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Active Management in Polish Domestic Treasury Bond Funds

Keywords: passive investing; bond funds; active share; portfolio concentration

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Abstract

Theoretical background: An increase in the interest in passive investing has been one of the most important trends on financial market over the last two decades. However, passive portfolio management is not limited to index funds and passive exchange-traded funds (ETFs). Despite the declared active approach to investing, in practice some active fund managers construct portfolios whose structure is quite similar to the index (usually a fund benchmark). Simultaneously, these funds charge relatively high fees, inadequate to the involvement in the investment process. In order to estimate the scale of this phenomenon, the activity and investment style of actively managed funds are examined.
Purpose of the article: The main aim of the paper is to determine the degree of active approach to portfolio management by domestic Treasury bond funds investing in the Polish currency. Specific objectives include examining the relationship between the level of the fund's active management and the size of the fund (assets under management) as well as the investment portfolio concentration.
Research methods: In the quantitative study, the portfolio-based measure of management activity, commonly used in the subject literature, was applied (adjusted to the bond fund), i.e. bond-level active share ratio. Moreover, to assess the portfolio concentration of the funds from the research sample, two measures were calculated: concentration ratio (CR5) and Herfindahl–Hirschman Index (HHI).
Main findings: The results of the study have proved that a majority of the investigated domestic Treasury bond funds manage their portfolios in an active manner. Additionally, the research has shown that the funds

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managing larger assets, with a low degree of portfolio concentration, are characterized by relatively lower values of the active share ratio, i.e. their portfolios are relatively passively managed.

Introduction

The first two decades of the 21st century saw a huge increase in the interest in passive investing. This phenomenon can be observed in particular in the mutual fund sector, where both index funds and passively managed exchange-traded funds (ETFs) achieve record levels of assets and net capital inflows. Still, entities declaring active management play a dominant role in the global investment fund market. Their managers' declarations, however, sometimes differ from their actual approach to asset management. Instead of active "bets", they prefer to construct a portfolio whose composition is largely similar to the composition of the index, usually a fund benchmark. Although such an approach, known as closet indexing, does not contradict applicable legal provisions, it is ethically questionable for two reasons at least. Firstly, misleading investors about how their money is managed is a form of abuse by asset management companies and presents a clear example of misselling in the financial services market. Secondly, fund participants are burdened with relatively high costs, inadequate to practical involvement in the investment process, and, thus, incur measurable losses (management fees in active funds are usually several times higher than in passive funds).

For years, investigating the investment style of actively managed investment funds has been of interest to both financial market supervision authorities (ESMA, 2016), organizations representing the interests of the clients of companies providing financial services (Better Finance, 2016), as well as academics (Cremers & Petajisto, 2009; Schlanger et al., 2012; Petajisto, 2013; Cremers et al., 2016; Frazzini et al., 2016). Scientific research of this kind was conducted mainly in developed markets, primarily in the US. However, it is worth to repeat such study in emerging markets like the Polish one, since it is very dynamically growing in the European Union, but also because it has a different history, background, and the structure of the investment funds than in the most developed fund market in the world, namely in the USA. In Poland, the research has been carried out occasionally so far (Miziołek, 2015; Bogdanowicz et al., 2017; Trzebiński, 2022), and has been limited mainly to equity funds (except Perez and Szymczyk [2022] who studied different types of funds).

The main aim of the article is to assess the degree of active approach to investment portfolio management by Polish funds belonging to one of the most prominent categories of debt funds, i.e. domestic Treasury bond funds investing in the Polish currency. The research sample covered 21 funds included in this category by the Chamber of Fund and Asset Management at the end of 2020. The study is the first research on the active management in domestic Treasury bond funds denominated in local currency in Polish literature. It is also, to the best of the author's knowledge, one of the first studies on the subject in emerging markets.

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The applied research method is an analysis of the composition of investment portfolios, with the help of hand-collected, unique dataset from annual financial statements. The study employed a measure commonly used in the subject literature, i.e. the active share ratio developed by Cremers and Petajisto, adjusted to the bond funds specificity. It measures the share of the long-short portfolio, i.e. the portfolio that represents all active "bets" taken by the fund in the entire investment portfolio.

Overall, the results of the study showed that a majority of the analyzed domestic Treasury bond funds declaring an active approach to the investment process – taking into account both their number and the assets under management – manage their portfolios in an active manner. This conclusion is fundamentally different from the findings regarding Polish domestic equity funds (Miziołek, 2015; Bogdanowicz et al., 2017; Trzebiński, 2022), which are managed relatively passively. At the same time, it was shown that funds managing larger assets and characterized by a low degree of portfolio concentration have relatively lower active share ratios, and, therefore, their portfolio composition is closer to the TBSP Index than the portfolio composition of funds with lower assets and a higher degree of portfolio concentration.

The remainder of this paper is structured as follows. The first section presents a review of literature and is followed by two parts demonstrating the research methodology, as well as data description and basic statistics of the sample. The next section focuses on the results of the study, while the last section includes discussion and concludes the study.

Literature review

The research aimed at assessing the degree of active management of the investment fund portfolio using the active share ratio has been conducted since the first decade of the 21st century. There are two main ways to calculate this indicator. The first one was proposed by Miller (2007), who defined it as the proportion of a fund's portfolio invested in its active component. Active part of the portfolio is entirely uncorrelated with the benchmark, while passive component is perfectly correlated with the index. Miller's approach to the estimation of active share uses the correlation of a fund's return versus its benchmark index. This method is more traditional and easier to apply than the method proposed by Cremers and Petajisto, described below, as it is return-based and does not require managed portfolio composition data. Additionally, it is not sensitive to fund managers' tendency to "window dress" their portfolios by the end of performance reporting periods.

Despite the aforementioned advantages, this method of active share calculation has not gained as much interest as the one introduced by Cremers and Petajisto (2009). This measure indicates the extent to which the weights of securities (usually

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stocks) held in the fund differ from their weightings in the benchmark index.[1] Contrary to the indicator developed by Miller, this one is not based on the performance of the fund, but on the composition of its portfolio, hence it requires much more work.[2] Nevertheless, it has been widely used by researchers for several years, as it allows to determine more precisely how actively fund managers manage the portfolio. It is also a standard tool in the research on closet indexing.[3]

The first study using the active share was conducted by Cremers and Petajisto (2009) on a sample of 2,647 U.S. equity funds operating in the years 1980–2003.[4] They employed the combination of active share and tracking error to describe various active management strategies engaged by fund managers. The obtained results were related to such fund characteristics as their size (measured by the assets under management), costs (expense ratio), and turnover. The main research finding was that mutual funds in the United States with a high active share generate risk-adjusted outperformance. This result was confirmed in subsequent years, e.g. by Amihud and Goyenko (2013), and Caquineau et al. (2016). Meanwhile, the studies by Schlanger et al. (2012), and Frazzini et al. (2016) did not support this conclusion.

The research using the active share ratio has been conducted mainly in relation to funds operating in the US mutual fund market. Similar research has been carried out somewhat less frequently in other developed markets, and occasionally in emerging markets. So far, the most comprehensive study on closet indexing, using, *inter alia*, the active share ratio, has been conducted by Cremers et al. (2016). They examined the relationship between indexing and active management in the mutual fund sector in 32 countries (including Poland), and found that the assets of Polish funds classified as closet indexers constituted 58% of the assets of all active open-end equity funds as of December 2010.

In Poland, the research on active share has been carried out three times only. Miziołek (2015) applied this ratio investigating 47 domestic, universal open-end and specialised open-end equity funds at the end of 2013. He found that a majority of funds (87% in terms of quantity and as many as 97% in asset terms) were managed quite passively – the share of the active part of their investment portfolio was less

[1] Then, Cremers (2017) introduced a new, alternative formula for the active share ratio that expresses it as 100% minus the sum of the overlapping weights between the portfolio and its benchmark. This approach assumes viewing all portfolios as perfectly active (100% active share) and making reductions according to the overlapping positions between the benchmark and portfolio, rather than treating a portfolio as perfectly passive and increasing its active share by adding the absolute and relative excess weights between the portfolio and benchmark.

[2] Active share ratios mentioned later in the article will refer to the measure developed by Cremers and Petajisto (2009), unless stated otherwise.

[3] Closet indexing is a practice used by asset management companies, in particular by investment fund management companies, consisting in a passive approach to portfolio management by funds declaring an active approach to this process, while burdening fund participants with relatively high costs (management fees), inadequate to the practical involvement in the investment process.

[4] Petajisto (2013) continued and expanded this research a few years later – the research sample was increased to 2,740 funds and the research period was extended to 2009.

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than 60%. A similar study was conducted by Bogdanowicz et al. (2017), who calculated the active share ratio for 26 open-end domestic equity funds. The results they obtained turned out to be quite similar – the percentage of funds with the active share ratio below 60% was 69%, and their assets accounted for 92% of total assets of the entire research sample. These results were higher than in the aforementioned Cremers study. Trzebiński (2022) examined 34 equity funds and found that the average value of the active share ratio was 46% in the 2017–2020 period.

Almost the entire research on active share to date has been related to equity funds (portfolios). It is only relatively recently that analogous research on bond funds has been started, hence the number of studies is quite insignificant as of now, and they are limited to developed markets.

Panesar (2018) calculated active share ratio (applying two different formulas – from 2009 and 2017) for 59 global high-yield credit funds at the end of 2017. The average active share amounted to 46.71%, while most funds' active shares were between 43–50% and 90–99% (using active share formulas from 2009 and 2017, respectively). Furthermore, he investigated the relation between high-yield credit funds' active shares and their volatility, tracking error, relative return, and asset under management. The results turned out to be similar to those presented by Cremers for equity funds, whereas differences can be explained by different characteristics of both asset classes.

Gurwitz et al. (2021), when assessing the performance of 512 actively managed U.S. open-end municipal bond mutual funds between 1999 and 2020, calculated active share applying the formula developed by Miller. The average active share for the aggregate sample was only 25% – a figure consistent with Miller's (2007) results for equity funds – implying that as much as 75% of a typical municipal bond fund's portfolio is identical to a benchmark index portfolio. The active share was relatively high (35–40%) for high-yield and short-term national funds, and significantly lower (23%) for single-state funds, where a portfolio manager's investment constraints can be greater. The study also revealed a weakly convex relation between alpha and the active share ratio, since both the highest- and lowest-performing funds had relatively high active share scores.

The most comprehensive research on active management in bond funds to date was carried out by Choi et al. (2021). They examined 541 US actively managed, taxable bond funds from four categories (government, investment-grade, high-yield, and "other" funds) in the 2002–2015 period at a quarterly frequency. They proposed and then calculated four active share ratios using different levels of holdings aggregation: bond-level active share, firm-level active share, rating-level active share, and maturity-level active share. Additionally, they measured internal and external active shares, i.e. ratios that measure funds' active management with respect to the securities inside and outside their benchmark's asset classes, respectively. The obtained results demonstrated high levels of bond funds' active management. The average bond-level active share was 93.2%, ranging from 73.6% in "other funds" category to 96.4% in

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investment-grade bond funds. The average internal active share at the bond level amounted to 84%, indicating that the majority of bond-level active management comes from investing within the primary asset class. On the other hand, the average firm-level active share was much lower (60.2%), oscillating between 45.6% ("other funds") and 80.2% (high-yield funds). Additionally, they found that dispersion in bond-level active share is predominantly explained by variation in firm-, rating-, and maturity-level active shares, pointing that funds take active "bets" in reference to those dimensions.

Interestingly, most above-mentioned studies on bond funds (mainly based on the classical active share formula proposed by Cremers and Petajisto) are one of the few using data on the components of bond funds' portfolios. Meanwhile, as Lithin et al. (2021) noted, other literature on the performance of bond funds, applying holdings-based measures at both aggregate and security levels, is really scarce, unlike studies on equity funds.[5] Therefore, studies on the active management in bond funds, applying the active share ratio, provide an opportunity to bridge the research gap.

Research methods

Applying active share to debt portfolios requires a different approach from the one applied towards equities, because companies/sovereigns issue various types of bonds with different characteristics. This results in a difference between active share at bond (security) level and active share at issuer level. The latter ratio is generally lower than the former, as bonds from one issuer are considered to be equal and the overweight of a certain bond from one issuer in the portfolio does not necessarily lead to an increase of active share. In turn, active share at bond level treats each security individually and takes into account differences in its characteristics. Still, both ratios may provide useful information on the active management in a bond portfolio.

Contrary to equities, the nature of fixed income securities is, however, much more complicated, which leads to problems in applying standard calculation and interpreting active share results in debt portfolios. Bonds are multidimensional – they differ, e.g. in the interest rate, maturity, and currency. This means that even if a bond fund's portfolio is in a given degree matched to a benchmark by percentage allocation to issuer, it does not necessarily mean that it is equally matched by duration or currency. Therefore, active share is especially difficult to interpret in corporate bond funds with exposure to large companies and sovereign bond funds, since these entities tend to issue dozens of bonds. In these cases, even with relatively high active share values, bond portfolios can behave similarly to the benchmark.

Bond-level active share ratio captures the overlap between a fund and its benchmark at the most granular level – in relation to individual bond issues (bond series).

[5] The first study of the kind was by Cici and Gibson (2012).

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It will be calculated in two versions. The first one adopts directly the formula developed by Choi et al. (2021):

$$BLAS\_TA = \frac{1}{2}\sum_{i=1}^{N}\left|w_{fund,i}\_TA - w_{benchmark,i}\right|$$

where:
BLAS_TA – bond-level active share_total assets,
$W_{fund,i}\_TA$ – portfolio weight of bond issue *i* in the fund's total assets,
$W_{benchmark,i}$ – portfolio weight of bond issue *i* in the benchmark portfolio.

The measure considers the portfolio weights of each distinct bond in a fund's total assets.

The second approach developed by the author assumes that the weight of each security in a fund's portfolio is calculated with respect to its weight exclusively in debt portfolio, i.e. in the part of the portfolio that includes only debt securities:

$$BLAS\_DP = \frac{1}{2}\sum_{i=1}^{N}\left|w_{fund,i}\_DP - w_{benchmark,i}\right|$$

where:
BLAS_DP – bond-level active share_debt portfolio,
$W_{fund,i}\_DP$ – portfolio weight of bond issue *i* in the fund's debt portfolio.

This modification is significant, as bond funds may invest some of their capital in other types of securities or hold them in cash. Thanks to this, the measure allows to assess the extent to which the fund's bond portfolio (not total assets) differs in relation to the benchmark portfolio (i.e. bond index).

Data description and sample statistics

The study employs mainly three datasets. The first dataset contains information on bond funds in Poland investing in domestic Treasury bonds denominated in Polish currency. This category includes funds, in case of which at least 80% of their net assets is invested in securities issued or guaranteed by the State Treasury or the National Bank of Poland, denominated in Polish zloty (PLN). The second dataset contains information about investment portfolios of analysed funds as of December 31, 2020. The third dataset provides information on the Treasury BondSpot Poland (TBSP) Index.

Sources of these datasets cover both first-hand data collected by the author, and secondary data collected by other entities, especially by the Chamber of Fund and Asset Management – an organization representing the investment fund companies (IFCs) environment in Poland and gathering various types of data on the Polish investment fund market.

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The dataset containing information about investigated category of investment funds was derived from monthly reports (statistic datasets) published by the Chamber of Fund and Asset Management, as well as from funds' information prospectuses. The data from Chamber of Fund and Asset Management allowed to identify funds constituting the research sample, i.e. the funds classified in the category of "Bond_Treasury_PLN (Domestic)".[6] This group involved 22 (sub)funds managed by 15 IFCs at the end of 2020. Since it was impossible to obtain the financial statement of one of these funds, the final research sample consisted of 21 (sub)funds managed by 15 IFCs, whose assets – PLN 15.7 billion – constituted 98.7% of the assets of all funds belonging to this investment category. Table 1 shows basic information on analysed funds in the sample.

Table 1. Basic information on the funds included in the research sample (as of December 31, 2020)

(Sub)Fund	Investment fund company (IFC)	NAV (PLN thou.)	Benchmark	Defined method of portfolio management (A – active, P – passive)
Allianz Polskich Obligacji Skarbowych	Allianz Polska	286,108	TBSP Index	A
AXA Obligacji	AXA	465,840	TBSP Index	A
BPS Spokojna Inwestycja	BPS	37,880	-	A
EQUES Obligacji SFIO	EQUES Investment	4,895	no data	A
Esaliens Obligacji	Esaliens	221,585	Citigroup Poland Government Bond Index All Maturities Local Terms	A
Generali Korona Obligacje	Generali	877,988	Bloomberg Barclays Series-E Poland Govt 1-5 Yr Bond Index	A
Generali Obligacje Aktywny	Generali	196,375	-	A
inPZU Obligacje Polskie	PZU	204,972	TBSP Index	P
MetLife Obligacji Skarbowych	MetLife	96,673	90% FTSE PGBI + 10% WIBID 1M	A
NN FIO Obligacji 2	NN Investment Partners	2,097,201	ICE BofAML Poland Government Index (G0PL)	A
NN Indeks Obligacji	NN Investment Partners	79,960	TBSP Index	P
NN Obligacji	NN Investment Partners	3,720,032	ICE BofAML Poland Government Index (G0PL)	A
Noble Fund Obligacji	Noble Funds	592,222	TBSP Index	A
Pekao Dłużny Aktywny	Pekao	11,101	70% ICE BofAML All Maturity Polish Government Index + 30% ICE BofAML Emerging Markets External Sovereign Index	A

[6] The classification of investment funds developed by the Chamber of Fund and Asset Management is based on declarations submitted by IFCs. The criterion that qualifies a fund to a given category is the compliance of its actual investment policy with the definition of a given category.

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(Sub)Fund	Investment fund company (IFC)	NAV (PLN thou.)	Benchmark	Defined method of portfolio management (A – active, P – passive)
Pocztowy Obligacji	IPOPEMA	84,443	1.5* WIBID 6M	A
PZU Dłużny Aktywny	PZU	170,263	TBSP Index	A
PZU Papierów Dłużnych Polonez	PZU	2,791,917	TBSP Index	A
Quercus Obligacji Skarbowych	Quercus	312,477	–	A
Santander Obligacji Skarbowych	Santander	1,570,649	ICE BofA Poland Government Index (G0PL)	A
Santander Prestiż Obligacji Skarbowych	Santander	1,463,373	ICE BofA Poland Government Index (G0PL)	A
Skarbiec-Obligacja	Skarbiec	417,991	90% FTSE GBI + 10% WIBID 3M	A

Source: Author's own study.

The data on portfolio holdings of analysed funds at the end of 2020 was obtained from their yearly financial statements gathered by the author. This hand-collected data-set was employed to conduct a general analysis of the funds' portfolios compositions, as well as calculate active share ratios. As shown in Table 2, the investment portfolio of the research sample funds consisted, on average, of 32 bond series, ranging from 14 (Esaliens Obligacji) to 77 (PZU Papierów Dłużnych POLONEZ). This means that fund managers have been using different investment concentration approaches when constructing their investment portfolios. This is confirmed by data on concentration ratios of debt securities portfolio. CR5 ratio and Herfindahl–Hirschman Index (HHI) varied considerably between funds, falling in between 40.84% and 96.18%, and 0.05 and 0.21, respectively. Generally, however, it can be concluded (based on the HHI values in particular) that the portfolios of most funds under study were characterized by a relatively low degree of concentration (average HHI amounted to 0.10).

Interestingly, although the research sample consists of funds declaratively investing in domestic Treasury bonds denominated in Polish currency, securities included in TBSP Index constituted minority of their debt portfolios on average (45.0%).[7] This can be explained by the fact that only 7 out of 21 analysed funds (including 2 index funds) chose this index as their benchmark (Table 1). The remaining funds usually either used indices of the Polish debt market, constructed by leading foreign index providers (ICE or FTSE Russell), or they did not indicate a benchmark at all. Hence, the portfolios of the surveyed funds also included other series of Polish Treasury bonds, as well as Treasury bonds issued by other countries, mainly from emerging markets; some funds also invested a small part of the capital in corporate

[7] After excluding from the research sample two index funds replicating this index (inPZU Obligacje Polskie and NN Indeks Obligacji), in which the entire debt portfolio consisted of bonds from the TBSP Index, this percentage was only 39.2%.

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bonds (mainly Polish companies, often under the control of the State Treasury). The portfolios of the analysed funds included 262 series of bonds in total.

Table 2. General information on investment portfolios of researched funds (as of December 31, 2020)

(Sub)Fund	Number of bond series in the portfolio	Share of bonds from TBSP.Index in the portfolio of debt securities (%)	Concentration ratio – CR5* (%)	Herfindahl–Hirschman Index (HHI)
Allianz Polskich Obligacji Skarbowych	27	16.93	40.84	0.06
AXA Obligacji	46	66.57	60.54	0.09
BPS Spokojna Inwestycja	27	11.46	64.75	0.10
EQUES Obligacji SFIO	23	27.96	44.25	0.07
Esaliens Obligacji	14	58.34	71.35	0.13
Generali Korona Obligacje	64	25.65	45.64	0.06
Generali Obligacje Aktywny	41	15.76	59.75	0.09
inPZU Obligacje Polskie	17	100.00	44.77	0.07
MetLife Obligacji Skarbowych	27	54.62	73.67	0.16
NN FIO Obligacji 2	42	46.02	57.76	0.08
NN Indeks Obligacji	16	100.00	46.02	0.07
NN Obligacji	52	45.40	56.23	0.08
Noble Fund Obligacji	33	27.61	65.76	0.12
Pekao Dłużny Aktywny	16	38.69	70.40	0.12
Pocztowy Obligacji	37	34.65	59.71	0.09
PZU Dłużny Aktywny	44	52.36	54.96	0.08
PZU Papierów Dłużnych Polonez	77	47.28	41.47	0.05
Quercus Obligacji Skarbowych	21	29.40	52.47	0.08
Santander Obligacji Skarbowych	19	49.84	96.18	0.21
Santander Prestiż Obligacji Skarbowych	18	49.01	94.87	0.21
Skarbiec-Obligacja	21	47.31	59.62	0.10
Mean	32.48	44.99	60.05	0.10

* on the basis of the debt securities portfolio
Source: Author's own study.

The dataset on the Treasury BondSpot Poland (TBSP) Index – Poland's first official Treasury bonds index[8] – was obtained from GPW Benchmark.[9] It includes detailed data on the portfolio composition of the aforementioned index as of December 31, 2020, which was necessary for active share calculation.

[8] TBSP.Index is a total return index which includes the bond price performance, accrued interest, and revenue from reinvested coupons. Its portfolio comprises zero coupon bonds and fixed rate bonds denominated in Polish zloty. The index is calculated on the basis of bond prices set on TBSP fixing sessions.

[9] GPW Benchmark is a benchmark administrator authorized under BMR (Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014) and listed on the ESMA (The European Securities and Markets Authority) register.

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Results

Active funds

Bond-level active share ratios for actively managed funds, calculated using two different methods specified in the "Research methods" section, are shown in Table 3.

Table 3. Bond-level active share ratios of (declaratively) actively managed funds (as of December 31, 2020)

(Sub)Fund	Bond-level active share_TA (%)	Bond-level active share_DP (%)
Allianz Polskich Obligacji Skarbowych	82.49	81.90
AXA Obligacji	57.30	56.88
BPS Spokojna Inwestycja	89.61	89.37
EQUES Obligacji SFIO	74.00	70.61
Esaliens Obligacji	64.38	63.65
Generali Korona Obligacje	79.89	79.47
Generali Obligacje Aktywny	91.21	90.74
MetLife Obligacji Skarbowych	79.55	79.21
NN FIO Obligacji 2	62.58	60.09
NN Obligacji	62.35	59.49
Noble Fund Obligacji	92.33	91.20
Pekao Dłużny Aktywny	66.02	57.11
Pocztowy Obligacji	77.53	76.35
PZU Dłużny Aktywny	63.42	60.66
PZU Papierów Dłużnych Polonez	57.78	57.44
Quercus Obligacji Skarbowych	79.96	78.64
Santander Obligacji Skarbowych	87.94	86.29
Santander Prestiż Obligacji Skarbowych	87.60	85.76
Skarbiec-Obligacja	67.42	62.79

Values in bold denote active share below 60%.
Source: Author's own study.

The bond-level active share ratios calculated with the help of the traditional method (i.e. based on the shares of individual securities in total assets [whole portfolio]) for declaratively actively managed funds oscillated between 57.3 and 92.3%. Equal-weighted average and asset-weighted average amounted to 74.9 and 70.1%, respectively. In this group of funds, a vast majority – 89.5% taking into account the number of funds, and 78.9% as regards their net assets – reached the active share ratio above 60%.

Similar results were obtained when the second method of active share calculation was employed, i.e. the ratio was calculated using shares of individual financial instruments in debt portfolio. Both equal-weighted average active share and asset-weighted average active share ratios were only a slightly lower than in the first method (73.0 and 68.4%), though they still turned out to be notably higher than 60%. Despite the change in the method of calculating the active share ratio, the percentage of active-

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ly managed funds decreased relatively slightly (to 78.9%). On the other hand, the percentage of this type of funds, taking into account their assets, decreased quite significantly – only slightly more than half of them (54.7%) achieved the active share ratio above 60% (if we took into account the two funds for which active share oscillated between 60 and 61%, this percentage would drop to 40.0%).

Based on the calculations of the active share ratio, it can be concluded that most of the surveyed funds – as mentioned earlier – can be described as "truly active", since the values of the above-mentioned ratio exceeded (sometimes significantly) the 60% threshold. Only a few funds (two using the first method of active share calculation and four using the second method) turned out to be "closet indexers", i.e. their portfolios differentiate from TBSP.Index portfolio in less than 60%.[10]

Active share ratios calculated in accordance with two different methods were in most cases (68%) very similar, i.e. the differences usually did not exceed 2 pp. Against this background, the Pekao Dłużny Aktywny, Skarbiec-Obligacja, and EQUES Obligacji SFIO funds stood out, as in their case active share calculated on the basis of the debt securities portfolio only (not the entire assets) turned out to be significantly higher – by 8.9, 4.6 and 3.4 pp, respectively. This was due to a relatively low share of debt securities in their assets (e.g. in the case of the Pekao Dłużny Aktywny fund, it was only slightly over 58%), which was a consequence of either getting involved in other types of financial instruments or transactions, or keeping a relatively large part of the portfolio in liquid assets.

It is also noteworthy that values of the active share ratio for a significant part of the surveyed funds would be lower if their investment policy was, in fact, limited to the Polish market only, in line with their assignment to a specific investment category by the Chamber of Fund and Asset Management, or in accordance with the benchmarks indicated in their prospectuses (regardless of whether it is TBSP. Index, ICE BofA Poland Government Index, or FTSE Polish Government Bond Index). In practice, however, it turns out that investigated funds have often resolved to diversify portfolios geographically,[11] as it creates an opportunity to obtain higher rates of return, especially when investing in emerging markets where government bond yields are often higher than those of the Polish government bonds. As follows from the analysis of the composition of the researched funds' portfolios, a significant part of them invested from a few to even more than 20% of assets in Treasury bonds

[10] It should be noted that the active share ratio is not always the only parameter used to identify funds as potential closet indexers and the threshold is not always set at 60%. For example, in the ESMA study (2016), additional criteria were used (tracking error and R-squared), and in the case of active share, two thresholds were applied – 60 and 50%.

[11] It is permissible because according to the "Classification of investment funds" developed by the Chamber of Fund and Asset Management, the share of financial instruments issued by entities based outside domestic market (e.g. Poland) in the whole assets of such funds may amount up to 34% (the share of financial instruments issued by entities based in a given country should constitute at least 66% of the fund's assets). This is the case even in the funds using indices as benchmarks, with exposure exclusively to the Polish Treasury debt securities market. This may be regarded as misleading investors.

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(sometimes also corporate bonds) of issuers from over 20 countries in Europe, Asia, South America and Africa.

Using the data on the active share ratio (Table 3) and the degree of concentration of the portfolio of the examined funds (Table 2), it can also be concluded that, there is a positive relationship between active share and portfolio concentration (measured by HHI), i.e. the funds whose portfolios are less similar to the TBSP.Index have more concentrated portfolios (Figure 1).

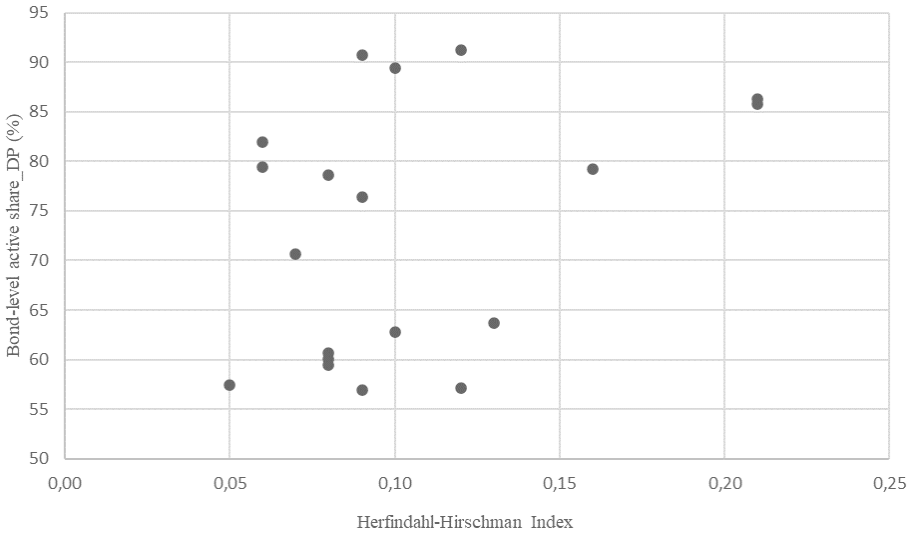

Figure 1. Active share ratio and degree of portfolio concentration of the investigated funds

Source: Author's own study.

Index funds

Bond-level active share ratios for index funds are shown in Table 4.

Table 4. Bond-level active share ratios of passively managed funds (as of December 31, 2020)

(Sub)Fund	Bond-level active share_TA (%)	Bond-level active share_DP (%)
inPZU Obligacje Polskie	4.66	4.75
NN Indeks Obligacji	5.93	6.43

Source: Author's own study.

In line with the declared investment policy, the two analysed index bond funds investing in domestic Treasury bonds denominated in Polish currency, actually passively manage their assets. Their active share ratios range from 4.7 to 6.4%, which means that their debt portfolios were almost identical in terms of composition as

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the TBSP.Index portfolio at the end of 2020. In other words, as much as 94–96% of the securities weights in their portfolios overlapped with the benchmark index weights. These funds can, therefore, be described as "explicitly indexed funds" (or "explicit indexers", or "pure indexers"), i.e. they seek to track an index as closely as possible at a low cost, usually employing active policy to a minimal extent. Both funds invested exclusively in Treasury bonds included in the TBSP.Index, and their involvement in individual instruments was very similar to the index structure. However, the importance of the funds on the Polish fund market is insignificant – their assets accounted for only 1.8% of total assets of the analysed category of bond funds at the end of 2020.

Discussion and conclusions

The main conclusion of the study is that the investment portfolios of the analysed group of 19 actively managed bond funds investing in domestic Treasury bonds denominated in Polish zloty are truly actively managed in general. This shows a fundamentally different situation than in the case of Polish active equity funds, which – as presented in the research by Miziołek (2015), Bogdanowicz et al. (2017), and Trzebiński (2022) – are mostly closet indexers, i.e. their active share ratio is below 60%.[12] Since, to the best of the author's knowledge, no studies of a similar nature have been carried out either in Poland or in other emerging markets so far, the only point of reference is the research from developed markets, the USA in particular. The results of this study are consistent with the results obtained by Choi et al. (2021), who found that bond funds in U.S. mutual fund market are highly active at the issue (bond)-level – the level much higher than in equity funds.[13] This difference may be explained by the fact that the bond universe provides more investment options, even within the same set of issuers.

Secondly, what proves that funds with higher assets are characterized by relatively lower active share values are lower asset-weighted average active share ratios compared to equal-weighted active share ratios (regardless of the calculation method used), and especially much lower percentage of funds actually actively managed, when taking into account their assets.[14] This conclusion is also consistent with the

[12] A high percentage of closet indexers in Poland among country-domestic funds (81%) was also identified by Cremers et al. (2016).

[13] For example, Cremers and Petajisto (2009) proved that in the post-2000 period, an average active share for an equity fund in the USA was only about 60%. According to Cremers et al. (2016), who examined actively and passively managed equity mutual funds in 32 countries in 2002–2010 period, the active share ratio amounted to 70.5% on average.

[14] Importantly, the value of a fund's assets should not be confused with the capitalization of stocks in its portfolio (or benchmark). Most studies test this relationship and demonstrate that small- and mid-cap funds have, statistically, significantly higher active share than large-cap funds.

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findings from both the aforementioned research on equity funds on the Polish fund market as well as research conducted on foreign markets. For example, Petajisto (2013) proved that the most active equity funds had relatively small assets. An average fund size within two groups of U.S. equity funds with the highest average active share ratios (concentrated funds [98%] and stock pickers [97%]) was USD 430 million and USD 463 million, respectively, while the least active funds (closet indexers – average active share 59%) had the highest average assets (USD 2.0 billion). In the European, more fragmented fund market, these differences are not as large as in the US. Caquineau et al. (2016) found that the most active funds were typically smaller (EUR 77.1 million) than the median (EUR 107.5 million). On the other hand, in the case of the least active funds their median assets fall close to the sample median.

Thirdly, the results of the analysis of the relationship between active share and fund's portfolio concentration proved to be in line with previous research on equity funds.[15] For example, Schlanger et al. (2012), when investigating 903 U.S. domestic equity long-only mutual funds in the period of 2001–2011, found that funds with higher levels of active share tended to have higher levels of concentration. The top decile of active-share funds with an average active share of almost 98% had an average concentration of 42% in their top ten stocks, while the lowest decile funds in terms of active share (about 51%) had a portfolio concentration at 27%.

The last observation may be important from the perspective of bond funds' predictive future outperformance. High active share and greater portfolio concentration constitute what is commonly referred to as "high conviction" investing. Some analyses (e.g. Antón et al., 2020) describe a positive relationship between high conviction (especially portfolio concentration) and generating excess returns. However, the research results on this subject are inconclusive. Other studies (e.g. Schlanger et al., 2012) indicate that "high-conviction funds" with high active share did not significantly outperform low-active-share funds. However, the research has been as yet conducted almost exclusively with respect to equity funds. Therefore, this study may be a starting point for future examination of this phenomenon in relation to bond funds operating in emerging markets.

[15] It should be emphasized that most of the research on the relationship between active share and concentration of holdings in the investment portfolio focuses more on the benchmark portfolio structure rather than the fund's portfolio composition. Interestingly, Chow et al. (2021) and Greengold (2021) found a strong negative relationship between the weight of the top 10 holdings in the representative benchmark and the median active share, both on European, Asian and South African equity funds, and U.S. equity funds markets, respectively.

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