Panel A				Panel B		Panel C				Panel D	
	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	SR
ALL	9.327***	2.033**	3.333***	2.207***	9.127***	2.429***	7.650	4.163	8.349*	1.754	7.264	1.943
	(0.001)	(0.029)	(0.000)	(0.000)	(0.000)	(0.000)	(0.560)	(0.219)	(0.098)	(0.448)	(0.562)	(0.441)
Funds	1147	1147	1147	1147	1959	1959	1147	1147	1147	1147	1959	1959
Obs.							1770	1770	1770	1770	3001	3001
ALC	7.768***	3.629***	5.643***	2.995***	8.169***	3.097***	4.625	4.325	9.389	2.469	5.181	2.455
	(0.005)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.690)	(0.271)	(0.139)	(0.445)	(0.627)	(0.443)
Funds	74	74	74	74	460	460	74	74	74	74	460	460
Obs.							117	117	117	117	704	704
FI	7.377***	2.005**	3.400***	3.137***	9.213***	3.829***	6.408	4.675	6.689	2.656	8.231	3.430
	(0.000)	(0.038)	(0.008)	(0.000)	(0.000)	(0.000)	(0.339)	(0.387)	(0.204)	(0.268)	(0.351)	(0.250)
Funds	165	165	165	165	252	252	165	165	165	165	252	252
Obs.							249	249	249	249	376	376
EM-E	15.105***	2.530**	4.936***	1.808***	22.656***	2.617***	25.432	0.993	9.106	3.040	29.092	3.576
	(0.004)	(0.030)	(0.000)	(0.009)	(0.000)	(0.002)	(0.429)	(0.760)	(0.242)	(0.432)	(0.368)	(0.363)
Funds	67	67	67	67	92	92	67	67	67	67	92	92
Obs.							104	104	104	104	138	138
I-E	11.064***	2.214*	3.618***	1.984***	10.820***	1.932***	7.187	5.618	10.481*	1.500	7.137	1.491
	(0.001)	(0.055)	(0.001)	(0.001)	(0.001)	(0.001)	(0.549)	(0.154)	(0.079)	(0.423)	(0.561)	(0.440)
Funds	421	421	421	421	534	534	421	421	421	421	534	534
Obs.							661	661	661	661	840	840
UK-E	7.367*	0.219	1.429	1.739**	6.779*	1.620**	5.378	2.258	6.176*	0.876	5.001	0.889
	(0.058)	(0.898)	(0.292)	(0.026)	(0.082)	(0.039)	(0.724)	(0.113)	(0.089)	(0.710)	(0.749)	(0.720)
Funds	288	288	288	288	336	336	288	288	288	288	336	336
Obs.							455	455	455	455	539	539
Other	8.447***	4.299***	4.386***	2.538***	5.827***	1.934***	8.488	4.643	7.222	2.438	5.821	1.459
	(0.000)	(0.001)	(0.001)	(0.000)	(0.008)	(0.004)	(0.483)	(0.393)	(0.285)	(0.322)	(0.551)	(0.442)
Funds	132	132	132	132	285	285	132	132	132	132	285	285
Obs.							184	184	184	184	404	404

Table 4. Regressions on constant of PPB-T-bills and Sharpe ratios. ACR denote annualised compounded returns and YR denote yearly. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	Panel A: ACR						Panel B: YR					
	1980-2009		1980-2007		2008-2009		1980-2009		1980-2007		2008-2009	
	PPB-Tbill	SR	PPB--Tbill	SR	PPB--Tbill	SR	PPB-Tbill	SR	PPB--Tbill	SR	PPB--Tbill	SR
ALL	0.164	0.066	1.124**	0.041	-3.128***	-0.272	0.158	0.131	1.171	0.370	-1.829	-0.338
	(0.854)	(0.704)	(0.043)	(0.821)	(0.002)	(0.117)	(0.968)	(0.863)	(0.655)	(0.563)	(0.886)	(0.867)
Funds	4531	4531	3383	3383	4530	4530	4531	4531	3383	3383	4530	4530
Obs.							25292	25292	16756	16756	8536	8536
ALC	-1.308*	0.158	-0.280	0.039	-3.926***	-0.313	-0.898	0.199	0.352	0.436	-3.175	-0.232
	(0.088)	(0.637)	(0.492)	(0.858)	(0.000)	(0.288)	(0.820)	(0.832)	(0.911)	(0.591)	(0.784)	(0.921)
Funds	337	337	263	263	337	337	337	337	263	263	337	337
Obs.							1814	1814	1171	1171	643	643
FI	0.115	-0.369*	-3.680***	-2.868***	1.889***	0.377**	-1.800*	-1.662**	-3.475***	-2.503***	1.620	0.053
	(0.840)	(0.076)	(0.000)	(0.000)	(0.007)	(0.041)	(0.088)	(0.026)	(0.000)	(0.000)	(0.154)	(0.911)
Funds	630	630	465	465	630	630	630	630	465	465	630	630
Obs.							3586	3586	2407	2407	1179	1179
EM-E	9.637***	1.094***	27.971***	4.957***	1.954	0.222	14.993	2.062*	17.792***	3.021***	12.017	1.043
	(0.000)	(0.000)	(0.000)	(0.000)	(0.469)	(0.409)	(0.160)	(0.083)	(0.000)	(0.000)	(0.690)	(0.751)
Funds	158	158	91	91	158	158	158	158	91	91	158	158
Obs.							590	590	304	304	286	286
I-E	0.820	0.077	2.361***	0.510***	-3.241***	-0.406**	0.404	0.206	2.229	0.611	-3.450	-0.650
	(0.427)	(0.660)	(0.000)	(0.002)	(0.004)	(0.021)	(0.916)	(0.748)	(0.487)	(0.331)	(0.774)	(0.700)
Funds	1708	1708	1286	1286	1707	1707	1708	1708	1286	1286	1707	1707
Obs.							10061	10061	6828	6828	3233	3233
UK-E	-1.369	-0.241	0.253	0.292	-6.465***	-0.931***	-0.206	0.253	1.290	0.888	-3.120	-0.984
	(0.278)	(0.296)	(0.715)	(0.233)	(0.000)	(0.001)	(0.973)	(0.844)	(0.689)	(0.360)	(0.872)	(0.770)
Funds	1364	1364	1076	1076	1364	1364	1364	1364	1076	1076	1364	1364
Obs.							7689	7689	5082	5082	2607	2607
Other	0.167	1.501***	-1.318	0.196	0.021	1.691***	0.486	2.365***	0.397	2.180***	0.631	2.668
	(0.836)	(0.000)	(0.158)	(0.522)	(0.979)	(0.000)	(0.841)	(0.000)	(0.786)	(0.000)	(0.930)	(0.112)
Funds	334	334	202	202	334	334	334	334	202	202	334	334
Obs.							1552	1552	964	964	588	588

Table 5A. Regressions of the PPB-restricted sample for the1980-2009 period. The performance measures are based on annualised compounded returns (ACR). ALC refers to allocation funds, FI to fixed income funds, EM-E – emerging markets funds, I-E - international funds, UK-E - UK equity funds and Others are all other investment funds not included in the previous styles. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR
	ALC				**FI**				**EM-E**			
Constant	-1.237	2.858***	1.192	-0.361	2.507*	2.973***	3.258***	1.164*	15.281**	-1.775	1.900	2.455**
	(0.541)	(0.000)	(0.110)	(0.595)	(0.086)	(0.001)	(0.000)	(0.052)	(0.039)	(0.121)	(0.242)	(0.017)
Size	1.199***	0.232**	0.815***	0.467***	0.170	-0.184	-0.085	0.059	0.072	0.652***	0.540***	-0.043
	(0.001)	(0.025)	(0.001)	(0.000)	(0.544)	(0.198)	(0.503)	(0.568)	(0.922)	(0.000)	(0.000)	(0.667)
Share-in-ABI	-0.698**	-0.186**	-0.403**	-0.296**	-0.140**	0.000	-0.012	-0.062*	0.121	-0.010	-0.058	0.025
	(0.041)	(0.030)	(0.035)	(0.010)	(0.045)	(1.000)	(0.855)	(0.063)	(0.382)	(0.775)	(0.174)	(0.165)
ABI-share	0.178**	0.042*	0.116**	0.073***	-0.028	0.008	0.002	-0.007	-1.738	-0.148	-0.502	-0.315
	(0.014)	(0.078)	(0.014)	(0.004)	(0.463)	(0.782)	(0.927)	(0.557)	(0.262)	(0.606)	(0.253)	(0.123)
R^2	0.080	0.015	0.107	0.096	0.020	0.009	0.003	0.021	0.012	0.108	0.068	0.029
F	9.648	5.150	16.430	12.359	2.536	0.702	0.171	2.839	0.460	12.882	11.965	1.072
p-value	0.000	0.008	0.000	0.000	0.076	0.558	0.915	0.055	0.713	0.000	0.000	0.384
Funds	336	336	336	336	628	628	628	628	158	158	158	158
	I-E				**UK-E**				**Other**			
Constant	1.397	1.236*	1.654***	0.098	1.882	1.755	2.097*	0.530	2.195	3.129**	4.884***	0.053
	(0.532)	(0.084)	(0.005)	(0.826)	(0.337)	(0.203)	(0.060)	(0.229)	(0.349)	(0.035)	(0.002)	(0.922)
Size	0.725**	0.198*	0.286***	0.136**	-0.294	0.030	0.048	-0.044	0.319	0.314	0.060	0.209***
	(0.016)	(0.077)	(0.005)	(0.013)	(0.137)	(0.813)	(0.652)	(0.346)	(0.248)	(0.122)	(0.720)	(0.007)
Shar- in-ABI	-0.380	0.014	-0.064	-0.079*	-0.004	0.063*	0.029	-0.011	-0.076	-0.158*	-0.134*	-0.063*
	(0.129)	(0.816)	(0.313)	(0.059)	(0.974)	(0.063)	(0.389)	(0.676)	(0.526)	(0.091)	(0.082)	(0.060)
ABI-share	0.036	-0.036	-0.018	0.032*	-0.000	-0.022	-0.019	-0.004	-0.063	-0.002	-0.062	0.026
	(0.689)	(0.230)	(0.591)	(0.097)	(0.994)	(0.575)	(0.559)	(0.725)	(0.308)	(0.962)	(0.173)	(0.195)
R^2	0.014	0.018	0.020	0.016	0.006	0.005	0.003	0.005	0.011	0.018	0.014	0.029
F	2.277	1.692	3.678	3.753	0.785	2.674	0.805	0.348	3.175	5.604	4.740	3.337
P	0.100	0.190	0.023	0.021	0.511	0.065	0.500	0.791	0.042	0.004	0.009	0.035
Funds	1708	1708	1708	1708	1364	1364	1364	1364	325	325	325	325

Table 5B. Regressions of the PPB-restricted sample for the1980-2007 period. The performance measures are based on annualised compounded returns (ACR). ALC refers to allocation funds, FI to fixed income funds, EM-E – emerging markets funds, I-E - international funds, UK-E - UK equity funds and Others are all other investment funds not included in the previous styles. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR
	ALC				**FI**				**EM-E**			
Constant	-0.429	0.741	1.224	-0.504	-0.484	3.141***	2.980***	-0.471	10.098**	3.126	4.471*	2.294***
	(0.805)	(0.535)	(0.318)	(0.506)	(0.312)	(0.000)	(0.000)	(0.231)	(0.025)	(0.106)	(0.059)	(0.009)
Size	0.026	0.049	-0.053	0.056	-0.415***	-0.365***	-0.340***	-0.352***	3.772***	-0.087	-0.570	0.603***
	(0.948)	(0.817)	(0.793)	(0.706)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.763)	(0.131)	(0.000)
Share-in-ABI	0.322	0.063	0.046	0.124	0.063**	0.074**	0.073***	0.058***	-0.651***	0.185***	0.271***	-0.109***
	(0.234)	(0.641)	(0.732)	(0.250)	(0.016)	(0.010)	(0.008)	(0.001)	(0.000)	(0.002)	(0.002)	(0.000)
ABI-share	-0.053	0.015	0.009	-0.018	-0.008	-0.028**	-0.025*	-0.009	2.519**	-1.767***	-2.386***	0.285
	(0.352)	(0.567)	(0.703)	(0.389)	(0.471)	(0.039)	(0.073)	(0.329)	(0.039)	(0.001)	(0.001)	(0.163)
R^2	0.045	0.022	0.016	0.052	0.078	0.040	0.037	0.076	0.249	0.257	0.280	0.337
F	0.931	2.730	3.166	1.001	13.939	6.158	5.970	10.382	11.868	6.877	4.983	9.611
p-value	0.442	0.068	0.045	0.411	0.000	0.002	0.003	0.000	0.000	0.003	0.012	0.001
Funds	263	263	263	263	465	465	465	465	91	91	91	91
	I-E				**UK-E**				**Other**			
Constant	0.669	0.388	1.206***	-0.645*	1.370	4.172***	4.137***	0.371	-2.261	3.422***	2.336*	-0.923
	(0.622)	(0.330)	(0.001)	(0.078)	(0.439)	(0.000)	(0.000)	(0.498)	(0.285)	(0.004)	(0.062)	(0.213)
Size	0.649**	0.216**	0.052	0.217**	0.055	-0.154*	-0.208**	0.072	0.354	-0.129	0.033	0.094
	(0.018)	(0.012)	(0.558)	(0.014)	(0.867)	(0.080)	(0.025)	(0.470)	(0.414)	(0.569)	(0.885)	(0.545)
Share-in-ABI	0.071	-0.054	-0.027	-0.022	0.201**	0.050	0.041	0.049	0.240	0.051	0.055	0.029
	(0.766)	(0.215)	(0.310)	(0.712)	(0.041)	(0.204)	(0.272)	(0.103)	(0.116)	(0.289)	(0.189)	(0.431)
ABI-share	0.099	0.151**	0.059	0.131***	-0.013	-0.110***	-0.112***	-0.003	-0.090	-0.126**	-0.108**	0.008
	(0.271)	(0.020)	(0.160)	(0.000)	(0.863)	(0.005)	(0.001)	(0.905)	(0.268)	(0.010)	(0.010)	(0.534)
R^2	0.027	0.018	0.003	0.046	0.025	0.026	0.031	0.030	0.034	0.029	0.029	0.013
F	8.307	6.262	1.042	12.056	4.666	6.620	8.350	3.015	2.151	2.663	3.089	0.647
p	0.000	0.002	0.388	0.000	0.008	0.001	0.000	0.045	0.121	0.072	0.047	0.593
Funds	1286	1286	1286	1286	1076	1076	1076	1076	199	199	199	199

Table 6A. Regressions of the PPB-restricted sample for the1980-2009 period. The performance measures are based on annual returns. ALC refers to allocation funds, FI to fixed income funds, EM-E – emerging markets funds, I-E - international funds, UK-E – UK equity funds and Others are all other investment funds not included in the previous styles. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR
	ALC				**FI**				**EM-E**			
Constant	2.378	0.707	-0.100	0.511	-5.256	-0.828	0.593	-1.192	-40.147	-3.764	-10.704**	-4.246
	(0.855)	(0.784)	(0.966)	(0.878)	(0.126)	(0.782)	(0.796)	(0.491)	(0.186)	(0.299)	(0.033)	(0.275)
Size	2.161	0.630*	1.152**	0.406	1.265*	0.562	0.414	0.312	9.736*	1.139***	2.706***	1.169*
	(0.331)	(0.072)	(0.028)	(0.458)	(0.079)	(0.292)	(0.341)	(0.335)	(0.061)	(0.002)	(0.001)	(0.060)
Share-in-ABI	-0.228	-0.296***	-0.147	-0.022	0.140*	0.038	0.028	0.058*	0.972**	0.004	0.050	0.121**
	(0.786)	(0.003)	(0.274)	(0.909)	(0.083)	(0.610)	(0.656)	(0.070)	(0.026)	(0.963)	(0.581)	(0.032)
ABI-share	-0.339	0.148	0.075	-0.035	0.141	0.424*	0.260	-0.056	-1.369	0.004	0.333	-0.207
	(0.716)	(0.261)	(0.551)	(0.867)	(0.686)	(0.095)	(0.111)	(0.693)	(0.329)	(0.986)	(0.447)	(0.207)
R^2	0.027	0.010	0.035	0.015	0.026	0.009	0.006	0.013	0.100	0.039	0.201	0.090
F	0.430	5.668	2.038	0.223	2.360	1.149	1.050	2.136	2.733	15.522	7.760	4.358
p-value	0.733	0.005	0.136	0.880	0.093	0.347	0.386	0.118	0.069	0.000	0.001	0.016
Funds	336	336	336	336	628	628	628	628	158	158	158	158
Obs.	1804	1804	1804	1804	3569	3569	3569	3569	589	589	589	589
	I-E				**UK-E**				**Other**			
Constant	-15.313	-3.086**	-2.824**	-2.179	5.366	1.799	1.508	1.838	-9.242	1.725	3.942	-0.731
	(0.141)	(0.018)	(0.043)	(0.251)	(0.385)	(0.340)	(0.421)	(0.160)	(0.299)	(0.462)	(0.285)	(0.754)
Size	1.301	0.376	0.946**	0.177	1.384	-0.343***	0.246	0.068	1.714	0.118	-0.185	-0.193
	(0.512)	(0.182)	(0.024)	(0.543)	(0.607)	(0.005)	(0.229)	(0.888)	(0.268)	(0.800)	(0.817)	(0.760)
Share-in-ABI	0.781	0.216	-0.187	0.131	0.884*	0.097	-0.085	0.210**	0.323*	0.041	-0.032	-0.021
	(0.351)	(0.187)	(0.345)	(0.312)	(0.064)	(0.170)	(0.253)	(0.023)	(0.055)	(0.417)	(0.561)	(0.449)
ABI-share	1.203	0.385**	0.504***	0.201	-1.225	0.143	0.150	-0.214	0.109	-0.042	-0.022	0.091
	(0.130)	(0.013)	(0.003)	(0.173)	(0.241)	(0.272)	(0.172)	(0.250)	(0.812)	(0.798)	(0.919)	(0.378)
R^2	0.017	0.010	0.033	0.015	0.022	0.007	0.004	0.015	0.024	0.000	0.000	0.004
F	2.356	5.874	4.909	1.953	2.284	10.565	1.033	3.021	2.603	0.498	0.189	0.531
p-value	0.095	0.003	0.008	0.146	0.101	0.000	0.393	0.046	0.074	0.687	0.903	0.665
Funds	1708	1708	1708	1708	1364	1364	1364	1364	325	325	325	325
Obs.	10025	10025	10025	10025	7642	7642	7642	7642	1528	1528	1528	1528

Table 6B. Regressions of the PPB-restricted sample for the1980-2007 period. The performance measures are based on annual returns ALC refers to allocation funds, FI to fixed income funds, EM-E – emerging markets funds, I-E - international funds, UK-E - UK equity funds and Others are all other investment funds not included in the previous styles. P-values are shown in parenthesis. ***: 1% significance; **: 5% significance and *: 10% significance.

	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR	R-Tbill	R-PPB	M^2	SR
	ALC				**FI**				**EM-E**			
Constant	23.640**	5.275**	4.573	6.388**	2.279*	4.157***	4.641***	2.246**	-5.206	2.676	2.865	-0.841
	(0.045)	(0.036)	(0.132)	(0.012)	(0.079)	(0.000)	(0.000)	(0.030)	(0.663)	(0.166)	(0.197)	(0.659)
Size	-0.125	0.127	-0.052	-0.323	-0.799***	-0.504***	-0.559***	-0.630**	6.263***	0.698***	0.084	1.016***
	(0.925)	(0.823)	(0.915)	(0.525)	(0.009)	(0.000)	(0.002)	(0.011)	(0.002)	(0.007)	(0.793)	(0.001)
Share-in-ABI	0.587	-0.255*	0.018	0.197	0.072	-0.044	-0.029	0.032	0.507	-0.120	-0.075	0.067
	(0.442)	(0.069)	(0.897)	(0.223)	(0.197)	(0.182)	(0.490)	(0.238)	(0.111)	(0.123)	(0.358)	(0.163)
ABI-share	-1.258	-0.050	-0.120	-0.298*	-0.207	0.251	0.114	-0.226**	-2.193*	-0.274*	-0.264*	-0.287**
	(0.132)	(0.609)	(0.342)	(0.083)	(0.201)	(0.174)	(0.298)	(0.012)	(0.051)	(0.060)	(0.085)	(0.024)
R^2	0.042	0.007	0.002	0.031	0.025	0.021	0.016	0.037	0.114	0.091	0.017	0.132
F	1.108	2.134	0.401	1.757	5.585	5.780	4.512	6.570	5.070	15.172	3.261	9.468
p-value	0.368	0.126	0.754	0.186	0.004	0.004	0.011	0.002	0.010	0.000	0.044	0.000
Funds	263	263	263	263	465	465	465	465	91	91	91	91
Obs.	1162	1162	1162	1162	2392	2392	2392	2392	303	303	303	303
	I-E				**UK-E**				**Other**			
Constant	-11.667	-2.591	-1.198	-1.947	1.229	0.604	1.237	1.316	2.111	2.494	6.540**	2.041
	(0.342)	(0.148)	(0.453)	(0.390)	(0.804)	(0.758)	(0.539)	(0.294)	(0.678)	(0.299)	(0.033)	(0.225)
Size	1.255	-0.054	-0.086	0.266	-0.313	-0.364	-0.361	-0.101	-0.195	-0.334	-0.984*	-1.456***
	(0.400)	(0.875)	(0.699)	(0.306)	(0.843)	(0.115)	(0.157)	(0.838)	(0.664)	(0.333)	(0.057)	(0.000)
Share-in-ABI	0.785	0.361	0.141	0.102	0.500*	0.136	0.021	0.137*	0.276	0.046	-0.017	-0.035
	(0.303)	(0.103)	(0.450)	(0.371)	(0.088)	(0.157)	(0.808)	(0.070)	(0.135)	(0.417)	(0.779)	(0.331)
ABI-share	1.040	0.320	0.254	0.213	0.036	0.215	0.186	-0.027	-0.382	-0.074	-0.145	0.068
	(0.245)	(0.102)	(0.142)	(0.217)	(0.902)	(0.142)	(0.117)	(0.737)	(0.113)	(0.601)	(0.228)	(0.420)
R^2	0.016	0.009	0.004	0.017	0.009	0.010	0.006	0.009	0.019	0.003	0.014	0.150
F	1.090	2.657	1.256	1.031	3.207	4.054	3.061	2.484	1.657	0.697	1.615	32.655
p	0.372	0.071	0.312	0.397	0.040	0.017	0.046	0.083	0.204	0.563	0.213	0.000
Funds	1286	1286	1286	1286	1076	1076	1076	1076	199	199	199	199
Obs.	6792	6792	6792	6792	5035	5035	5035	5035	953	953	953	953

Appendix 1. Classification of ABI sectors into investment style categories.

Allocation	Equity			Fixed Income	Other
	Equity UK	Emerging markets	International markets		
Balanced (up to 85% Equity) Managed	UK All Companies	Global Emerging Markets Equities	Asia Pacific excl. Japan	Global Fixed Interest	Commodity/Energy
Cautious (up to 60% Equity) Managed	UK Smaller Companies		Asia Pacific incl. Japan	Global High Yield	Money Market
Defensive (up to 35% Equity) Managed	UK Equity Income		Europe excl. UK	Sterling Corporate Bond	Protected/Guaranteed Funds
Flexible (up to 100% Equity) Managed			Europe incl. UK	Sterling Fixed Interest	Global Property
			Global Equities	Sterling High Yield	UK Direct Property
			Japan Equities	Sterling Long Bond	Specialist
			North America	Sterling Other Fixed Interest	
				UK Index-Linked Gilts	
				UK Gilt	