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The research on the effectiveness of unit-linked insurance plans

The paper aims to present the research on the evaluation of the effectiveness and risk of investing in unit-linked insurances, which constitute an investment part of life insurances with capital funds. The paper's theoretical part covers a review of Polish and foreign research on the evaluation of the effectiveness of unit-linked insurances as well as investment funds, the overwhelming majority of which are of the same type. The research methods used in this field are presented through the assumptions adopted by the researchers, their hypotheses and final conclusions, together with determining their usefulness in implementation within original research conducted by the author. This allowed the author to use the selected methods to conduct her own analysis of effectiveness of one group of unit-linked insurances, singled out on the basis of their investment portfolio composition and selected by the insured persons within the applied investment strategy.

Keywords: unit-linked insurance, evaluation of effectiveness, capital funds, risk management

Introduction

The growing interest in life insurances of strictly saving nature is a reason for paying more attention to the topic of selecting life insurances, not only as means of protection for investors against the risks determined in the contract, but also as an effective method of increasing the value of a particular part of insurance premiums. Insurances related to insurance-linked plans offer transparency of their investment part, in which the risk of investment is transferred onto the client of the insurance company. The issue of the effectiveness of that part of the product, which seems useful both from the perspective of the insurers, being individual investors, and entities managing the funds and attracting new clients, seems to be of particular significance.

The behavior of the insurers – who, in case of unit-linked insurances, should be treated as rational investors taking decisions in the conditions of risk on the capital market – should be determined by their evaluation of the effectiveness of a given product. Therefore, it is important to define the notion of the effectiveness of unit-linked insurance plans, which constitute an integral

part of life insurances, and to choose specific techniques or methods for measuring investment effectiveness.

The aim of this paper is to present the significance of the research into the assessment of the effectiveness and risk of allocating money into unit-linked insurance plans, which constitute an investment part of life insurances related to ULIP, by:

1) reviewing selected Polish and foreign research on the effectiveness of funds, including ULIP;
2) discussing the situation of the ULIP market, as perceived by individual households – entities particularly interested in the effectiveness of ULIP;
3) presenting selected ratios used in the analysis of effectiveness and the risk of investment into selected ULIPs, and using them in the analysis of the evaluation of effectiveness and the investment risk of ULIPs.

The review of the research and the indication of various solutions concerning the assessment of the effectiveness of unit-linked insurance plans is an introduction to further research planned by the author in the analyzed area, and accomplishing all these assumptions will also indicate measures for objective assessment of the effectiveness of managing these parts of insurance premiums which are allocated into unit-linked insurance plans.

Due to the multitude and variety of methods used to assess the effectiveness of investments in unit-linked insurance plans all over the world, we presented:

1) the possibilities of applying selected methods for ULIPs,
2) possible discrepancies of ULIP results due to the application of various methods of their assessment.

1. A review of selected research on assessing the effectiveness of unit-linked insurance plans

The effectiveness of unit-linked insurance plans is only one of the elements taken into account when evaluating life insurance products linked to this type of specific saving activity. It should be emphasized that, when analyzing this form of insurance policy as a financial instrument, the calculation of its effectiveness may concern both the protection part and the investment part. The assessment of the protection part takes into account the estimated surrender value and most of all the calculations of the premium level, reflecting such parameters as, for example, likelihood of death, based on complicated mathematical models used in actuary calculation. Evaluation of the investment part, on the other hand, is based on assessing many additional costs related to this type of products. First of all, it should be based on calculating the results achieved by funds linked to a particular insurance and their effectiveness, resulting not only from various investment strategies, but also from the variety of adopted evaluation methods, comprising a broad catalogue of models estimating effectiveness. Bearing in mind the goal of this paper, our analysis covers only evaluating the effectiveness of unit-linked insurance plans.

The scientific analyses of both Polish and foreign researchers presenting the issue of ULIP effectiveness demonstrate various approaches adopted by the authors to unit-linked insurance plans, which may be due to the fact that they are created as internal and external funds. Internal funds serve the purpose of investing monetary means obtained from insurance premiums, and are established by insurance companies themselves, whereas external insurance funds are used

in a situation when insurers purchase share units in specialized open investment funds (OIF). Some authors, when analyzing effectiveness, focus exclusively on funds managed internally by insurers[1]. However, assuming that insurers, acting as clients, purchase share units in external funds, we may consider unit-linked insurance as a product linked to the general category of open investment funds, focusing on OIF research[2].

Irrespective of whether ULIPs are internally or externally managed funds, many authors point at different factors affecting the prices of particular securities or share units of unit-linked insurance plans, leading to varied empirical premises and heterogeous approach to the methods of assessing the investment effectiveness.

In scientific analyses, researchers concentrate on such methods of measuring the effectiveness of investing in funds that do not reflect risk but are used only to assess the investments efficacy by calculating returns on investment rates for selected funds. However, the majority of analyses emphasize the measures that reflect the existence of investment risk when assessing the effectiveness of funds. This field was pioneered by three American economists, W.F. Sharpe, M.C. Jensen and J.L. Treynor, who initiated research on the effectiveness of funds by constructing various measures based on ratios reflecting the existence of risk and obtained similar results[3]. A common feature of these methods is the way in which ratios are calculated, as they are the quotient of the return rate measure and risk measure. All three ratios derive from the capital asset pricing model (CAPM), which assumes that the required return on investment depends on the return rate achieveable using risk-free instruments. These methods have been used in assessing the effectiveness of the ULIPs inter alia by: Jogish[4]; Vasantha[5], Maheswari and Subashini[6]; Jamróz;

1. Samajpati U., 2012, *Performance appraisal of unit linked insurance plans (ULIPS) in India*, SMS Varanasi Management Insight, Vol. VIII, No 2, pp. 65–69; Jogish D., 2014, *Performance of ulip schemes in Indian insurance market*, The International Journal Of Business & Management, Vol 2, Issue 12, pp. 217–223.

2. Zulfigar B., Raheman A., Khalid Sohail M., Nasr M., 2011, *Examining the Performance of Closed-End Mutual Funds Under Different States of Pakistani Stock Market*, International Review of Business Research Papers Vol. 7. No. 3, pp. 233–249; Witkowska D., 2009, *Efektywność wybranych funduszy akcyjnych w latach 2005–2007*, Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego. Ekonomika i Organizacja Gospodarki Żywnościowej, No 74, pp. 39–62.

3. Sharpe W.F., *Mutual Fund Performance*, The Journal of Business, Vol 39, No 1/1966, Part 2, pp. 119–138; Jensen M., *The performance of mutual funds in the period 1945–1964*, Journal of Finance, Vol 23/1968, pp. 549–572; Treynor J.L., *How to rate management investment funds*, Harvard Business Review, No 1/1965, pp. 63–75.

4. Jogish D., *Performance of ulip schemes in Indian insurance market*, The International Journal Of Business & Management, Vol 2/2014, Issue 12, pp. 217–223.

5. Vasantha S., Maheswari U., Subashini K., *Evaluating the Performance of some selected open ended equity diversified Mutual fund in Indian mutual fund Industry*, International Journal of Innovative Research in Science, Engineering and Technology Vol. 2/2013, Issue 9, pp. 4735–4744.

6. Jamróz P., *Efektywność wybranych FIO rynku akcji w latach 2003–2011*, Zeszyty Naukowe Uniwersytetu Szczecińskiego Nr 768, Finanse, rynki finansowe, ubezpieczenia No 63/, 2013, pp. 193–206.
   Karkowska R., Niewińska K., *Analiza zmienności stóp zwrotu funduszy inwestycyjnych w Polsce*, Zarządzanie i Finanse R. 11, No 1/2013, part 1, pp. 255–267.

Karkowska, Niewińska[7]; Samajpati[8]; Zulfigar, Raheman, Khalid Sohail, Nasr[9]; Witkowska[10] or Jagric, Podobnik, Strasek, Jagric[11].

In order to examine the efficacy of unit-linked insurance plans from the perspective of various insurers, D. Jogish selected 24 ULIPs from the Indian market, operating in the period from 2009 to 2013. Jogish used the model of calculating the absolute return rate, taking annual opening and closing values of the share units for all examined insurance companies. He also used the Sharpe ratio as a measure allowing to determine the amount of "premium" obtained in relation to taken risks. The conducted research indicated that in 2011 all insurers achieved a negative return rate (except for 1 fund), while in 2012 all insurers enjoyed a positive return rate, which clearly demonstrates that ULIPs are closely correlated with market fluctuations.

S.Vasantha, U. Maheswari and K. Subashini used Treynor ratio, Sharpe ratio and Jensen ratio in their analyses, as well as standard deviation, Beta, coefficient of variation, co-variation and correlation. The authors selected 5 Indian funds in the period from 2008 to 2012, indicating that beta value for all funds was lower than 1, which denotes weaker reaction of funds than that of the market. Moreover, the authors demonstrated that for all the selected funds, the values of Treynor and Sharpe ratios were negative. On the basis of their analyses the authors evaluated the effectiveness of particular funds compared to the degree of risk and suggested one of them as a potential strategy for an investor who wants to enjoy regular profits.

P. Jamróz, who assessed the effectiveness of fifteen open investment funds of the stock market in 2003–2011, noticed that the effectiveness which is normally measured only with the achieved return rate in a given period does not provide us with a full picture, as historical results do not guarantee that similar results will be achieved in the future. He also proved that the effectiveness of funds in the economic boom period does not result in their effectiveness in a period of economic downturn on the capital market. R. Karkowska and K. Niewińska, in order to determine to what extent the OIF results may reflect changes of asset prices on the Polish capital market, conducted an analysis of the OIF operating on the stock market in the period from February 2003 to June 2012, differentiatiating the period of financial crisis. They indicated statistically significant influence of market benchmarks on the shaping of share funds return rates. Examining the effectiveness of selected insurance capital funds – from the group of aggressive funds belonging to the same group of funds and with reference to the wide market for three different insurance companies – U. Samajpati indicated that all 3 portfolios achieved a positive return rate in the analyzed period. Additionally, the value of standard deviation was the highest in the market, which means that return rates for the market are more variable (riskier) than for the analyzed ULIPs. Moreover,

7. Karkowska R., Niewińska K., *Analiza zmienności stóp zwrotu funduszy inwestycyjnych w Polsce*, Zarządzanie i Finanse R. 11, No 1/2013, part 1, pp. 255–267.

8. Samajpati U., *Performance appraisal of unit linked insurance plans (ULIPS) in India*, SMS Varanasi Management Insight, Vol. VIII, No 2/2012, pp. 65–69.

9. Zulfigar B., Raheman A., Khalid Sohail M., Nasr M., *Examining the Performance of Closed-End Mutual Funds Under Different States of Pakistani Stock Market*, International Review of Business Research Papers Vol. 7. No. 3/2011, pp. 233–249.

10. Witkowska D., *Efektywność wybranych funduszy akcyjnych w latach 2005–2007*, Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego. Ekonomika i Organizacja Gospodarki Żywnościowej, No 74/2009, pp. 39–62.

11. Jagric T., Podobnik B., Strasek S., Jagric V., *Risk-adjusted performance of mutual funds: some tests*, South-Eastern Europe Journal of Economics vol. 2/2007, pp. 233–244.

the results of his research indicated that all 3 funds in the analyzed period were above the broad market, which proves they were managed effectively. B. Zulfigar, A. Raheman, M. Khalid Sohail and M. Nasr analyzed 22 closed investment funds listed at the Karachi Stock Exchange. The results of these funds were analyzed in three different situations, assuming: normal stock exchange conditions, economic boom and economic downturn in the period of 1999–2009. In their analysis the authors emphasized that they obtained negative Sharpe ratios, compared to stock exchange index or to benchmarks. Moreover, quoting the indications of particular measures and indicating how particular measures described the results of the funds, the authors formulated a suggestion for managing unprofitable funds by changing their investment strategy.

D. Witkowska assessed the effectiveness of twenty investment funds operating on the Polish market in the period of 2005–2007, proving that the quotations of the analyzed funds are closely related to the market on which they invest. Comparing a fund's return and risk rates with return and risk rates of the main stock exchange index WIG, she pointed at the most profitable investments.

In order to present the market of funds and application of selected tests to assess their results, T. Jagric, B. Podobnik, S. Strasek, V. Jagric analyzed funds with dominant share of stocks or bonds. Although most funds had mixed portfolios, the SBI20 index was used as a benchmark (average weighter capitalization of 15 biggest Slovenian companies quoted on their stock exchange – Ljubljana Stock Exchange). Through their calculations, the authors developed a ranking of Slovenian funds, based on results achieved by them. The results for Sharpe and Treynor ratios were quite similar, which is typical for well-diversified funds.

Some researchers suggest that the use of Sharpe, Jensen and Treynor ratios, calculated on the basis of estimations of the Capital Asset Pricing Model (CAPM), as one of the oldest and most frequently used ways of analyzing and evaluating the results obtained by OIFs and ULIPs, is insufficient. As emphasized by Zamojska this oldest and most classic approach to measuring effectiveness, typically using the return rate and risk, does not take into account other elements, such as costs of participation in a fund, affecting its net profit. According to Zamojska[12], in order to measure the effectiveness of the fund compared to other funds from a given sample, one can use the DEA method as an alternative or supplement to classic ratios. This has been confirmed in the conducted comparative analysis of the DEA method with Sharpe, Jensen and Treynor ratios, pointing at the conformity of obtained classifications of funds based on the classic approach with the classification of funds arrived at when applying the DEA method.

2. The ULIP market in Poland, as perceived by households – entities particularly interested in the effectiveness of funds

A clear tendency observed for some years on the Polish market of unit-linked insurance plans is a significant growth in the value of assets collected by insurers within the ULIPs. Only between 2010 and 2014 the total value of net assets grew by 40%, raising from the level of PLN 36.4 billion at the end of 2010 to the level of PLN 51.0 billion at the end of the first half of 2014. The total value of all household savings at the end of 2014 exceeded PLN 1 trillion, while the share of ULIPs

12. Zamojska A., *Zastosowanie metody DEA w klasyfikacji funduszy inwestycyjnych*, Przegląd Statystyczny, R. LVI, Zeszyt 3–4/2009, pp. 51–66

in their structure never reached 5%. Despite the value of net assets of ULIPs growing by over 40% in the past 4 years, following a small dip in the ULIP asset value in 2011 (by 1.5%), next years brought the average annual growth rate of 15%, which proves the growing interest in ULIPs. The share of ULIP in the structure of household savings compared to the dynamics of ULIP asset growth was presented in Figure 1 below.

Figure 1. ULIP share in the structure of household savings compared to the dynamics of ULIP assets growth in years 2010–2014
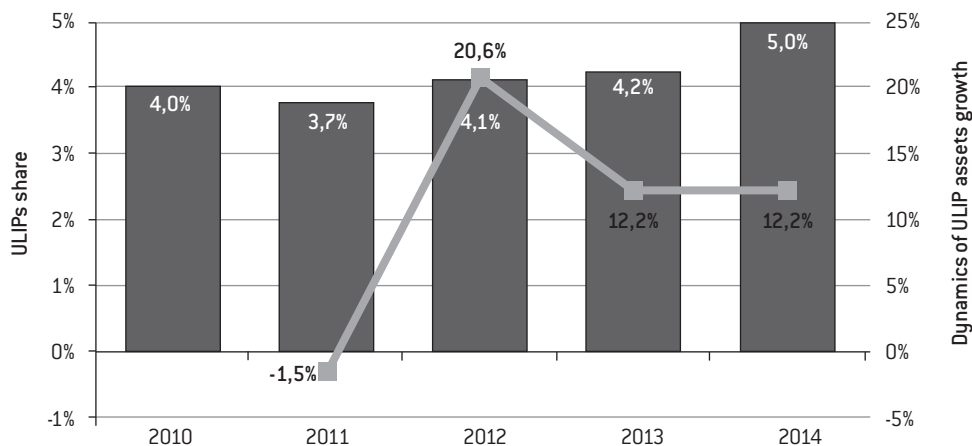
Source: original research based on periodical reports from IZFiA.

The ULIP asset structure is dominated by mixed funds, which account for approximately a third of all assets. In the analyzed period we can observe a significant, 3-fold growth in the value of debt funds. It should be emphasized, though, that in spite of relatively high dynamics of ULIP assets, their share in total savings, compared to other groups of assets, still remains rather low. The value of net assets in various types of ULIPs was presented in Table 1 below.

Table 1. Types of ULIP net assets (in PLN million) in 2010–2014

Types of ULIP net assets	2010	2011	2012	2013	2014*	Structure (in %)*
Debt	2 550	3 606	6 482	7 297	8 212	16.1
Capital protection	5 803	7 405	9 058	9 692	10 153	19.9
Mixed	14 106	13 027	14 592	16 498	16 942	33.2
Securitization				57	323	0.6
Share	11 898	8 406	10 053	11 703	11 962	23.5
Cash and monetary	1 571	3 000	2 656	2 637	2 771	5.4
Commodities market	36	149	127	61	78	0.2
Absolute return rate	413	230	243	540	546	1.1
Total	336 377	35 823	43 211	48 485	50 987	100

*data at the end of June 2014.

Source: original research based on data published by analizy.pl.

3. Selected ratios used in the analysis of effectiveness and risk of investing in ULIPs

When analyzing the approach of most Polish and foreign researchers to the evaluation of effectiveness of managing the entrusted capital by investment funds and ULIPs, it should be noticed that while methods vary, most of the research conducted focuses on two areas: return on investment rate and compensation of risks taken.

In order to show how differentiated the approach to effectiveness can be, and how, via various methods, we can indicate different results of investing in ULIP, we used such indicators as return rate, Information Ratio, Sharpe Ratio and Standard Deviation for two funds in the period of 2011–2014.

The rate of return measures the relationship between the profit obtained in a particular period by investing in a given fund, and the value of initial investment, which shows how the value of the share unit has changed in that period. A serious limitation in applying this measure is the fact that it does not reflect various levels of risk associated with investment in particular funds.

$$R_t = \frac{C_k - C_p}{C_p} \qquad (1)$$

where: R_t – rate of return, C_p – value of share unit at the beginning of the period, C_k – value of share unit at the end of the period.

A fuller and more objective picture of the analysis of effectiveness is offered by the Information Ratio, which measures the profitability of the risk of investing in a given fund compared to the benchmark risk, and is one of the most popular measures used in comparing the risk levels of various funds. The higher value the ratio has, the lower (than in benchmark) risk was taken to achieve the fund results.

$$IR_x = \frac{R_x - R_b}{TE_x} \qquad (2)$$

where: IR_x – Information Ratio, R_x – return rate on portfolio x, R_b – return rate on the benchmark selected by investor (reference portfolio), TE_x – the so-called *tracking error* of portfolio x in relation to benchmark (standard deviation of the difference between return rates of portfolio x and benchmark).While the Information Ratio is based on Sharpe ratio, the difference lies in the fact that it is based only on benchmark, that is a selected reference portfolio. Therefore it is worth showing the results of the same funds basing on Sharpe ratio (S) only, which depicts the profitability of the risk of investing resources in the fund in relation to risk-free investments (for example investment in treasury bonds). Funds with a higher value of the ratio enjoy a higher return rate at the same level of risk.

$$S = \frac{R_j - R_f}{\sigma R_j}, \qquad (3)$$

where: S – Sharpe ratio, R_j – average return rate of the portfolio in a given period, R_f – average return rate of the risk-free portfolio in a given period, σR_j – standard deviation of return rates in a given period.

The level of standard deviation ratio (σ) informs us of the scale of risk associated with investing in a selected fund. This measure is used in comparisons of risk in funds belonging to the same group (for example mixed funds).

$$\sigma = \sqrt{\frac{\sum_{t=1}^{n}(R_t - R)^2}{(n-1)}} \qquad (4)$$

where: S – standard deviation of the fund return rate, R_j – return rate achieved by the fund in t[th] period of time, R – expected (mean) return rate of a given fund, n – number of periods.

In the same periods of time, using various methods of analyzing and evaluating the effectiveness of the portfolio investment, it is possible to obtain very different results.

The values of the presented ratios for selected ULIPs, that is UniStabilny Wzrost (UniStable Growth) (ULIP) and Skarbiec Top Funduszy Stabilnych (Treasury Top Stable Funds) (ULIP) were presented in figure 2 below. Using simple accounting return rate, we observe that the latter fund used better results in nearly the whole analyzed period, reaching the highest change in the value of a share unit in 2012 compared to the previous year – amounting to 14.11%.

Comparing simple return rates with the profitability of secure instruments, that is analyzing the effectiveness with Sharpe ratio, or relating the obtained return rates to standard deviation which expresses variation, we also obtain similar results. Additionally, Skarbiec had higher (at the level of 1.69%) profitability of the risk of investing resources in 2012, at the same level of risk. Analyzing the values of Information ratio, that is relating the already obtained return rate to a particular benchmark, we must emphasize that the obtained results differ. In the analyzed period, in 2014, the highest profitability and the lowest level of risk compared to the assumed benchmark risk, was achieved by Uni Stabilny Wzrost (UFK) fund. Excluding the profitability of investment and taking into account only the risk level, that is examining the values of standard deviation, we must point out that the highest variation of the share units was observed in Skarbiec Top Funduszy Stabilnych (UFK) fund in 2011.

Figure 2. The ratios of effectiveness for selected ULIPs in the period of 2010–2014
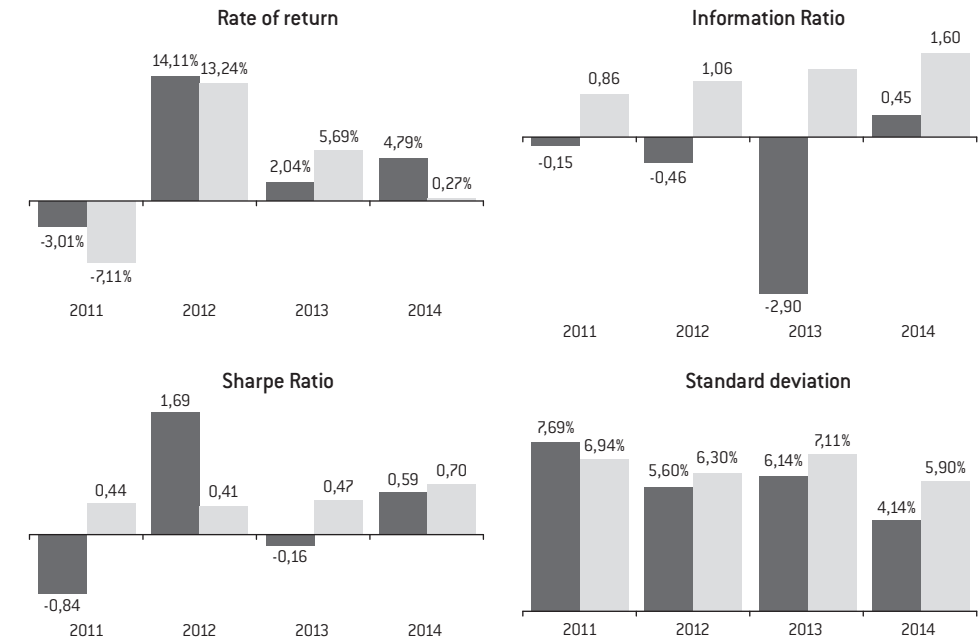
Skarbiec Top Funduszy Stabilnych (UFK); Benchmark: 30% WIG + 70% 52-week treasury bond, with fixe management fee deducted.

Uni Stabilny Wzrost (UFK); Benchmark: 70% EFFAS Bond Indices POLAND TRACKER 1-5 years (in PLN) + 30% WIG
Source: original research on the basis of periodical reports on funds published on http://www.union-investment.pl and http://www.skarbiec.pl.

Summary

Unit-linked insurance plans are becoming more and more popular among those who purchase insurance policies. This can be seen in both the results of the insurers and the values of net assets collected by insurers in ULIPs. Taking into account the development of such products and a low share of this form of saving in household savings, it seems vital to educate the clients on investment opportunities offered by insurances and on methods used to measure the effectiveness of ULIPs. Reviewing the research on various methods of evaluating effectiveness and verifying known and most commonly used methods and techniques of evaluating the effectiveness of funds, or proposing an alternative approach to the analysis of the efficacity of an actively managed portfolio - all this indicates that the methods to measure the effectiveness of managing the portfolio of funds may show different values. This has also been confirmed by the analysis of selected mixed unit-linked insurance plans, which focused on their effectiveness measured by selected ratios. The same funds for which the book return rate was calculated had, in the same years, different values of the ratios showing profitability of the risk of investing resources in funds, compared to other investments, which points at possible discrepancies of ULIP results, attributed to the application of various methods and their evaluation.

The analysis proves that the evaluation of the ULIP profitability may be approached either by applying one method or all of them, bearing in mind that the results of the same funds will have different values. From the point of view of ULIP clients, it is important to realize what methods are used by insurers to present the profitability of their products, and to compare them with other products on the market. When they are provided with relevant information on the profitability of investment in ULIP, clients will make correct decisions when choosing funds, and when changing them during their insurance contracts as well.

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Badania efektywności ubezpieczeniowych funduszy kapitałowych

Opracowanie ma na celu zaprezentowanie istoty badań w zakresie oceny efektywności oraz ryzyka lokowania środków w ubezpieczeniowe fundusze kapitałowe, stanowiące inwestycyjną część ubezpieczeń na życie związanych z funduszem kapitałowym. Część teoretyczna obejmuje przegląd krajowych i zagranicznych badań prowadzonych w zakresie oceny efektywności zarówno samych ubezpieczeniowych funduszy kapitałowych, jak i funduszy inwestycyjnych, które w zdecydowanej większości mają dokładnie taki sam charakter. Stosowane w tej dziedzinie metody badań zostały przedstawione z punktu widzenia przyjętych przez badaczy założeń, stawianych przez nich hipotez oraz formułowanych wniosków końcowych, wraz z określeniem stopnia ich przydatności do implementacji w ramach własnych badań prowadzonych przez autora. Pozwoliło to następnie autorowi, na podstawie wybranych metod, przeprowadzić własną analizę efektywności jednej z grup ubezpieczeniowych funduszy kapitałowych, wyodrębnianych ze względu na skład portfela inwestycyjnego i wybieranych przez ubezpieczonych w ramach stosowanej strategii lokacyjnej.

Słowa kluczowe: ubezpieczenia typu unit-linked, ocena efektywności, ubezpieczeniowe fundusze kapitałowe, zarządzanie ryzykiem.

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