Saving with group or individual personal pension schemes:

How much difference does it make?

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Abstract

It is commonly argued that seeking the advice and services of wealth mangers is financially beneficial. However, the literature also suggests that wealth managers are skilled in favoring financially savvy investors by offering them lower fees. This paper looks beyond the fee differentiation issue and address the question of whether wealth managers engage in another form of investor discrimination by offering similar investors different quality investment opportunities according to whether or not an 'informed' third party is negotiating on the investor's behalf. Using a sample of 14,429 individual personal pension (IPP) funds and 1,681 group personal pension (GPP) funds offered to UK investors over 1986-2015 (adopting cross-section, time-series and propensity score analysis on a range of sub-samples and sub-periods) we show that GPP funds statistically and economically outperform IPP funds. We also document that GPPs tend to have tougher performance benchmarks and that tougher performance benchmarks are associated with better benchmark-related performance.

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1. Introduction

It is commonly argued that seeking the advice and services of wealth mangers is financially more rewarding than when individuals invest by themselves (Allen and Gale, 1999; von Gaudecker, 2015; Gennaioli, Shleifer and Vishny, 2015; Guiso and Viviano, 2015) and that differences in financial savvy between professional wealth managers and individuals are one of the critical factors determining differences in the performance of portfolios run by the two groups (e.g. Lakonishok and Maberly, 1990; Dorn and Huberman 2005; Barber and Odean, 2008). However, it also appears that the consequences of a lack of financial savvy do not end with hiring a wealth manager. It is well-documented that wealth managers are quite skilled in separating less financially savvy from more financially savvy investors and charge those with low performance-fee sensitivity higher fees than those with high performance-fee sensitivity (e.g. Christoffersen and Musto, 2002; Houge and Wellman, 2007; Gil-Bazo and Ruiz-Versy, 2009). In this paper, we look beyond the fees differentiation issue and address the question of whether wealth managers engage in another form of investor discrimination by offering similar investors different quality investment opportunities according to whether or not an 'informed' third party is negotiating on the investor's behalf. In particular, by examining the sample of over 16,000 UK personal pension funds over the 1986-2015, we assess whether investors with less protection received worse deals in the sense that funds (of the same investment style) offered to them delivered lower returns than funds offered to investors with more protection. We also discuss whether funds offered to investors with less protection had lower performance targets and managers less successful in meeting these performance targets than funds offered to investors with more protection.

There are good reasons to look to pension fund data to address these questions. First, because of the global scale and growth of the industry and the consequent impact of discrimination between investors. If financially unsavvy mutual fund investors end-up paying higher fees than financially savvy ones, one can argue that this is partly because 'the difference lies in the investors themselves' (Christoffersen and Musto, 2002). Given that mutual fund investments are voluntary and subject to relatively low exit fees, this is up to individuals whether they join the game or not, and subsequently, bear the consequences. However, the situation is different in the case of pension investments. Pension savings, even if not compulsory, are strongly encouraged (by governments and international agencies),

are long-term in nature, have long-term financial and social implications and are even more important for the low-income investors, which typically also means less financially savvy, than they are for the high income, highly financially savvy, investors. Identifying whether pension funds discriminate between investors by providing similar investors different investment opportunities according to whether or not an 'informed' third party is involved in setting up and subsequent monitoring of pension funds is of vital importance given the growing size of the defined contribution (DC) pension industry and the growing importance of its share in servicing retirement. According to Willis Towers Watson (2017), in 2015, DC pension schemes in 22 major world economies amounted to about $17 trillion, or 48% of private pension assets. In the period 2005-2015 the average annual growth of DC pension assets was 5.6% compared with 2.6% of the defined benefits (DB) schemes.

Second, the UK personal pension industry, given its size, notably lax regulation, rich sample of investment styles, and the co-existence of large numbers of individual and group agreements, provides an excellent sample for studying whether DC pension providers engage in discriminatory behavior. The UK personal pension industry is one of the oldest and biggest in Europe with about £3 trillion assets under management (OECD, 2015) and 11 million contributors as of March 2014 (HMRC, 2016). Individuals can save/invest for retirement under group agreements, i.e. agreements negotiated and overseen by companies where the individuals are employed (known as group personal pensions, GPPs), and individual agreements that are offered directly to the public (known as individual personal pensions, IPPs) thus, do not have any formal bodies that monitor their performance.

The GPP and the IPP agreements are between individual contributors and providers. The difference between the GPPs and the IPPs is that the GPP contracts, although these are contracts between individuals and fund providers, are negotiated by professionals hired by employers, who are, on average, more financially savvy, have a better understanding of the letter of law, and are more thorough monitors of performance than the average IPP investor. Indeed, companies that offer GPP schemes often establish a management committee that is similar to a board of DB pension scheme trustees, which meets regularly and assesses the performance of the fund.[2] Moreover, when a company is dissatisfied

[2] http://www.thepensionsregulator.gov.uk/docs/employer-management-committees.pdf

with the level of services provided and decides to change the pension provider, this can carry considerable reputational and financial loss to the pension provider, which may put extra pressure on the pension providers to deliver good returns. In contrast, IPP investors, like any other body of small and dispersed investors, have low bargaining and monitoring abilities and face high charges if they want to swap pension providers.[3] Thus, although, there are no reasons to believe that individuals saving under GPP schemes are any more financially savvy, better at monitoring, etc., than the IPP investors,[4] the involvement of employers in contract setting and subsequent monitoring may be beneficial to the GPP investors. We investigate if this is true and also, if so, what the financial benefits of it are for individual investors.

To assess our primary question of whether there are differences in the quality of the investment opportunities provided by the GPP and the IPP schemes we test whether there is evidence that the GPP funds outperform the IPP funds. There are solid, economic, theory-based, arguments that support the notion that the GPP funds may outperform the IPP funds. The tests whether there are differences in the performance are based on (annualized) cumulative returns to account for the fact that for pension fund investors it is the total and not the (arithmetic) average returns that matter. Excess returns and several ratios commonly used in portfolio performance analysis are used. Given that cross-sectional regressions may insufficiently control for risk, we also adopt the asset class pricing model (Sharpe, 1992; Fung and Hsieh, 1997) to explain differences between the performance of portfolios of GPP and of IPP funds. In addition, we also perform propensity score matching to further test the robustness of the findings.

Given that we find that the GPPs outperform the IPPs, we also ask the question of whether there is any evidence of systematic differences in the performance of the GPPs' and of the IPP's prospectus performance benchmarks (PPBs), e.g. the performance benchmarks declared by the funds in their investor prospectuses as indicators of expected returns. The PPBs can also be considered indicators of the performance targets set for asset managers as they are chosen when the funds are created. While, as

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

[4] If anything, IPP investors may, on average, be more financially savvy, as it can be expected that it is more wealthy individuals who invest with the IPP schemes. They may also have more flexibility in choosing pension providers as they are not restricted to the employer's choice.

indicated above, there are strong arguments in support of the thesis that the GPP funds outperform the IPP funds, it is less clear whether the GPP PPBs can be expected to be different from the IPP PPBs. Given that absolute returns are what matters at the end of the day, the better performance of the GPPs could result from monitoring activities of boards set by employers without the need for tougher benchmarks. On the other hand, greater scrutiny and financial savvy of employers' representatives involved in the GPP schemes creation might result in the GPP funds having tougher benchmarks than the IPP funds. Whichever argument prevails, we should not observe the IPP funds having tougher benchmarks than the GPP funds. Moreover, where the benchmarks are comparable, one would not expect that the IPP managers are better at meeting their performance targets than their GPP counterparts. However, where the GPP benchmarks are tougher, it may be harder for the GPP managers to achieve better benchmark-relative performance than it is for the IPP managers. Thus, where there is evidence of GPPs having tougher PPBs than the corresponding IPPs, it may be expected that the PPB-relative performance of the GPPs may be inferior to that observed for the IPPs. On the other hand, with GPPs with tougher benchmarks beat their benchmarks by more than IPPs beat theirs then this is stronger evidence for the superiority of GPPs over IPPs. We test which of these is the case.

As far as we are aware this is the first paper that addresses the question of whether there are differences in the quality of investment opportunities offered to investors protected because their schemes are negotiated and subsequently monitored by professional on their behalf, and individual investors who do not enjoy such protection. It is also the first paper that documents that, indeed, such differences exist and that they are statistically and economically significant.

The findings of the paper contribute to several strands of the literature. The paper adds to the literature on the role of employers in supporting pension schemes. While many papers are critical about the quality of pension services and investments offered through employer supported schemes (e.g. Elton et al., 2006; Rauh, 2006; Benartzi et al., 2007; Farrell and Shoag, 2016), this paper shows that employers' involvement, even if it is only in the form of a 'third party' is better than its absence. The paper also adds to the literature on the importance of financial advice for not-so-financially savvy individuals (e.g. Allen and Gale, 1999; Bhattacharya, Hackethal, Kaesler, Loos and Meyer, 2012; Inderst and Ottaviani, 2012; von Gaudecker, 2015; Guiso and Viviano, 2015) by documenting better

investment opportunities being offered to individuals when a third, well-informed party (i.e. employer) was involved in contract negotiations and monitoring. Moreover, it adds to the literature on fund performance by exposing wealth managers' weak performance when monitoring pressure is low (e.g. Almazan, Brown, Carlson, and Chapman, 2004; James and Karceski, 2006; Adams, Nishikawa and Rao, 2016), and contributes to the understanding of the importance of proper benchmarking (e.g. Blake, Lehmann andTimmermann, 1999; Dor, Jagannathan, Meyer, 2003; Chan, Dimmock and Lakonishok, 2009; Petraki and Zalewska, 2016). It also adds to the regulatory literature on the effectiveness of different saving schemes (e.g. Poterba, Venti and Wise 1995; Lindbeck and Persson, 2003; Looney and Hardin, 2009; Ahmed, Barber and Odean, 2016; Boes and Siegman, 2016) and the literature on the importance of trust for market participation (El-Alttar and Poschke, 2011; Ballock, Nikolae, and Philip, 2015). Finally, it contributes to the literature that documents the importance of relational contracts for the provision of financial services (Jiménez, Salas-Fumás and Saurina, 2011; Belavina and Girotra, 2012; Benczúr and Iluti, 2016) and discriminatory practices of financial intermediaries (e.g. Cavalluzzo, Cavaluzzo and Wolken, 2002; Houge and Wellman, 2007; Gil-Bazo and Ruiz-Versy, 2009; Beck and Brown, 2015; Palia, 2016).

The paper also has far-reaching policy implications as its results indicate that empowering individual investors may not be enough to increase the efficiency of financial intermediaries. Individual investors may need much more protection from regulatory bodies than they currently have, to ensure that they receive good returns on their savings. And, although, the paper is concerned with the UK DC pension schemes, it provides a valuable lesson for all countries that have well developed or are in the process of developing DC pension schemes.

2. Hypothesis statement

The UK 1986 Social Security Act established personal (GPP and IPP) pensions as the organized form of non-occupational pension provision provided by insurance companies, friendly societies, and banks. Under GPP schemes employers enter an agreement with a financial institution to provide personal pensions to their employees. As such, GPP schemes are organized by employers even though, the legal contract exists only between a financial institution, that is to provide the pension, and the

individual employee who signs the contract. In contrast, IPP schemes are offered directly to the individual members of the public.

There are several reasons to expect that GPP schemes may be more attractive to contributors than the IPP schemes. First, companies oversee the creation of GPP agreements and subsequently monitor the schemes' performance on behalf of employees. Companies' representatives in charge of contract negotiations are often lawyers and financial advisors, hence, it can be expected to be more financially savvy than individual investors, who are well-documented to have limited investment skills (e.g. Bernheim 1995, 1998; Lusardi and Mitchell, 2006, 2014). It also is common practice that companies appoint boards of trustees whose job is to oversee the performance of their GPP schemes. It is more likely that these trustees are more thorough at keeping an eye on the performance figures and are better at understanding them than the average individual investor who, on top of the low level of financial savvy, is also known to have poor commitment abilities. To make things worse, there are no regulatory bodies that perform monitoring duties on behalf of IPP investors.

Second, companies have greater market and monitoring power than dispersed individual investors. This is because companies buy considerably bigger parts of pension provider's portfolios than individual investors do. Hence, companies are a source of greater financial benefits and prestige when they are clients, but also a source of a greater financial and reputational loss when they change the pension provider. Therefore, from the perspective of a pension provider 'catching' big clients and maintaining good relations with them is more important and beneficial than signing contracts with individual investors.

Third, GPP schemes are more mobile than IPP schemes as GPP schemes are not permitted to charge exit penalties to their members, while the exit fees can be substantial for individuals in IPP schemes (Blake, 2003). Indeed, the area of transfer and exit charges have been extremely opaque. There do not seem to be any official statistics reporting them. However, over the years the popular press has reported numerous cases of excessively high exit charges and other obstacles that IPP schemes' investors face when trying to switch providers or even schemes within the same provider.[5] There is

[5] "Rip-off pension charges: how much am I paying?", The Telegraph, 18 July 2012

little evidence in relation to the provider/schemes switches for the GPPs but the Department for Work and Pension's (2014) survey documents that out of 717 companies with DC schemes they interviewed 79% reviewed whether the scheme in place remained suitable for their needs. Of these who reviewed their schemes 20% have switched providers as the result of the review. In addition, there are sound theoretical grounds in support of the notion that higher mobility of investors plays an important role in determining the quality of the services provided. Appendix 1 provides a simple partial equilibrium model that illustrates such a case.

Finally, it can be expected that due to the collective nature of the GPP schemes, economies of scale can arise for the pension provider resulting in lower costs and, consequently, lower charges than those associated with the IPP schemes.[6]

In the light of the greater level of bargaining power employers have, and the greater protection and monitoring they blanket over their GPP schemes, we investigate whether the GPPs are more attractive investment opportunities than the IPPs. Thus, the main objective of this paper is to test whether GPP funds deliver higher returns than the IPP funds. Given that it is the final amount of money accumulated in one's account that determines one's retirement income, the differences between the excess returns, i.e. the returns less the risk-free rate of return, of the GPP and of the IPP funds will be assessed. However, the returns earned may depend on funds' investment strategies and, given that the separation of funds into investment strategies using official classifications may be less than perfect, the risk adjusted returns are also examined.

While the assessment of the relative fund performance is the main objective of this research, to further understand the differences in the quality of investment opportunities offered to the GPP and the IPP investors, it is interesting to know whether there are differences in the benchmarks assigned to the funds. While, as indicated above, there are strong arguments in support of the thesis that GPP funds perform better than IPP funds, it is less clear whether any differences between the GPP PPBs and the

[6] Pitt-Watson and Mann (2012) quote that, on average in the Netherlands, the costs of collective pensions, which are somewhat similar to the British GPPs, are 0.15% of total assets versus 1.27% for the schemes operating under individual contracts. The Department for Work and Pensions (2014) reports that the average annual charges of GPP small schemes were 0.91% while those of the big GPP schemes (with 1,000+ members) were 0.51%. The GPP sector average fee of 0.84% is higher than the equivalent statistic reported for the Dutch pension schemes which is consistent with the notion that UK schemes are most expensive in Europe.

IPP PPBs can be expected. On one hand, the greater financial awareness and market power of employers standing by the GPP schemes, and possible attempt by fund managers to 'window dress' the IPP funds suggest that the GPP funds could display tougher benchmarks. On the other hand, given that absolute returns are what matters at the end of the day, the GPPs could be obtaining the better returns because of the monitoring activities of the employers without the need for tougher benchmarks. Taken together, these suggest that one should not observe tougher benchmarks for the IPP funds, even though it is not clear whether tougher GPP PPBs can be observed.

Another interesting effect of GPPs and IPPs having potentially different benchmarks is their benchmark-relative performance. Where the benchmarks are comparable, one would not expect that the IPP managers are better at meeting their performance targets than their GPP counterparts. However, where the GPP benchmarks are tougher, it may be harder for the GPP managers to achieve better benchmark-relative performance than it is for the IPP managers. Thus, as simple logic would suggest that the less challenging performance targets should be easier to achieve than the tough ones, the funds with softer benchmarks may have better benchmark-relative performance than the funds with the tough benchmark. In other words, where there is evidence of GPPs having tougher PPBs than the corresponding IPPs, it may be expected that the PPB-relative performance of the GPPs may be inferior to that observed for the IPPs. However, if funds with the softer benchmarks have worse benchmark-relative performance than funds with the tougher benchmarks, than this may be perceived as the evidence that soft-benchmark funds' managers have lower skills and/or motivation to work hard than their colleagues from tough-benchmark funds.

3. Data

Morningstar Direct lists 1,843 GPP funds that opened between January 1968 and December 2014, and 15,165 IPP funds that opened between January 1963 and December 2014. For each of these funds information about the funds' monthly returns (gross of costs and fees), the date of inception, the name of insurance company providing the fund, investment style as specified by the Global Broad Category Group (GBCG), ABI Pension Classification (ABI PC), the Primary Prospectus Benchmark (PPB), value of assets under management (AUM), regional asset allocation and a short description of

the investment strategy were collected. The GBCG and the ABI PC classifications group funds into ten and 34 investment categories, respectively.[7] Information about the AUM is available from 2006 and about the regional asset allocation from 2003. Both suffer from numerous missing observations.

Funds' monthly returns were collected from January 1986 till December 2015 giving at least one full year of the performance data for each fund. The start of the sample is dictated by the 1986 Social Security Act which established personal pensions as the first organized form of non-occupational pension provision and the data quality. Given that there were a few regulatory and market events that could be expected to impact on the development and performance of the personal industry, two sub-periods are also considered. These are (i) January 1996 – December 2015, and (ii) August 2007 – December 2015. The first sub-period marks the creation of the Occupational Pension Regulatory Authority (OPRA) and gives up to 20 years of data that cover the dotcom rise and decline of the stock markets and of the 2008 financial crisis. August 2007 – December 2015 is chosen to cover the period of market turbulences following the 2007 credit crunch. August 2007 is chosen as the starting point of the sub-period because, on 9 August 2007, BNP Paribas announced that it was ceasing activities in three large hedge funds specializing in the US mortgage market signaling that the market was overheated.

The 17,008 funds listed by Morningstar include funds that stopped operating. For these funds no information about the before-the-closure performance is available. This applies to 70 IPPs and eight GPPs opened in the 1980s. Among the funds incepted in the 1990s, 30 IPPs and 12 GPPs closed-down. For the 2000s, these statistics increase to 155 IPPs and 42 GPPs, and among those created since 2010, 171 IPPs and 44 GPPs have ceased. Given that these funds are excluded from the calculations, the sample is subject to a potential survivorship bias. However, as the dead funds account for a small fraction of the sample and are similar proportions for the two groups of funds (about 3% of the IPP

[7] The GBCG investment asset classes are: allocation, alternative, commodities, convertibles, equity, fixed income, miscellaneous, money market, specialist, and property. The ABI PC investment asset classes are: Asia Pacific excl. Japan equities, Asia Pacific including Japan equities, commodity/energy, deposit & treasury, Europe excluding UK equities, Europe incl. UK equities, flexible investment, global emerging markets equities, global equities, global fixed interest, global high yield, global property, Japan equities, mixed investment 0%-35% shares, mixed investment 20%-60% shares, mixed investment 40%-85% shares, money market, North American Equity, protected/guaranteed funds, specialist, Sterling corporate bond, Sterling fixed interest, Sterling high yield, Sterling long bond, Sterling strategic bond, UK all companies, UK direct property, UK equity income, UK gilt, UK index-linked gilts, UK property securities, UK smaller companies and unclassified.

sample and about 5% of the GPP sample), the effect of the bias should not be detrimental to our findings, especially that we are interested in the relative performance of the GPP and the IPP schemes. In total, the sample has 16,456 funds that opened before 1 January 2015 and were still in operation on 31 December 2015.

Table 1 Panel A shows that for 74.2% of the sample, i.e. 12,214 funds, complete return time series are available in the 1986-2015 period. The number of funds with the complete return data increases to 14,429, i.e. 87.7%, when the period of the investigation is shortened to 2007-2015. This increase in the number of funds with the complete return data is driven by older funds, many of which do not have complete return statistics in the 1980s and 1990s. Therefore, using different sub-periods allows to test for robustness of our findings over different time periods and for different sample compositions (with shorter samples having more older funds included).

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

Table 1 Panel A shows that the investment style could not be determined for 162 funds. In fact, based on the Morningstar information only 11,054 funds were GBCG classified. To complete the investment style classification ABI classification and 'soft' information about 'Investment Strategy – English' provided by Morningstar were used and cross-checked with information about regional asset allocation, were available.

In this way a further 3,375 funds were classified into one of the ten GBCG investment styles. Table 1 Panel B shows the numbers of funds in each GBCG investment style for each of the three sub-periods for the IPPs and GPPs (the top numbers in each asset-class row). It shows that funds specializing in equity investments are most numerous. Allocation is the second most numerous investment style among the IPP funds. In contrast, fixed income funds are most numerous among the GPPs. There is only a handful of IPPs specializing in convertibles and commodities. No GPP specializes in these two categories.

The next challenge was to identify PPBs and obtain their performance statistics. Morningstar provides several performance statistics in relation to the PPBs, but these are available for about 40% of

the sample only. Therefore, to utilize the size of the sample, great effort was made to identify individual PPBs and obtain their performance statistics (numerous data sources were used to achieve this).[8]

As Table 1 Panel B shows, 591 IPPs and 21 GPPs declare not to have any PPB. Moreover, there is no PPB specification for 2,511 IPPs and 158 GPPs. Out of the remaining 11,768 IPPs and 1,511 GPPs the monthly returns of the corresponding PPBs were calculated for 8,988 (76%) IPPs and 1,120 (74%) GPPs, respectively. These were used to calculate various performance statistics as described in Section 4.2. In total, 863 PPBs were named, of which 114 were with incomplete specification. Out of the remaining 749 PPBs with full names returns for 472 were calculated (these correspond to 10,108 funds). The remaining 267 PPBs remained unidentified.[9]

Table 1 Panel B shows that the success rate in obtaining the PPB returns varies considerably across the investment styles. The numbers in round brackets show the numbers of funds for which their corresponding PPB returns were calculated and the numbers in square brackets show the percentage of the funds with the PPB returns have in their corresponding samples.

The highest rates of the PPB returns calculations are for the equity, fixed income, money market and alternative funds. Also, GPP miscellaneous funds have a rate of 63%. Consequently, to have representative samples for both the IPP and the GPP funds, when individual investment styles are analyzed, the focus is on seven styles: equity, fixed income, money market, allocation, miscellaneous, alternative and property.

Three months' T-bills are used as a proxy for the risk-free rate of return. In addition, to calculate multifactor portfolios alphas following the methodology proposed by Sharpe (1992) and Fung and Hsien (1997), the monthly observations of the following time series were collected: the UK Citygroup government bond index (UK-bonds), the Citygroup UK WGBI world non-GBP bond all maturities total return hedged index (nonUK-bonds), the Citigroup UK Eurosterling AAA/AA excluding UK total return index (Eurosterling), the UK broad trade weighted pound sterling index against major currencies

[8] Return statistics of the PPBs were downloaded from Morningstar, DataStream, Bank of England official statistics, and other web resources.

[9] The difficulties with identification of the PPBs were typically related to an incomplete specification of the benchmark. For instance, it was stated that a fund was benchmarked to a composite or bespoke index without any details how individual components were weighted.

(GBP-index), and the gold bullion LBMA £/troy ounce index (Gold). The remaining three indexes used in the regression specification, i.e. the FTSE All Share index (FTSE), the FTSE All World Equity index (FTSE-world), the IPD All Property index (IPD) were collected alongside other PPBs.

4. Methodology and variables

4.1. Some methodological issues

Pension schemes are expected to be long-term investors and given the restricted investors' mobility, it is important that the long-term performance of pension funds, i.e. cumulative returns and related performance measures, is being assessed. Using cumulative returns imposes a cross-section regression structure and allows controlling for time invariant fund characteristics such as investment style, management type, investment regions, etc. Using cross-section regressions may, however, result in information loss, as the time series of monthly returns get compressed to a single statistic. Moreover, it imposes 'rough' investment style grouping as each investment style category used in the analysis must be numerous enough (i.e. have enough data points) to make the regressions econometrically meaningful.

Working with time-series, however, is not without caveats, either, as it may positively bias the assessment of the performance towards high-volatility portfolios. This is because the differences between arithmetic and geometric means increase with the volatility of time-series. Inability to control for funds' size is also a limitation given the data at hand. First, this is because 20 years of data would need to be removed (the AUM are available from 2006 only), and second, the sample size during the remaining period (2006-2015) would be considerably reduced given numerous missing observations in the AUM data. The advantage of the time-series analysis is in its potentially more accurate accounting for market conditions (i.e. adjustment for market risk-factors) than the cross-section analysis allows for, and that many more investment styles can be analyzed. Given that cross-section regressions must have enough observations to make them meaningful, many investment styles cannot be analyzed on their own as they do not have enough funds. In the case of time-series analysis this restriction does not hold as portfolios of GPP and of IPP funds can be created for as long as there is at least one fund in a given investment style. Thus, while the GBCG classification is more suitable for the cross-section analysis, the ABI PC classification can be adopted in the time-series analysis.

To exploit the information content of the data, we perform both cross-section and time-series analysis as they complement each other. The cross-section analysis assesses the differences in the range of performance statistics between the GPP and the IPP funds after controlling for funds' investment style and other characteristics. The time-series analysis assesses the differences between the performance of the portfolios made of GPP funds (held long) and made of IPP funds (held short) after controlling for the risk factors defined by the major asset-classes the funds invest in.

We also adopt propensity score matching regressions with the GPPs being the treated population and the IPPs being the control to further address some potential shortcomings of the cross-section analysis and to further test robustness of the findings. A logit model is used for probability treatment in finding propensity scores in nearest-neighbor matching that allows for ties.

In the propensity score analysis (less numerous) GPP funds are matched with (typically much more numerous) IPP funds by the ABI PC investment style (as it is more detailed than GBCG), management type (i.e. whether the fund was internally or externally managed), funds' size and age. This provides a potentially more careful comparison of like-with-like funds even though it eliminated many funds from the analysis.

4.2. Performance measures

All the monthly returns of the pension funds are denominated in pound sterling and those PPB returns that were not denominated in pound sterling were converted into pound sterling using the Bank of England's end of month exchange rate of pound sterling to the foreign currency the PPB was originally denominated in.

For each fund and for each of the periods (i.e. 1986-2015, 1996-2015, and 2007-2015), the annualized average compounded returns are calculated. This means that if a fund opened before the start of a given period, then only those observations that are within that period are accounted for. If a fund started to operate after the starting date of the period, then all its observations are included in the calculations. Using these annualized returns, the excess returns for the funds against annualized average returns on T-bills are calculated and denoted as $R\text{-}R_{TB}$. The calculations are repeated for each funds' PPB resulting in the annualized average compounded returns for the same time period as the fund's

calculations were performed. The annualized excess returns against the PPBs are denoted $R\text{-}R_{PPB}$ and annualized excess PPB returns against T-bills are denoted as $R_{PPB}\text{-}R_{TB}$.

To adjust for risk, both $R\text{-}R_{TB}$ and $R_{PPB}\text{-}R_{TB}$ are divided by annualized standard deviations of the corresponding pension funds' and of the PPBs' returns respectively. These ratios are denoted as Sharpe and $Sharpe_{PPB}$, respectively.[10] To adjust $R\text{-}R_{PPB}$ for risk, the Modigliani-Modigliani measure, M^2 (Modigliani and Modigliani, 1997), and the geometric information ratio (GIR) are calculated. M^2 is calculated as Sharpe x $\sigma_{PPB}+R_{TB}-R_{PPB}$, where σ_{PPB} denotes the annualized standard deviation of the PPB monthly returns, and Sharpe, R_{TB}, and R_{PPB} are as defined above. The GIR is obtained as the ratio of the expected $(R - R_{PPB})$ and the geometric standard deviation of $(R\text{-}R_{PPB})$.[11]

In addition, the tracking error, TE, and the annualized downside risk, DR, are calculated. TE is defined as the annualized standard deviation of differences between monthly fund returns and its PPB's monthly returns. DR is defined as the annualized semi-standard deviation of fund's monthly returns. The Sharpe, $Sharpe_{PPB}$, M^2 and GIR statistics are winsorized at 0.01% to reduce the impact of outliers. The summary statistics of these measures are shown in Table 2 Panel A.

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

A quick look at the excess returns shows that regardless of the period of calculations, on average, the GPPs performed better than the IPPs when compared against T-bills and their PPBs. Over the 30 years, the average excess return of the GPP funds was 4.481%, while the corresponding average for the IPPs was 4.273%. Both these averages are statistically significantly different from zero at 1% and from each other at 5%. The difference between the GPPs and the IPPs is higher for the shorter periods of assessment (the statistical significance of their differences increases to 1%). In particular, the differences in the performance for the 2007-2015 period are clearly pronounced. The GPPs

[10] Sharpe ratios are commonly used to assess the quality of portfolios, e.g. Goldreich and Hałaburda (2017).

[11] For the time series of monthly fund returns R_t and of its benchmark returns R_{PPBt} the GIR is calculated as $GIR = \left(\left(\prod(1+R-\beta R_{PPB})\right)^{1/n} - 1\right) / \sigma_g$ where $\sigma_g = \exp\left(\sum\left(\ln(1+R-\beta R_{PPB}) - \ln(\prod(1+R-\beta R_{PPB}))^{1/n}\right)^2\right)^{0.5} - 1$ and β is the slope coefficient obtained from regressing $\{R\}_t$ against $\{R_{PPB}\}_t$. The restriction of three years of observations of the data was adopted to obtain the beta estimates.

outperformed the IPPs by 0.84% on an annual basis. To check whether this increase in the difference was driven by older funds that are included in the 2007-2015 calculations, the averaging over the 2007-2015 period was repeated for the same set of funds as it was used in the 1986-2015 and the 1996-2015 calculations. The mean returns for the reduced GPP sample are 4.998% and 5.001%, respectively. The analogous figures for the IPPs changed to 4.406% and 4.390%. This means that the addition of the older funds does not drive the results. Quite the opposite, the exclusion of the older funds increased the means for both the IPPs and the GPPs and the differences between them. The DR, i.e. the risk of earning negative returns, is on average lower for the GPP funds than for the IPP funds.

The difference between the GPPs and the IPPs is also strongly pronounced when the fund returns are compared against the returns on their PPBs (i.e. $R\text{-}R_{PPB}$). All the averages reported for the GPPs are positive. In contrast, all the averages reported for the IPPs are negative. They are statistically significantly different from zero and from each other at 1%. Again, the shorter the period of the analysis is, the bigger the difference between the GPP and the IPP funds is. In particular, in 2007-2015 the GPP funds outperformed their PPBs by 0.304% per annum, while the corresponding statistic for the IPP funds is -0.374%.

The comparison of the Sharpe ratios confirms that the GPPs performed better than the IPPs for 2007-2015. The 2001-2015 Sharpe ratio was also the only one for which t-test of the differences was statistically significant (at 1%). The comparison of the $Sharpe_{PPB}$ ratios indicates that GPPs may have tougher performance targets. In addition, the average M^2s and GIRs are larger for the GPPs than for the IPPs. In contrast, TEs are higher for the IPPs than for the GPPs, what in combination with the $R\text{-}R_{PPB}$, M^2 and GIR statistics may mean that the GPPs are better at tracking their PPBs than the IPPs. That is, it may be that the GPPs make an effort to follow the PPBs' movement, while the IPPs stay passive which results in comparatively weaker performance and higher tracking errors.

All these statistics suggest that there are considerable differences in the performance of the IPPs and the GPPs, but more careful analysis is needed given that there are differences in the structures of the samples causing that different investment styles weigh differently in the averages. For instance, the allocation funds constitute over 20% of the IPP sample, while they account for just 3% of the GPP one.

4.3. Fund characteristics

In the regression analysis several fund characteristics are controlled for. The dummy D_{GPP} separates GPPs from IPPs and is defined as one for funds offered under GPP agreements and zero otherwise (i.e. for the IPPs). Tables 1 Panel A shows that the IPPs account for about 89% of the sample. The dummy $D_{external}$ separates internally from externally managed funds and is equal to one if a fund is externally managed and zero otherwise. Table 2 Panel B shows that outsourcing is a recent phenomenon. The inclusion of older funds decreases the IPPs' mean of $D_{external}$ from 74.8% for 1986-2015 to 67.8% for 2007-2015. The corresponding figures for the GPPs are 31.8% and 29.2% respectively.

The variable Size denotes the funds' AUM (in million pound sterling) as in the last quarter of 2015. On average, as intuition would suggest, the GPPs are bigger than the IPPs. To account for potential size effects the variable LnSize, the natural logarithm of Size, is used in the regression analysis. Fund's age (Age) is measured in years from the month of its inception till 31 December 2015. The average age of the GPP funds is about 11 years regardless of the period of the performance calculation. In contrast, the average age of the IPP funds increases from 8.9 years for the 1986-2015 period to 10.8 years for the 2007-2015 period as the shorter the sample is, the more older funds are included in it.

We also control for whether a fund is offered by a provider who offers both IPP and GPP contracts or only one contract type (i.e. IPP or GPP). For this purpose, the dummy $D_{individual}$ is created and equal to one when the fund's provider does not offer both types of contracts and zero when she does. About 21% and 24% of funds are offered by one-type contract providers among the IPP and the GPP funds, respectively.

Controlling for funds' investment style creates certain challenges. On one hand, it is important to ensure that like-with-like funds are being compared. On the other hand, it is important to keep the size of investment style groups big enough to make them suitable for a cross-section analysis. Keeping these two objectives in mind, the GBCG classification is used to define ten broad investment styles (and

dummies corresponding to them).[12] Given that the GBCG classification does not control for the region of investment, the dummy D_{UK} equal to one when a fund specializes in UK assets and zero otherwise, and the dummy D_{nonUK} equal to one when a fund specializes in overseas assets and zero otherwise are introduced. The ABI PC classification is used in the time-series regressions when portfolios of funds with the same investment style are created. Moreover, the ABI PC classification is used for clustering in the cross-section regressions.[13]

Table 2 Panel B shows that the proportions of funds specializing in domestic assets are similar across the three periods and are about 21% for the IPPs and 24% for the GPPs. The proportions of funds specializing in the overseas investments also do not change much with the length of the period, and that the IPPs are slightly more overseas focused (18%) than the GPPs (15%).

To account for potential time effects, especially given that these can be expected to be non-linear, time dummies associated with three potentially important regulatory/market events are created. The D_{1995} dummy is equal one for all the funds incepted from January 1995 onwards, and zero otherwise. The dummy is associated with the creation of the OPRA and the rise of the dotcom bubble. D_{2004} is equal to one for funds created from December 2004 onwards and zero otherwise. The dummy is associated with the 2004 Pension Act establishing the Fraud Compensation Fund and the period following the collapse of the dotcom bubble. Finally, the D_{2008} dummy is equal to one for funds created from November 2008 onwards. It is associated with the creation of the automatic enrolment system, NEST and the financial crisis. In some sub-samples some of these time dummies cause multicollinearity, hence occasionally some of them are dropped from the regressions.

[12] We also ran regressions with the ABI PC dummies (and ABI PC clustering). The results were very similar to those obtained for the regressions with the GBCG dummies, investment region dummies and ABI PC clustering. We do not present them to save space but they can be obtained from the authors on request.

[13] Age also seems a natural clustering variable as it potentially controls for differences in the market's conditions that may be detrimental to the fund performance. However, given that the standard errors are bigger for the higher proportion of the regressions clustered by ABI PC than clustered by Age and when the Age-clustered standard errors were bigger than those obtained from ABI PC clustering, the significance of the coefficients of interest remained unaffected, the ABI PC clustering is adopted and reported. To show the robustness of the results to the Age and the ABI PC clustering, a sample of Age clustered regressions is provided in Appendix 2.

4.4. ACPM risk factors

To additionally account for potential risk factors the asset class pricing model (ACPM) originally proposed by Sharpe (1992), and further developed by Fung and Hsieh (1997) for funds with limited or no leverage, investing in well-defined asset classes is adopted after a few modifications.

First, given that the UK domestic market equity indexes are highly correlated with the developed markets excluding UK equity indexes and the emerging markets equity indexes, it is econometrically unsound to use these three equity indexes in a single regression specification as proposed by Fung and Hsieh (1997) for US funds.[14] This creates an issue of finding a single equity risk factor that would be appropriate. To deal with the fact that many funds invest outside the UK market, two separate regression specifications are adopted: (i) with the FTSE All Share index (FTSE) only, and (ii) with the FTSE All World equity index (FTSE-world).[15] Second, given that some UK pension funds invest in property, the IPD All Property index (IPD) is added to account for risk of the funds specializing in the UK property market.

Thus, the seven-factor Fung and Hsieh's (1997) specification is replaced by the six-factor specification. The list of the risk factors and their summary statistics are shown in Table 3 Panel A.

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

To test for the differences in the performance between the GPP and the IPP funds, for each ABI PC investment style the differences between the monthly returns earned on the equally weighted portfolios of the GPP and of the IPP funds belonging to the same ABI PC investment style are calculated. The summary statistics for the monthly returns earned on holding the GPP portfolios long and the IPP portfolios short i.e. R_{GPP}-R_{IPP} are presented in Table 3 Panel B. The biggest positive difference between the returns earned by the GPP portfolios and the IPP portfolios is for the UK gilts

[14] Regardless of the index definition (MSCI, FTSE, DS), the correlations of the UK index with the other relevant stock market indexes were well above 80%.

[15] We also used the specification with two indexes one for developed and one for the emerging markets (although correlated at 78%). The results remained robust and can be obtained from the authors on request.

(0.203%, equivalent to 2.44% per annum) and the biggest negative is for the UK Smaller Companies (-0.178% equivalent to -2.14% per annum).

5. Do GPP funds outperform IPP funds?

We start the analysis from regressing R-R_{TB} and Sharpe against funds' characteristics as defined in Section 4.3 for various sample specifications. The D_{GPP} dummy is the main variable of interest while it is controlled for whether a fund is externally/internally managed ($D_{external}$), its size (LnSize), its geographical diversification (D_{UK}, D_{nonUK}), its period of inception (D_{1995}, D_{2004}, D_{2008}) and investment style (the GBCG classification dummies).

Table 4 shows the coefficients estimated for these regressions for the whole sample (Panel A) and for the PPB-restricted sample, i.e. the sample of funds with PPB returns (Panel B). The results show that the GPP funds statistically significantly outperform the IPP funds regardless of the performance measures used, and the period specification. This outperformance is also economically significant. For instance, in the 2007-2015 period the GPPs outperformed the IPPs by over 1% per annum whether the full or the PPB-restricted samples are used.

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

The coefficients estimated for the other variables are similar in size and statistical significance across the specifications. That is, the regressions show that the size of funds and the external management, specialization in UK assets and, to a lower degree, specialization in overseas assets are positively related to the performance. The coefficients estimated for the three inception time dummies confirm that explanatory power of time is non-(log)linear. While all the estimates of the D_{1995} are positive and statistically significant, many of the estimates of the D_{2004} coefficients are not statistically significant, and none is statistically significant for D_{2008}.[16]

[16] The results for Age clustering are provided in Table A1 in Appendix 2.

Finally, Table 4 Panel C shows the average treatment effects on treated (ATETs) for the PPB-restricted sample. The estimates show that if we assume that, after matching by the investment style, management type, and age (and by size) any other differences between the treatment (the GPPs) and the control (the IPPs) populations are the result of the treatment, e.g. the GPPs being under more scrutiny than the IPPs, that this treatment is worth an additional return of 1.539% per annum over the period 2007-2015 and 0.745% over 1986-2015, and is highly statistically significant.[17]

One could argue that the differences in the performance between the GPP and the IPP funds may result from these two groups being run by different types of providers. Indeed, in total, there are 75 different providers of pension funds of which only 22 service both GPP and IPP schemes. The remaining 46 providers offer only IPP funds and seven providers offer only GPP funds. Therefore, it is possible that the differences in the performance could result from differences in unobserved provider specific factors which happen to be correlated with the services they offer. That is, the differences between the GPPs' and the IPPs' performances could result from a sample selection. If this was the case, then the differences in the performance between the GPP and the IPP funds should not be observable once the sample is restricted to those funds whose providers offer both types of contracts. This is because, the provider specific factors would be common for the providers' services whether they be GPP or IPP funds. However, if the differences in the performance of the GPP and of the IPP funds persist in the sample of the providers offering both types of contracts, then we can say that these differences are not the result of a sample selection effect.

Table 5 provides the estimates of the D_{GPP} coefficients for several sample specifications. To save space only the coefficient of interest and R^{2}-adjusted statistics are reported. The full set of the estimates can be found in Appendix 2 (this will apply to the remaining regressions, too).

First, the sample is restricted only to the funds that were provided by those 22 providers who offered both the GPP and the IPP funds (Table 5 Panel A). The restriction removed 3,717 observations from the IPP sample and 223 observations from the GPP sample. All the estimates of the D_{GPP} coefficients remain positive and highly statistically significant showing that the GPP funds

[17] A selection of the standardized differences and variance ratios for the propensity score matching presented in Tables 4, 8, 10, 11, and 12 is shown in Table A16 in the Appendix.

outperformed the IPP funds in the sample of the providers who offered both types of contracts. Hence, the poorer performance of the funds offered through the individual contracts is not a sample selection phenomenon.

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

To go one step further, we test whether there are differences in the performance between the IPP funds offered by those providers who offered both types of agreements and those who offered just individual agreements. Similarly, are there any statistically significant differences between the GPP funds offered by the providers who offered both types of agreements and those who offered just GPPs?

Table 5 Panels B and C report the results of the regressions in which D_{GPP} is replaced by $D_{individual}$. Table 5 Panel B shows that whether an IPP fund was offered by a provider who offered IPP contracts only or by a provider who offered both IPP and GPP schemes did not impact on the performance as all the coefficients estimated for $D_{individual}$ are statistically insignificant. An analogous conclusion can be drawn for the GPP funds, although, there is some evidence that the GPP providers who offered group contracts only perform better than providers of both types of contracts as one of the coefficient estimated for the Sharpe ratio is statistically positive and significant at 5% (Table 5 Panel C).

Finally, Table 5 Panel D shows the D_{GPP} coefficient estimates when the sample is restricted to funds that have the same PPBs, i.e. an IPP fund was included in the sample only if there was a GPP fund, in the same GBCG category, with the same benchmark, and vice versa. Table 5 Panel E further restricts the sample used in the regressions presented in Table 5 Panel D to the providers who provided both types of contracts. This is a tough test and reduces the sample substantially but provides a valuable robustness test for our findings. Most importantly, it confirms that the GPPs outperformed the IPPs, and that this result is not driven by a type-of-provider selection bias.

To shed light on the performance of individual investment styles Tables 6 and 7 provide the estimates of the D_{GPP} coefficients for each of the most numerous investment styles for the PPB-restricted sample (analogous to Table 5 Panel A) and for the PPB-restricted sample of providers who offer both GPP and IPP schemes and use the same PPBs (analogous to Table 5 Panel E), respectively.

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

********** insert Table 7 here **********

Both tables show that the GPP funds' outperformance of the IPPs is, more or less, universal across the investment styles. The GPP equity, money market, allocation, alternative and property funds deliver statistically higher excess returns and/or Sharpe ratios. The economic significance of the coefficients is also high. Practically, no statistical difference is observed for the fixed income and miscellaneous funds which had to be dropped from Table 7 due to a small sample size.

The strong outperformance of money market funds is particularly interesting. Christoffersen and Musto (2002) focused on this asset class to assess the difference in fees paid in the mutual fund industry because, the discrepancy between returns earned by funds within this category should be small. Tables 6 and 7 show that the GPP UK money market pension funds deliver statistically significantly higher returns than their IPP counterparts. These differences differ between 0.328% and 0.518% per annum depending on the period of calculations.

The general expectation is that investors holding portfolios with higher downside risk require a premium for doing so (e.g. Ang, Chen and Xing, 2006). Therefore, the higher returns of the GPP funds might be nothing more but a compensation for their higher downside risk. Table 8 Panel A shows no evidence of the GPP funds having higher downside risk than the IPP funds. All the coefficients are statistically insignificantly different from zero (the whole sample, equity, fixed income, allocation and miscellaneous funds) or highly statistically negative (money market, alternative and property funds). Therefore, it is impossible to conclude that the higher returns earned by the GPP funds are the compensation for a higher probability of losing money.

Table 8 Panel B shows the ATETs for the propensity score matching for the DR and confirms the lack of evidence that the GPP funds have higher downside risk than the IPP funds.

********** insert Table 8 here **********

To complete the discussion of the differences in the performance between the GPP and the IPP funds Table 9 Panel A presents the estimates of the alpha coefficients from the ACPM regressions where the differences in the performance of the GPP and the IPP portfolios are the explanatory variables. First, the equity risk factor is proxied by the returns on FTSE, then by FTSE-world, as indicated in the headings of the columns.

The results show that the strategy to invest long in the GPP portfolios and short in the IPP portfolios would result in the positive and statistically significant alphas for the equity, mixed investments (referred to as alternative investments in the GBCG classification), money market and specialist funds. The regressions based on individual ABI PC styles show that among the equity funds the biggest differences in the performance between the GPP and the IPP funds are for the funds specializing in European equity excluding UK, and Global equity. Also, some statistical significance (10%) is found for the funds specializing in Asian Pacific including Japan, and UK all equities. Interestingly, the analysis of the performance of the individual ABI PC investments styles shows that the long GPP-short IPP strategy would also result in the positive alphas for several fixed interest portfolios, and the UK property securities, even though the sector alphas are statistically insignificant.

As the statistically significant coefficients are economically significant, the ACPM regressions confirm that the GPP funds deliver higher returns than the IPP funds.

********** insert Table 9 here **********

Thus, so far, we have shown that there are statistically and economically significant differences between the performance of the GPP and of the IPP funds. These differences are in favor of the GPP funds and are robust to the different sample and period specifications, as well as various methods of controlling for risk and fund characteristics (Tables 4-9). Table 2 also shows that both the GPP and the IPP funds, on average, earned over 4% per annum regardless of the period of specification (t-tests show that these averages are statistically significantly different from zero, and from each other), but that the differences between the GPP and the IPP funds are less pronounced for the Sharpe ratios. As the risk adjustment plays an important role, Table 9 Panel B shows the alphas obtained from the ACPM

regressions when the fund performance is the explanatory variable and FTSE-world is used as the equity risk factor. The results confirm the superiority of the GPP funds' performance - four out of five investment styles' alphas are statistically positively significant at 10% or higher, whereas only two of the five alphas are statistically significantly positive, and one alpha is statistically significantly negative for the IPPs.

Thus, the results show that, regardless of the period of performance calculation and restrictions imposed on the sample, the GPP funds perform better than the IPP funds. We show that the better performance of the GPP funds cannot be explained by type-of-provider selection bias, i.e. this is not true that better providers offer GPP schemes than those that offer IPP schemes (as we show that there are statistically and economically significant differences in the performance of the GPP and the IPP funds within the sub-sample of providers who offer both types of contracts). We also show that the observed differences in the performance of the GPP and the IPP funds cannot be explained by differences in the downside risk, as, if anything, the downside risk of the GPPs is lower than that of the IPPs. Controlling for risk factors associated with asset classes pension funds invest in also preserves the main result.

6. Are there differences in PPBs and PPBs' relative performance?

We conjectured that the IPP GPPs should not be tougher than GPP PPBs but that the opposite could be true. To test whether there are differences in the performance of the GPP PPBs and the IPP PPBs, the regressions equivalent to those presented in Table 4 Panel B and Table 6 with R_{PPB}-R_{TB} and $Sharpe_{PPB}$ as the dependent variables were estimated. Table 10 Panel A shows that, indeed, there is no evidence that the IPPs have tougher benchmarks, but there is some statistical evidence that the GPP PPBs earned statistically significantly higher excess returns than the IPP PPBs. All three coefficients estimated for the D_{GPP} dummy for the whole sample (the rows marked as 'All funds') are statistically significant, although two of them at 10% only.

Individual investment style regressions show considerable differences across the investment styles. The largest differences, in the sense of the size and statistical significance, are obtained for the allocation funds which, regardless of the period of the performance calculations, had the GPP PPBs

earning over 3.6% per annum more than the IPP PPBs. However, these differences disappear after the risk adjustment, i.e. none of the $Sharpe_{PPB}$ ratios is statistically significant.

Some weak evidence of the GPP PPBs having higher excess returns is also found for the fixed interest funds (10% significance obtained for R_{PPB}-R_{TB} for 2007-2015). There is much more robust evidence of the GPP PPBs being tougher than the IPP GPPs for the equity, the money market and the property funds for which two out of the three $Sharpe_{PPB}$ ratios are statistically significant.

********** insert Table 10 here **********

These results may seem slightly surprising. While the differences in the PPBs of the allocation funds might be somewhat expected (having loosely defined proportions of asset classes may give some flexibility in setting benchmarks), finding differences in the performance of the PPBs for the equity, the money market and the property funds may be less intuitive. It seems that there are two potential explanations. One is that some GPP and the IPP do use different benchmarks. The other possibility is that the observed differences result from the differences in the sample sizes and different mixes of individual investment styles that the regression specifications do not fully control for.

To deal with this latter concern, Table 10 Panel B shows the ATETs for the sample of the PPBs (analogous to Table 4 Panel C). The performance of the GPP PPBs and of the IPP PPBs is compared after the funds associated with them were matched by age, ABI PC investment style and type of management (i.e. whether they were internally or externally managed) and then, in addition, by the fund size. In this way, the samples of the GPP and the IPPs were more balanced and the PPBs of only 'comparable' funds were used in the analysis. The estimated ATETs are highly statistically and economically significant, confirming that differences between the GPPs' and the IPPs' benchmarks are not caused by a selection bias.

Finally, we turn our attention to the question of whether there are differences in the performance of the GPP and the IPP funds in relation to their PPBs. Table 11 Panel A presents the coefficients estimated for the D_{GPP} dummy in the regressions with the R-R_{PPB} and M^2 as the dependent variables. It shows that, on average, both R-R_{PPB} and M^2 are statistically and economically larger for the GPP funds.

For instance, the GPPs delivered 0.54% per annum more than the IPPs in comparison with the PPBs over 1986-2015. This difference increased to 0.798% per annum in 2007-2015. These differences remain highly statistically and economically significant even after the differences in the risk of the pension funds and their benchmarks are accounted for. The estimates of the D_{GPP} coefficients for the M^2 regressions vary between 0.475% and 0.730% (both significant at 1%) per annum. These results are fully confirmed by the propensity score matching analysis (Table 11 Panel B).

********** insert Table 11 here **********

The estimates obtained for the individual investment styles show that the GPP funds specializing in the equity, the money market and the property markets, i.e. the three investment styles for which statistically significant differences in the $Sharpe_{PPB}$ coefficients were obtained, have better PPB-relative performance than the corresponding IPPs. In addition, statistically significantly higher R-R_{PPB} coefficients are obtained for the alternative funds. In contrast, the GPP allocation funds perform worse than their IPP counterparts as all the D_{GPP} coefficients estimated for the R-R_{PPB} and M^2 are statistically significantly negative. Thus, we have an interesting phenomenon. All the investment styles for which the GPP funds had PPBs with higher risk-adjusted returns than the IPP funds (i.e. equity, money market and property) also score better in comparison against these tougher PPBs. The only investment styles for which GPPs are worse than the IPPs in the benchmark related performance are the allocation funds which benchmarks earned over 3,6% per annum more than the IPPs' benchmarks.

To shed more light on the differences between the GPPs and the IPPs in meeting their performance targets, Table 12 Panel A shows the results for the regressions that use the GIRs and the TEs as the dependent variables, and Table 12 Panel B shows the results of the corresponding ATETs from the propensity score analysis.

Once more, we find support for the conjecture that the GPP fund managers are better at meeting their performance targets where the targets were tougher. All the D_{GPP} coefficients estimated for the equity, the money market and the property funds are highly statistically significant. In addition, the GIR regressions also indicate that the alternative GPP funds' managers are better than the alternative

IPP funds' managers. In contrast, the opposite seems to be true for the allocation funds for which all the estimated D_{GPP} coefficients are negative.

********** insert Table 12 here **********

The comparison of the differences between the TEs of the GPP and the IPP funds complete the picture. The IPP managers in addition to earning lower returns also tend to have higher tracking errors. The D_{GPP} estimates of the TE regressions show that the GPP managers of the equity, property and, to some extent, of the money market funds (only 10% significance obtained for one of the coefficients) were more successful in tracking their PPBs than the IPP managers were. The result also holds for the whole sample (after controlling for investment styles) and for the propensity score matching analysis. Thus, once more we have some evidence that tougher performance benchmarks are associated with better benchmark-relative performance, and better ability to track these tougher benchmarks. This may be interpreted as an effect of better monitoring.

In contrast, the GPP allocation funds have larger tracking errors than the IPP allocation funds. This might be a warning sign if it was not for the fact that the GPP funds earn statistically higher excess returns, and their benchmarks earn higher excess returns than the IPP benchmarks. Given that these differences disappear for the allocation funds after controlling for risk of the portfolios (e.g. for the Sharpe and $Sharpe_{PPB}$ ratios), it seems that GPP portfolios and benchmark may be more tilted towards equity whereas the IPPs portfolios and benchmarks may be more tilted towards fixed income assets. This would be consistent with the finding that the IPP funds have smaller tracking errors (as their benchmarks have lower volatility) whereas the GPP funds finds it hard to outperform their BPPs and produce higher TEs.

Thus, the results support the conjecture that the performance targets of the IPP funds are not more challenging than those of the GPP funds. Interestingly, the superior performance of the GPP funds is associated with the GPP funds having tougher PPBs than the corresponding IPP funds. Moreover, the expectation that having tougher benchmarks may result in lower benchmark-related performance finds support for the allocation funds only. In the case of the other investment styles for which there is

evidence of GPP PPBs being tougher (i.e. equity, money market and property funds), the benchmark-relative performance of GPPs is statistically and economically better than that of IPPs (and hence, further evidence that GPPs are better investment opportunities than IPPs). This suggests that having softer-benchmarks seems to be associated with fund managers 'taking things easy'.

7. Conclusions

The paper uses a data set of over 14,000 personal pension funds offered to investors through individual agreement contracts (IPPs) and nearly 1,700 personal pension funds offered to individuals through group contract agreements (GPPs) over the period 1986-2015 to test whether there is evidence that pension providers systematically treat the two groups of investors differently. It is hypothesized that the GPP funds outperform the IPP funds given that the GPP funds are expected to be subject to tighter monitoring of financially savvy employers' representatives and their higher bargaining power than the IPP funds. The paper also assesses whether there are differences in funds' benchmarks (PPBs), and their ability to beat and track these benchmarks.

The results provide statistically strong evidence that the IPP investors receive less attractive investment opportunities than the GPP investors. In particular, the GPP funds earn higher excess and risk adjusted returns than the IPP funds. The differences in returns earned by the two groups of funds are highly economically significant with the IPP investors being worse off by more than 1% per annum in comparison with the GPP investors. The outperformance of the GPP funds in comparison with the IPP funds is robust to various sample specifications, and risk adjustment. The results also suggest that IPP investors are offered worse financial deals to start with, i.e. if there are differences between the PPBs of the IPP and of the GPP funds, the GPP PBBs are more challenging than the IPP PPBs, and the IPP funds' managers tend to be less successful in tracking their PPBs.

The evidence of the better GPP funds' performance is consistent with the predictions of economic theory for markets with frictions and cannot be attributed to selection bias resulting from differences across investors saving individually and under group agreements, risk sharing in big insurance groups, or window-dressing by mutual funds.

Regarding selection bias there is a theoretical possibility that there are providers' specific differences and that providers able to offer better deals (through, for example, offering funds with more challenging performance targets) or offering funds that earn higher returns, for some (random) reason, offer GPP funds only, while those funds offering "worse" deals have randomly chosen to offer IPP funds only (as opposed to the IPPs being their only customers in equilibrium). However, we show that the differences in the performance between the GPP and the IPP funds persist in the sample of providers who offer both the GPP and the IPP schemes.

In the context of risk sharing, pooling investors with different risk characteristics together can improve a scheme's risk diversification opportunities if it is a DB scheme. However, in the case of DC schemes, the investors are the risk bearers, hence this risk-sharing argument does not hold for DC funds (the funds analyzed in the paper).

Window-dressing practices cannot be completely ruled out. However, window dressing of the performance results is more likely to be present in the case of the IPPs than the GPPs given the differences in the financial experience, monitoring powers and abilities, etc. between the two groups of investors. Indeed, the IPP schemes' weaker performance benchmarks could themselves be interpreted as a form of window-dressing. But if window-dressing of some sort is present in the data, it would not weaken our results since correcting for any window dressing would reduce the IPPs' reported performance more than that of the GPPs. Hence, this would widen the observed performance gap between the schemes.

Finally, the argument that the differences in performance result from the providers responding to different characteristics of the IPP and of the GPP cohorts can also be dismissed. This is because, if anything, one would expect that individual investors who start 'consciously' saving for retirement, i.e. enter IPP agreements, are also likely on average to be expecting to live longer. If so, they may feel the need to have more, rather than less, retirement income and hence have a stronger incentive to seek out the best performing schemes, not settle with the less attractive ones.

Taken together, these results have important policy-making implications. They suggest that individual investors need more protection from regulatory bodies than is currently provided. In particular, the results suggest that empowering individual investors may not be enough to solve the

problem of the weak performance of pension funds. For as long as individual investors remain dispersed, their individual voice will not be heard. Given that monitoring and bargaining power of employers seem to play an important role in the provision of quality services, managed accounts may be a better form of pension provision than empowering individual investors.

The uneven treatment of different groups of investors documented for the UK personal pension industry is particularly disturbing given that the UK DC system is one of the oldest and biggest in the world and that the UK (or more precisely the City of London) is one of the world's biggest financial centers which should be expected to provide high quality services. The paper highlights weaknesses of the system in place and of the importance of setting appropriate performance standards and monitoring mechanisms. Appropriate steps should be taken that minimize differences in the performance of personal individual and group pension schemes so that investors trust is rebuilt.[18]

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Table 1. The number of the individual personal pension (IPP) funds and the group personal pension (GPP) funds with the complete record of return statistics in the entire sample (Panel A) and for each GBCG investment category (Panel B). In the Panel B the numbers in the round brackets show the numbers of funds for which the Primary Prospectus Benchmark (PPB) returns were obtained; the numbers in the square brackets show what percentage of the funds in the given category the funds for which the PPB returns were obtained are.

	IPP funds			GPP funds		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
Complete returns	12,214	12,332	14,429	1,441	1,444	1,681
Complete returns and investment style specification	12,017	12,130	14,137	1,430	1,433	1,669
Complete returns, investment style specification and:	10,057	10,124	11,626	1,336	1,339	1,511
PPB identified	7,912	7,950	8,988	979	981	1,120
No PPB	582	582	591	20	20	21
Incomplete specification of PPB	565	582	927	138	139	152
PPB not identified	998	1,010	1,120	199	199	218
Panel B						
Equity	6,339	6,388	7,279	845	847	981
	(5,210)	(5,233)	(5,784)	(632)	(634)	(721)
	[82%]	[82%]	[79%]	[75%]	[75%]	[73%]
Fixed income	1,673	1,684	1,968	259	260	314
	(1,180)	(1,188)	(1,392)	(192)	(192)	(225)
	[70%]	[70%]	[71%]	[77%]	[77%]	[72%]
Money market	297	309	309	48	48	48
	(163)	(169)	(169)	(33)	(33)	(33)
	[55%]	[55%]	[55%]	[69%]	[69%]	[69%]
Allocation	2,631	2,657	3,113	134	134	152
	(975)	(1,009)	(1,064)	(33)	(33)	(37)
	[48%]	[38%]	[34%]	[25%]	[25%]	[24%]
Specialist	192	194	199	2	2	2
	(37)	(37)	(39)	(0)	(0)	(0)
	[19%]	[19%]	[19%]	[0%]	[0%]	[0%]
Alternative	218	218	219	16	16	16
	(143)	(143)	(144)	(15)	(15)	(15)
	[65%]	[65%]	[65%]	[94%]	[94%]	[94%]
Miscellaneous	383	390	390	109	109	109
	(74)	(74)	(74)	(69)	(69)	(69)
	[19%]	[19%]	[19%]	[63%]	[63%]	[63%]
Convertibles	10	10	10	0	0	0
	(6)	(6)	(6)	(0)	(0)	(0)
	[60%]	[60%]	[60%]	[0%]	[0%]	[0%]
Commodities	4	4	4	0	0	0
	(2)	(2)	(2)	(0)	(0)	(0)
	[50%]	[50%]	[50%]	[0%]	[0%]	[0%]
Property	267	274	378	17	17	23
	(123)	(124)	(187)	(5)	(5)	(7)
	[46%]	[45%]	[49%]	[29%]	[29%]	[30%]

Table 2. The summary statistics of the performance measures calculated for the IPP and the GPP funds for the three periods considered in the paper (Panel A) and of the independent variables used in the cross-section analysis (Panel B). The statistics are annualized and expressed in percentage points. R-R_{TB} denotes a fund's excess return above the T-bill; R-R_{PPB} denotes a fund's excess return above the return on its PPB's return; R_{PPB}-R_{TB} denotes the excess return of the PPBs above the T-Bill; Sharpe denotes a fund's Sharpe ratio; $Sharpe_{PPB}$ denotes the Sharpe ratio for the PPBs; M^2 denotes the Modigliani-Modigliani measure for a fund against its PPBs; GIR denotes the geometric information ratio; TE denotes the tracking error and DR denotes the downside risk. $D_{external}$ equals one if a fund is run by an external manager, and zero otherwise; $D_{individual}$ is equal one if a fund is offered by a provider who offers only IPP or GPP schemes and zero if she offers both IPP and GPP schemes; D_{UK} is equal to one if a fund specializes in domestic assets and zero otherwise; D_{nonUK} is equal one if a fund specializes in overseas assets and zero otherwise; Size is a fund's size as of 31 December 2015; Age is the age of funds measured from inception till 31 December 2016.

	IPP funds					GPP funds				
	N	Mean	Stdev	Min	Max	N	Mean	Stdev	Min	Max
Panel A										
R-R_{TB}										
1986-2015	10,057	4.273	4.444	-44.436	24.418	1,336	4.481	2.900	-25.169	17.51
1996-2015	10,124	4.250	4.446	-44.436	24.418	1,339	4.482	2.899	-25.169	17.51
2007-2015	11,626	4.088	4.325	-44.436	24.418	1,511	4.928	2.701	-25.169	18.34
R-R_{PPB}										
1986-2015	7,912	-0.171	3.243	-37.620	15.194	979	0.229	2.543	-31.292	9.139
1996-2015	7,950	-0.177	3.246	-37.620	15.194	981	0.236	2.547	-31.292	9.139
2007-2015	8,988	-0.374	3.288	-37.620	15.194	1,120	0.304	2.523	-31.292	9.325
R_{PPB}-R_{TB}										
1986-2015	7,912	4.666	4.426	-34.296	40.974	979	4.562	3.392	-23.399	35.07
1996-2015	7,950	4.650	4.418	-34.296	40.974	981	4.556	3.391	-23.399	35.07
2007-2015	8,988	4.649	4.314	-34.296	40.974	1,120	4.975	3.386	-33.366	35.07
Sharpe										
1986-2015	7,912	0.407	0.414	-1.008	1.528	979	0.405	0.272	-0.372	1.270
1996-2015	7,950	0.405	0.417	-1.042	1.528	981	0.406	0.276	-0.372	1.308
2007-2015	8,987	0.373	0.459	-1.633	1.499	1,120	0.446	0.282	-0.339	1.251
$Sharpe_{PPB}$										
1986-2015	7,912	0.594	1.048	-0.653	8.626	979	0.609	1.135	-0.188	6.983
1996-2015	7,950	0.593	1.048	-0.725	8.626	981	0.609	1.135	-0.188	6.983
2007-2015	8,988	0.604	1.083	-0.720	9.082	1,120	0.644	1.210	-0.103	7.662
M^2										
1986-2015	7,912	-0.262	2.695	-9.306	7.816	979	0.047	1.805	-3.996	6.181
1996-2015	7,950	-0.270	2.709	-9.526	7.816	981	0.056	1.817	-3.996	6.243
2007-2015	8,987	-0.439	2.823	-9.361	7.916	1,120	0.136	1.916	-4.211	5.805
GIR										
1986-2015	7,716	0.016	0.164	-0.621	0.489	946	0.038	0.116	-0.295	0.438
1996-2015	7,754	0.015	0.166	-0.653	0.490	948	0.038	0.117	-0.295	0.438
2007-2015	8,779	-0.014	0.232	-1.402	0.473	1,087	0.045	0.130	-0.363	0.484
TE										
1986-2015	7,912	6.024	2.986	0.225	15.436	979	4.824	2.369	0.116	13.99
1996-2015	7,950	6.005	2.994	0.210	15.438	981	4.817	2.377	0.116	13.99
2007-2015	8,988	5.969	3.039	0.194	15.454	1,120	4.965	2.563	0.073	14.40
DR										
1986-2015	7,912	1.619	0.164	0.000	1.788	979	1.595	0.245	0.000	1.729
1996-2015	7,950	1.619	0.166	0.000	1.788	981	1.595	0.245	0.000	1.729
2007-2015	8,988	1.626	0.167	0.000	1.788	1,120	1.606	0.241	0.000	1.729
Panel B										
$D_{external}$										
1986-2015	10,057	0.748	0.434	0	1	1,336	0.318	0.466	0	1
1996-2015	10,124	0.743	0.437	0	1	1,339	0.317	0.466	0	1
2007-2015	11,626	0.678	0.467	0	1	1,511	0.292	0.455	0	1
$D_{individual}$										
1986-2015	10,057	0.204	0.403	0	1	1,336	0.111	0.314	0	1
1996-2015	10,124	0.204	0.403	0	1	1,339	0.113	0.316	0	1
2007-2015	11,626	0.200	0.400	0	1	1,511	0.114	0.319	0	1
D_{UK}										
1986-2015	10,057	0.206	0.404	0	1	1,336	0.237	0.426	0	1
1996-2015	10,124	0.206	0.405	0	1	1,339	0.237	0.425	0	1
2007-2015	11,626	0.210	0.407	0	1	1,511	0.240	0.427	0	1
D_{nonUK}										
1986-2015	10,057	0.184	0.388	0	1	1,336	0.153	0.360	0	1
1996-2015	10,124	0.184	0.388	0	1	1,339	0.152	0.359	0	1
2007-2015	11,626	0.178	0.382	0	1	1,511	0.150	0.357	0	1
Size (£mln)										
1986-2015	8,999	178	851	1.01	20,300	832	313	1,280	2.70	23,70
1996-2015	9,066	183	861	1.01	20,300	835	313	1,280	2.70	23,70
2007-2015	10,463	277	1,150	1.01	43,000	950	382	1,600	2.70	23,70
Age (years)										
1986-2015	10,057	8.954	6.680	1	47	1,336	11,004	4.828	1	44
1996-2015	19,124	9.083	6.848	1	47	1,339	11.037	4.874	1	44
2007-2015	11.626	10.853	8.499	1	52	1,151	11.496	4.958	1	44

Table 3. The summary statistics of the monthly returns (in %) on the market indexes consistent with Fung and Hsieh's (1997) model (Panel A): the FTSE All Share index (FTSE), the FTSE All World index (FTSE-world), the Citygroup UK government bonds index (UK-bonds), Citigroup UK WGBI world non-GBP bond all maturities (nonUK-bonds), the Citigroup UK Eurosterling AAA/AA excluding UK total return index (Eurosterling), the UK £ broad index Jan05=100 trade weighted (GBP-index), the Gold bullion LBMA £/troy ounce spot rate (Gold), and the IPD All Property (IPD) index., and of the differences between monthly returns (in %) of the GPP and of the IPP portfolios created based on the ABI PC classification (Panel B).

	Mean	St.dev.	Min	Max	N
Panel A					
FTSE	0.876	4.665	-27.779	13.448	359
FTSE-world	0.687	4.520	-14.127	17.322	263
UK-bonds	0.681	1.843	-6.451	7.538	359
nonUK-bonds	0.690	0.978	-1.845	4.047	359
Eurosterling	0.564	1.320	-3.152	4.311	252
GBP-index	0.057	1.902	-11.812	5.638	311
Gold	0.433	4.913	-11.459	19.743	359
IPD-property	0.743	1.078	-5.268	3.638	348
Panel B					
Equity sector					
UK all companies	0.149	1.086	-6.100	9.200	360
UK smaller companies	-0.178	1.253	-4.600	4.200	143
UK equity income	-0.027	1.136	-3.600	3.200	174
Global equities	0.098	1.285	-10.300	12.700	360
Europe excl. UK equity	0.050	1.049	-5.100	5.400	254
North America equities	0.041	1.149	-4.100	4.400	254
Asia Pacific excl. Japan equity	0.099	1.233	-3.400	6.000	254
Asia Pacific incl. Japan equity	0.011	2.686	-17.000	19.300	227
Japan equity	0.029	1.112	-3.200	4.900	239
Global emerging markets equity	-0.088	1.614	-5.600	8.800	219
Fixed interest sector					
UK gilts	0.203	0.763	-2.200	2.800	162
UK index-linked gilts	0.105	0.527	-3.500	2.800	360
Sterling fixed interest	0.032	1.380	-6.700	6.200	323
Sterling corporate bond	0.163	0.419	-0.900	2.400	191
Sterling high yield	0.123	0.843	-2.700	3.000	115
Sterling long bond	0.054	0.454	-1.800	3.300	269
Sterling strategic bond	-0.025	0.514	-1.200	1.200	52
Global fixed interest	0.042	0.670	-1.700	2.900	269
Mixed investment sector					
Mixed investment 0%-35% shares	-0.061	0.987	-2.600	4.500	302
Mixed investment 20%-60% shares	0.156	0.777	-2.700	4.300	174
Mixed investment 40%-85% shares	0.126	0.604	-2.200	2.400	215
Flexible investment	0.017	1.653	-5.500	9.300	355
Property sector					
UK direct property	0.143	0.735	-3.500	3.300	360
UK property securities	0.068	1.745	-6.900	4.100	116
Global property	-0.146	1.875	-9.600	4.000	113
Other fund sectors					
Money market	0.090	0.117	-0.600	0.600	360
Deposit & treasury	0.058	0.114	-0.900	0.600	360
Specialist	0.178	1.504	-9.200	4.400	193

Table 4. Regression results for the whole sample (Panel A) and for the PPB-restricted sample (Panel B) and the average treatment effects on treated (ATET) obtained from the propensity score matching based on logit regressions for the PPB-restricted sample (Panel C). The dependent variables are $R\text{-}R_{TB}$ and Sharpe, as indicated in the headings of the columns. The standard errors in Panels A and B are clustered by the ABI PC investment style classification. The GBCG dummies are included by not reported in Panel A. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	$R\text{-}R_{TB}$			**Sharpe**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
Const.	-1.878**	-1.830**	-0.440	-0.100	-0.097	-0.000
	(0.013)	(0.019)	(0.493)	(0.197)	(0.215)	(1.000)
D_{GPP}	0.883***	0.905***	1.139***	0.060***	0.064***	0.089***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
$D_{external}$	1.050***	1.057***	0.650***	0.066***	0.066***	0.040*
	(0.000)	(0.000)	(0.004)	(0.006)	(0.007)	(0.056)
LnSize	0.187***	0.182***	0.159***	0.018***	0.018***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)
D_{UK}	1.167***	1.167***	0.631***	0.120***	0.110***	0.076***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D_{nonUK}	0.585*	0.588*	0.438*	0.066***	0.066***	0.060***
	(0.089)	(0.087)	(0.080)	(0.008)	(0.009)	(0.000)
D_{1995}	1.826***	1.828***	1.696***	0.300***	0.301***	0.287***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D_{2004}	0.802**	0.824**	0.517	0.070**	0.073**	0.062*
	(0.029)	(0.025)	(0.122)	(0.044)	(0.040)	(0.064)
D_{2008}	-0.589	-0.623	0.002	-0.073	-0.075	-0.020
	(0.599)	(0.575)	(0.999)	(0.402)	(0.387)	(0.853)
GBCG	Yes	Yes	Yes	Yes	Yes	Yes
R^2adj	0.166	0.168	0.166	0.309	0.327	0.366
N	11,443	11,552	13,539	11,395	11,551	13,538
Panel B						
Const.	-2.941***	-3.023***	-1.465**	-0.149*	-0.157**	-0.080
	(0.002)	(0.002)	(0.027)	(0.051)	(0.043)	(0.247)
D_{GPP}	0.888***	0.915***	1.163***	0.066***	0.073***	0.100***
	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)
$D_{external}$	1.180***	1.201***	0.623**	0.079***	0.080***	0.044**
	(0.001)	(0.001)	(0.016)	(0.003)	(0.004)	(0.047)
LnSize	0.238***	0.239***	0.206***	0.020***	0.021***	0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D_{UK}	1.329***	1.371***	0.859***	0.123***	0.123***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D_{nonUK}	0.372	0.373	0.319	0.044*	0.044*	0.040**
	(0.362)	(0.360)	(0.306)	(0.074)	(0.074)	(0.021)
D_{1995}	1.980***	1.981***	1.902***	0.289***	0.290***	0.281***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D_{2004}	1.122**	1.125**	0.817*	0.073*	0.073*	0.072
	(0.018)	(0.018)	(0.071)	(0.080)	(0.087)	(0.109)
D_{2008}	-0.641	-0.665	-0.113	-0.091	-0.092	-0.038
	(0.588)	(0.572)	(0.940)	(0.306)	(0.294)	(0.723)
GBCG	Yes	Yes	Yes	Yes	Yes	Yes
R^2adj	0.150	0.153	0.150	0.282	0.298	0.361
N	7,718	7,758	8,800	7,718	7,758	8,800
Panel C						
Matched by: External/Internal, ABI PC, Age						
ATET	1.104***	1.192***	1.560***	0.087***	0.058**	0.136***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.019)	(0.000)
N	1,958	1,962	2,240	1,958	1,962	2,240
Matched by: External/Internal, ABI PC, Age,						
ATET	0.745***	1.451***	1.539***	0.019	0.0411*	0.130***
	(0.006)	(0.000)	(0.000)	(0.424)	(0.065)	(0.000)
N	1,238	1,242	1,430	1,238	1,242	1,430

Table 5. Extract of the regression results for the PPB-restricted sample of funds offered by providers offering both GPP and IPP funds (Panel A), by providers offering IPP funds only (Pane l B), by providers offering GPP funds only (Panel C), funds that have PPBs used by IPP and GPP funds (Panel D) and additionally provide both GPP and IPP funds (Panel E). The dependent variables are $R\text{-}R_{TB}$ and Sharpe, as indicated in the heading of the columns. Complete regressions are presented in Appendix 2 (Tables A2-A6). $D_{individual}$ equals one if a fund is offered by a provider offering individual contracts only (i.e. does not offer GPP funds in the Panel B specification and does not offer IPP funds in the Panel C specification). The standard errors are clustered by ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	$R\text{-}R_{TB}$			**Sharpe**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
D_{GPP}	0.805***	0.816***	0.977***	0.053**	0.057**	0.080**
	(0.004)	(0.004)	(0.000)	(0.016)	(0.014)	(0.011)
R^2adj	0.140	0.143	0.151	0.262	0.279	0.368
N	6,189	6,219	7,066	6,171	6,219	7,066
Panel B						
$D_{individual}$	-0.123	-0.126	-0.107	0.004	0.004	0.007
	(0.428)	(0.414)	(0.492)	(0.768)	(0.777)	(0.613)
R^2adj	0.149	0.153	0.149	0.281	0.299	0.367
N	7,099	7,137	8,085	7,080	7,137	8,085
Panel C						
$D_{individual}$	-0.289	-0.224	0.282	0.033	0.040	0.076**
	(0.436)	(0.499)	(0.360)	(0.328)	(0.228)	(0.037)
R^2adj	0.297	0.292	0.271	0.437	0.456	0.503
N	619	621	715	619	621	715
Panel D						
D_{GPP}	0.886***	0.911***	1.034***	0.067***	0.073***	0.091***
	(0.001)	(0.001)	(0.000)	(0.003)	(0.002)	(0.002)
R^2adj	0.194	0.194	0.188	0.295	0.302	0.347
N	5,328	5,352	6,048	5,314	5,352	6,048
Panel E						
D_{GPP}	0.817***	0.819***	0.842***	0.056**	0.059**	0.075**
	(0.005)	(0.006)	(0.003)	(0.015)	(0.015)	(0.022)
R^2adj	0.183	0.183	0.192	0.285	0.292	0.357
N	4,333	4,351	4,936	4,320	4,351	4,936

Table 6. Extract of the regression results for the seven most numerous GBCG investment styles, i.e. equity, fixed income, money market, allocation, alternative, miscellaneous and property, for the PPB-restricted sample. The dependent variables are R-R_{TB} and Sharpe, as indicated in the heading of the columns. Complete regressions are presented in Appendix 2 (Table A7). The standard errors are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	R-R_{TB}			**Sharpe**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Equity						
D_{GPP}	1.239***	1.269***	1.232***	0.090***	0.092***	0.087***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
R^2adj	0.115	0.119	0.094	0.213	0.215	0.191
N	5,143	5,167	5,728	5,143	5,167	5,728
Fixed income						
D_{GPP}	0.222	0.192	0.938**	-0.039	-0.038	0.024
	(0.400)	(0.505)	(0.042)	(0.259)	(0.272)	(0.350)
R^2adj	0.180	0.172	0.157	0.164	0.163	0.092
N	1,187	1,195	1,410	1,187	1,195	1,410
Money market						
D_{GPP}	0.397**	0.406	0.518**	0.603***	0.622***	0.752***
	(0.040)	(0.103)	(0.033)	(0.000)	(0.000)	(0.001)
R^2adj	0.216	0.254	0.127	0.176	0.183	0.159
N	176	181	307	176	181	307
Allocation						
D_{GPP}	1.706***	1.707***	2.301***	0.040	0.040	0.079**
	(0.004)	(0.004)	(0.000)	(0.212)	(0.209)	(0.048)
R^2adj	0.175	0.180	0.203	0.280	0.282	0.312
N	828	830	909	828	830	909
Alternative						
D_{GPP}	3.358***	3.358***	3.397***	0.890***	0.907***	0.953***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
R^2adj	0.287	0.287	0.293	0.259	0.259	0.258
N	136	136	137	136	136	137
Miscellaneous						
D_{GPP}	-0.345	-0.335	1.432	0.067	0.064	0.214*
	(0.706)	(0.726)	(0.108)	(0.608)	(0.627)	(0.090)
R^2adj	0.119	0.110	0.166	0.260	0.252	0.228
N	100	100	103	100	100	103
Property						
D_{GPP}	1.305***	2.064***	2.353***	0.373***	0.735***	0.465***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
R^2adj	0.653	0.615	0.611	0.525	0.506	0.499
N	118	119	174	117	119	174

Table 7. Extract of the regression results for the performance of the seven most numerous GBCG investment styles, i.e. equity, fixed income, money market, allocation, alternative, miscellaneous and property for the PPB-restricted sample when funds are offered by providers offering both IPP and GPP funds and have PPB used by IPP and GPP funds. The dependent variables are R-R_{TB} and Sharpe, as indicated in the heading of the columns. Complete regressions are presented in Appendix 2 (Table A8). The standard errors are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	R-R_{TB}			**Sharpe**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Equity						
D_{GPP}	1.238***	1.236***	0.983**	0.090***	0.090***	0.072***
	(0.001)	(0.001)	(0.013)	(0.000)	(0.000)	(0.007)
R^2adj	0.131	0.134	0.111	0.211	0.214	0.188
N	3,026	3,039	3,357	3,026	3,039	3,357
Fixed income						
D_{GPP}	0.070	0.043	0.675	-0.038	-0.035	0.024
	(0.786)	(0.878)	(0.150)	(0.256)	(0.291)	(0.475)
R^2adj	0.227	0.208	0.152	0.138	0.136	0.062
N	687	690	838	687	690	838
Money market						
D_{GPP}	0.330*	0.400***	0.564***	0.492**	0.519**	0.767***
	(0.056)	(0.001)	(0.002)	(0.027)	(0.019)	(0.004)
R^2adj	0.166	0.275	0.277	0.142	0.153	0.186
N	101	102	142	101	102	142
Allocation						
D_{GPP}	1.189**	1.180**	1.741***	0.018	0.017	0.047
	(0.046)	(0.046)	(0.006)	(0.659)	(0.671)	(0.308)
R^2adj	0.229	0.243	0.251	0.394	0.399	0.421
N	289	289	316	289	289	316
Alternative						
D_{GPP}	4.310**	4.310**	4.243**	1.004**	1.036***	1.211***
	(0.035)	(0.035)	(0.035)	(0.010)	(0.009)	(0.002)
R^2adj	0.433	0.433	0.427	0.384	0.384	0.364
N	77	77	78	77	77	78
Property						
D_{GPP}	2.030***	2.933***	3.770***	0.538***	0.970***	0.736***
	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
R^2adj	0.689	0.626	0.573	0.599	0.571	0.521
N	94	95	143	94	95	143

Table 8. Extract of the regression results for the specifications using the downside risk (DR) as the dependent variable in the PPB-restricted sample (Panel A) and the average treatment effects of treated (ATET) obtained from the propensity score matching based on logit regressions for the PPB-restricted sample (Panel B). Complete regressions corresponding to Panel A are presented in Appendix 2 (Table A9). The standard errors of the regressions in Panel A are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
	All Funds			**Equity**		
D_{GPP}	-0.016	-0.017	-0.024	0.000	-0.000	0.002
	(0.363)	(0.332)	(0.343)	(0.985)	(0.926)	(0.565)
R^2adj	0.575	0.552	0.391	0.089	0.089	0.019
N	7,718	7,758	8,800	5,143	5,167	5,728
	Fixed income			**Money market**		
D_{GPP}	0.039	0.038	0.023	-0.498***	-0.504***	-0.510***
	(0.123)	(0.132)	(0.230)	(0.000)	(0.000)	(0.003)
R^2adj	0.027	0.026	0.040	0.153	0.150	0.251
N	1,187	1,195	1,410	176	181	307
	Allocation			**Alternative**		
D_{GPP}	-0.009	-0.009	-0.005	-0.091**	-0.091**	-0.092**
	(0.255)	(0.248)	(0.551)	(0.023)	(0.023)	(0.023)
R^2adj	0.085	0.078	0.053	0.163	0.163	0.167
N	828	830	909	136	136	137
	Miscellaneous			**Property**		
D_{GPP}	-0.030	-0.029	-0.037	-0.126***	-0.173***	-0.056**
	(0.471)	(0.478)	(0.351)	(0.001)	(0.001)	(0.025)
R^2adj	0.138	0.138	0.165	0.484	0.479	0.570
N	100	100	103	118	119	174
Panel B						
Matched by:	**External/Internal, ABI PC, Age**			**External/Internal, ABI PC, Age, Size**		
ATET	-0.017	-0.003	-0.000	-0.009	0.023	0.022
	(0.365)	(0.825)	(0.974)	(0.653)	(0.382)	(0.272)
N	1,958	1,962	2,240	1,958	1,962	2,240

Table 9. The annualized estimates of the alpha coefficients estimated for the specification $R= \alpha+\sum\beta_I R_{I,t}+\varepsilon_t$, where R is equal R_{GPP}-R_{IPP} in Panel A and R_{GPP} or R_{IPP} (as indicated by the heading) in Panel B. The funds are grouped based on the ABI PC classification. The dependent variables, R_I, are the returns on: FTSE All Share(FTSE), or FTSE-All World (FTSE-world), as specified in the top row of Panel A, in addition to the UK government bonds index (UK-bonds), the non-UK government bonds index (nonUK-bonds), the Citigroup UK Eurosterling AAA/AA excluding UK total return index (Eurosterling), the UK effective trade weighted pound sterling index against major currencies (GBP-index), the gold index (Gold) and the IPD All Property (IPD) index. The standard errors have the GARCH(n,k) specification ($\sigma^2_t =\alpha_1 +\sum\gamma_i\sigma^2_{t-i}+\sum\delta_i\varepsilon^2_{t-i}$). Complete regressions are presented in Appendix 2 (Tables A10-A12). P-values of the estimated coefficients are shown in the parenthesis.***-1% significance, **-5% significance and *-10% significance.

	Panel A				**Panel B**				
	FTSE		**FTSE-world**		**R_{GPP}**		**R_{IPP}**		
	α	$R>\chi^2$	α	$R>\chi^2$	α	$R>\chi^2$	α	$R>\chi^2$	N
Equity sector	1.044*	0.000	1.032*	0.000	8.520*	0.000	7.716*	0.000	250
of which	(0.094)		(0.100)		(0.055)		(0.071)		
UK all	1.056*	0.025	1.056*	0.028	7.356*	0.000	6.696	0.000	250
	(0.063)		(0.066)		(0.082)		(0.104)		
UK smaller	-2.220	0.004	-2.040	0.003	0.007	0.000	0.007	0.000	142
	(0.177)		(0.189)		(0.215)		(0.141)		
UK equity	2.088	0.002	2.292	0.001	6.108	0.000	6.468	0.000	173
	(0.148)		(0.109)		(0.226)		(0.169)		
Global equities	1.104**	0.001	1.08**	0.002	8.28**	0.000	7.308*	0.000	250
	(0.041)		(0.049)		(0.046)		(0.076)		
Europe excl. UK	2.688***	0.001	2.700***	0.001	9.48*	0.000	9.048*	0.000	250
	(0.003)		(0.003)		(0.070)		(0.096)		
North America	0.900	0.001	0.924	0.001	10.5**	0.000	9.54**	0.000	250
	(0.242)		(0.245)		(0.012)		(0.026)		
Asia Pacific	0.300	0.247	0.336	0.212	12.024**	0.000	11.556*	0.000	250
	(0.769)		(0.745)		(0.041)		(0.052)		
Asia Pacific incl.	2.616*	0.789	2.88*	0.912	9.984*	0.000	7.404	0.000	226
	(0.091)		(0.070)		(0.079)		(0.132)		
Japan	-0.432	0.245	-0.432	0.249	7.512*	0.000	8.34*	0.000	238
	(0.563)		(0.574)		(0.100)		(0.098)		
Global emerging	0.888	0.032	0.864	0.034	8.616	0.000	7.62	0.000	218
	(0.457)		(0.476)		(0.203)		(0.254)		
Fixed interest	-0.360	0.000	-0.384	0.000	-0.924	0.000	-1.056*	0.000	250
of which	(0.437)		(0.408)		(0.260)		(0.053)		
UK gilt	-0.528	0.000	-0.468	0.000	-2.388***	0.000	-0.576*	0.000	161
	(0.220)		(0.282)		(0.006)		(0.094)		
UK index-linked	0.864***	0.000	0.876***	0.000	1.644	0.000	0.624	0.000	250
	(0.001)		(0.001)		(0.227)		(0.612)		
Sterling fixed	1.224***	0.000	1.212***	0.000	-0.588	0.000	-1.692***	0.000	233
	(0.000)		(0.000)		(0.207)		(0.000)		
Sterling	0.816***	0.000	0.804***	0.000	-0.24	0.000	-3.072***	0.000	190
	(0.008)		(0.009)		(0.770)		(0.000)		
Sterling high	0.972	0.000	1.152*	0.000	8.148***	0.000	8.148***	0.000	114
	(0.113)		(0.077)		(0.000)		(0.000)		
Sterling long	-0.192	0.000	-0.144	0.000	-3.684***	0.000	-4.200***	0.000	250
	(0.510)		(0.615)		(0.000)		(0.000)		
Global fixed	0.600	0.000	0.600	0.000	3.240***	0.000	2.064**	0.000	250
	(0.365)		(0.364)		(0.006)		(0.027)		
Mixed investments	1.536***	0.000	1.524***	0.000	5.484*	0.000	3.936	0.000	250
of which	(0.006)		(0.007)		(0.077)		(0.186)		
Mixed	-0.6000	0.000	-0.396	0.000	2.268***	0.000	1.212	0.000	250
	(0.503)		(0.651)		(0.000)		(0.280)		
Mixed	2.364***	0.000	2.352***	0.000	4.68*	0.000	2.076	0.000	173
	(0.000)		(0.000)		(0.056)		(0.390)		
Mixed	2.244***	0.003	2.232***	0.002	4.884	0.000	3.648	0.000	214
	(0.000)		(0.000)		(0.151)		(0.267)		
Flexible	0.036	0.000	0.084	0.000	6.276**	0.000	6.132	0.000	250
	(0.974)		(0.936)		(0.050)		(0.106)		
Property sector	0.804	0.017	0.816	0.020	2.016***	0.000	0.468	0.000	250
of which	(0.229)		(0.223)		(0.001)		(0.659)		
UK direct	-2.004	0.000	-1.896	0.000	-5.328*	0.000	-1.596	0.000	112
	(0.299)		(0.338)		(0.069)		(0.736)		
UK property	1.800***	0.297	1.788***	0.295	1.272***	0.000	-1.584***	0.000	250
	(0.003)		(0.004)		(0.010)		(0.000)		
Global property	1.644	0.029	1.836	0.016	8.076	0.000	0.624*	0.000	115
	(0.539)		(0.485)		(0.144)		(0.094)		
Other funds	1.908**	0.976	1.836**	0.943	5.112***	0.159	4.092***	0.001	250
of which	(0.023)		(0.034)		(0.000)		(0.000)		
Money market &	0.804***	0.434	0.804***	0.462	4.944***	0.081	3.192***	0.040	250
& Treasury	(0.000)		(0.000)		(0.000)		(0.000)		
Specialist	1.608*	0.369	1.596*	0.425	5.604*	0.000	3.564	0.000	192
	(0.088)		(0.099)		(0.100)		(0.248)		

Table 10. Extract of the regression results for the specifications using R_{PPB}-R_{TB} and $Sharpe_{PPB}$ (as indicated by the headings of the columns) as the dependent variables (Panel A) and the average treatment effects on treated (ATET) obtained from the propensity score matching based on logit regressions for the PPB-restricted sample (Panel B). Complete regressions of Panel A are presented in Appendix 2 (Table A13). The standard errors are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	R_{PPB}-R_{TB}			**$Sharpe_{PPB}$**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
All Funds						
D_{GPP}	0.440*	0.449*	0.503**	0.141	0.143	0.109
	(0.056)	(0.051)	(0.022)	(0.143)	(0.136)	(0.307)
R^2adj	0.088	0.089	0.081	0.369	0.369	0.316
N	7,718	7,758	8,800	7,718	7,758	8,800
Equity						
D_{GPP}	0.361	0.369	0.172	0.036*	0.037**	-0.032
	(0.287)	(0.270)	(0.522)	(0.054)	(0.040)	(0.609)
R^2adj	0.048	0.052	0.039	0.095	0.097	0.048
N	5,143	5,167	5,728	5,143	5,167	5,728
Fixed income						
D_{GPP}	0.112	0.094	0.548*	-0.063	-0.068	-0.033
	(0.675)	(0.721)	(0.061)	(0.256)	(0.219)	(0.480)
R^2adj	0.144	0.146	0.193	0.103	0.102	0.058
N	1,187	1,195	1,410	1,187	1,195	1,410
Money market						
D_{GPP}	0.079	0.092	0.004	0.028	0.056**	0.048*
	(0.198)	(0.171)	(0.919)	(0.313)	(0.048)	(0.075)
R^2adj	0.233	0.270	0.601	0.141	0.195	0.495
N	176	181	307	176	181	307
Allocation						
D_{GPP}	3.633***	3.631***	3.840***	-0.037	-0.037	-0.016
	(0.000)	(0.000)	(0.000)	(0.709)	(0.708)	(0.880)
R^2adj	0.118	0.118	0.101	0.171	0.171	0.160
N	828	830	909	828	830	909
Alternative						
D_{GPP}	-0.059	-0.059	-0.020	-0.875	-0.875	-0.803
	(0.865)	(0.865)	(0.950)	(0.319)	(0.319)	(0.449)
R^2adj	0.091	0.091	0.088	0.273	0.273	0.266
N	136	136	137	136	136	137
Miscellaneous						
D_{GPP}	-0.569	-0.530	0.795	1.035	1.036	1.298
	(0.548)	(0.577)	(0.493)	(0.137)	(0.136)	(0.102)
R^2adj	0.149	0.152	0.136	0.747	0.747	0.748
N	100	100	103	100	100	103
Property						
D_{GPP}	0.503**	0.887**	0.453	0.116**	0.219***	0.079
	(0.046)	(0.013)	(0.228)	(0.015)	(0.003)	(0.213)
R^2adj	0.119	0.118	0.102	0.171	0.171	0.160
N	118	119	174	118	119	174
Panel B						
Matched by: External/Internal, ABI PC, Age						
ATET	0.455**	0.241	0.451**	0.199***	0.084*	0.150***
	(0.040)	(0.218)	(0.011)	(0.000)	(0.089)	(0.001)
N	1,958	1,962	2,240	1,958	1,962	2,240
Matched by: External/Internal, ABI PC, Age, Size						
ATET	0.248	0.733***	0.492**	0.138**	0.164***	0.125**
	(0.346)	(0.002)	(0.031)	(0.017)	(0.001)	(0.026)
N	1,238	1,242	1,430	1,238	1,242	1,430

Table 11. Extract of the regression results for the specifications using $R\text{-}R_{PPB}$ and M^2 (as indicated by the headings of the columns) as the dependent variables and the average treatment effects on treated (ATET) obtained from the propensity score matching based on logit regressions for the PPB-restricted sample (Panel B). Complete results are presented in Appendix 2 (Table A14). The standard errors are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	$R\text{-}R_{PPB}$			**M^2**		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
All funds						
D_{GPP}	0.540**	0.555**	0.798***	0.475**	0.496**	0.730***
	(0.024)	(0.020)	(0.001)	(0.041)	(0.033)	(0.001)
R^2adj	0.057	0.058	0.074	0.053	0.053	0.068
N	7,718	7,758	8,800	7,718	7,758	8,800
Equity						
D_{GPP}	1.022***	1.039***	1.232***	0.896***	0.916***	1.109***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
R^2adj	0.079	0.077	0.078	0.064	0.063	0.065
N	5,143	5,167	5,728	5,143	5,167	5,728
Fixed income						
D_{GPP}	0.053	0.094	0.408	0.132	0.175	0.427*
	(0.748)	(0.552)	(0.176)	(0.376)	(0.247)	(0.069)
R^2adj	0.054	0.058	0.155	0.036	0.04	0.084
N	1,187	1,195	1,410	1,187	1,195	1,410
Money market						
D_{GPP}	0.331	0.318	0.514**	0.293*	0.277	0.390*
	(0.109)	(0.235)	(0.025)	(0.059)	(0.260)	(0.098)
R^2adj	0.287	0.311	0.232	0.200	0.235	0.273
N	176	181	307	176	181	307
Allocation						
D_{GPP}	-1.924***	-1.924***	-1.539***	-0.984***	-0.983***	-0.355**
	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.045)
R^2adj	0.082	0.083	0.079	0.140	0.142	0.137
N	828	830	909	828	830	909
Alternative						
D_{GPP}	3.417***	3.417***	3.417***	-0.163	-0.163	-0.227
	(0.001)	(0.001)	(0.001)	(0.295)	(0.295)	(0.158)
R^2adj	0.209	0.209	0.208	0.158	0.158	0.183
N	136	136	137	136	136	137
Miscellaneous						
D_{GPP}	0.155	0.061	0.638	-0.151	-0.234	0.296
	(0.914)	(0.966)	(0.614)	(0.905)	(0.854)	(0.797)
R^2adj	0.194	0.182	0.187	0.396	0.389	0.393
N	100	100	103	100	100	103
Property						
D_{GPP}	0.905***	1.177***	1.900***	0.818***	1.758***	2.258***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
R^2adj	0.121	0.133	0.354	0.203	0.200	0.351
N	118	119	174	118	119	174
Panel B						
Matched by: External/Internal, ABI PC, Age						
ATET	0.859***	0.671***	1.056***	0.447***	0.805***	0.749***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	1,958	1,962	2,240	1.958	1,962	2,240
Matched by: External/Internal, ABI PC, Age, Size						
ATET	0.497***	0.718***	1.047***	0.334**	0.560***	0.810***
	(0.004)	(0.002)	(0.000)	(0.031)	(0.005)	(0.000)
	1,238	1,242	1,430	1,958	1,962	2,240

Table 12. Extract of the regression results for the specifications using the geometric information ration (GIR) and the tracking error (TE) as the dependent variables (as specified by the headings of the columns) and the average treatment effects on treated (ATET) obtained from the propensity score matching based on logit regressions for the PPB-restricted sample (Panel B). Complete results are presented in Appendix 2 (Table A15). The standard errors are clustered by the ABI PC investment style classification. P-values are reported in the parenthesis. ***-1% significance, **-5% significance and *-10% significance.

	GIR			TE		
	1986-2015	1996-2015	2007-2015	1986-2015	1996-2015	2007-2015
Panel A						
All Funds						
D_{GPP}	0.033**	0.035**	0.070***	-0.910***	-0.889***	-0.782***
	(0.021)	(0.017)	(0.005)	(0.000)	(0.001)	(0.004)
R^2adj	0.080	0.087	0.290	0.395	0.395	0.401
N	7,512	7,552	8,581	7,718	7,758	8,800
Equity						
D_{GPP}	0.041***	0.042***	0.058***	-1.289***	-1.255***	-1.080***
	(0.008)	(0.007)	(0.000)	(0.000)	(0.001)	(0.003)
R^2adj	0.066	0.067	0.072	0.192	0.191	0.202
N	5,120	5,144	5,695	5,143	5,167	5,728
Fixed income						
D_{GPP}	-0.002	0.002	0.038	-0.182	-0.181	-0.513
	(0.872)	(0.892)	(0.101)	(0.497)	(0.502)	(0.266)
R^2adj	0.041	0.046	0.073	0.106	0.107	0.112
N	1,167	1,175	1,390	1,187	1,195	1,410
Money market						
D_{GPP}	0.264***	0.272***	0.399***	-0.255	-0.247	-0.597*
	(0.008)	(0.003)	(0.008)	(0.365)	(0.288)	(0.051)
R^2adj	0.189	0.193	0.280	0.200	0.151	0.104
N	168	173	296	176	181	307
Allocation						
D_{GPP}	-0.060***	-0.060***	-0.025**	1.215***	1.222***	1.947***
	(0.001)	(0.001)	(0.048)	(0.009)	(0.010)	(0.000)
R^2adj	0.108	0.114	0.166	0.106	0.105	0.137
N	784	786	865	828	830	909
Alternativ						
D_{GPP}	0.380**	0.380**	0.369***	-0.037	-0.037	-0.040
	(0.017)	(0.017)	(0.006)	(0.893)	(0.893)	(0.884)
R^2adj	0.207	0.207	0.235	0.286	0.286	0.322
N	55	55	56	136	136	137
Miscellane						
D_{GPP}	-0.027	-0.031	0.050	-0.075	-0.063	0.565
	(0.774)	(0.747)	(0.664)	(0.949)	(0.957)	(0.639)
R^2adj	0.087	0.077	0.067	0.327	0.329	0.313
N	81	81	84	100	100	103
Property						
D_{GPP}	0.046***	0.077***	0.022*	-2.335***	-2.632***	-2.349***
	(0.000)	(0.000)	(0.058)	(0.001)	(0.001)	(0.004)
R^2adj	0.324	0.297	0.267	0.434	0.446	0.410
N	118	119	174	118	119	174
Panel B						
Matched by: External/Internal, ABI PC, Age						
ATET	0.043***	0.051***	0.095***	-0.461***	-0.374**	-0.541***
	(0.000)	(0.000)	(0.000)	(0.004)	(0.021)	(0.001)
N	1,892	1,896	2,174	1,958	1,962	2,240
Matched by: External/Internal ABI PC, Age, Size						
ATET	0.043**	0.011	0.058***	-1.062***	-0.452**	-0.418*
	(0.011)	(0.372)	(0.000)	(0.001)	(0.048)	(0.071)
N	1,190	1,194	1,382	1,238	1,242	1,430