



UNIT-LINKED LIFE INSURANCE PRODUCTS VERSUS OTHER ALTERNATIVE INVESTMENTS

Cristina CIUMAS¹, Diana-Maria CHIS²

¹ Professor, Ph.D., Department of Finance, Faculty of Economics and Business Administration, Babeş-Bolyai University, Cluj-Napoca, Romania, E-mail: cristina.ciumas@econ.ubbcluj.ro

² Ph.D. Student, Department of Finance, Faculty of Economics and Business Administration, Babeş-Bolyai University, Cluj-Napoca, Romania, E-mail: dianamaria.chis@yahoo.com

Abstract

Unit-linked insurance is a life insurance policy with investment component. An important component of the activity carried out by the insurance companies is the investment of the premiums paid by policyholders in various types of assets, in order to obtain higher yields than those guaranteed by the insurance contracts, while providing the necessary liquidity for the payment of insurance claims in case of occurrence of the assumed risks. This research contributes to the existing literature regarding the study of investment alternatives, with an exclusive focus on the investment in unit-linked life insurance. A special place in this study is the presentation of investments in unit-linked insurance versus other types of financial investments: deposits, treasury bills, shares (BET), currency (EURO) and gold.

Key words:

Unit-linked life insurance, alternative investments, investment programs, protection component, investment component.

JEL Codes:

G22, G14, C58, C87

1. Introduction

One of the most interesting life insurance products which have emerged in recent years has been the unit-linked contract (Boyle and Schwartz, 1977). Unit-linked insurance contracts have been studied worldwide since the middle of the 1970s. The payoff in such contracts depends on two factors: the value of some underlying financial instrument(s) and some insurance-type event in the life of the owner of the contract (death, retirement, survival to a certain date etc.) (Romanyuk, 2006).

Unit-linked insurance is a life insurance policy with investment component. These financial products invest most of the premium paid by the insured person in the funds managed by the insurance company or an external administrator and the lower part of the premium is intended to cover the insured risk (death, disability, etc). The insurance premium paid by the policyholder is invested into one or more investment funds managed and provided by the insurer, from which the policyholder receives a share part (respectively a number of units). Each investment fund has its' own unit with individual prices. The insured person chooses the investments – the funds and the allocation between them. The policyholder has the right to choose the structure and the funds in which he will invest the premiums, with the possibility that during the term of the

contract to change the initial allocation of his investment (Şerbănescu, 2009).

An important component of the activity carried out by the insurance companies is the investment of the premiums paid by policyholders in various types of assets, in order to obtain higher yields than those guaranteed by the insurance contracts, while providing the necessary liquidity for the payment of insurance claims in case of occurrence of the assumed risks. The policyholders' financial resources are invested by the insurance company in different types of financial assets: stocks, bonds, deposits and other capital market or monetary market instruments. In general the insurance companies which offer unit-linked policies manage several investment funds with different levels of risk: low, medium, high and very high. The revenues earned from investing the premiums are closely linked to the funds performances and their associated risk. As in any ordinary financial investment, investment alternatives with a higher risk are those that can bring higher returns. The payoff of these products contains both financial and insurance risk elements, which have to be priced so that the resulting premium is fair to both the seller (insurance company) and the buyer of the contract (policyholder) (Romanyuk, 2006). The essence of mortality risk is that individual lives are independent so that risks may be nearly eliminated by pooling and

diversification. On the other hand investment risk affects all contracts simultaneously and in the same direction. Also, the securities markets themselves determine a relationship between risk and return which should be reflected in the pricing of investment risk (Boyle and Schwartz, 1977).

In comparison to traditional life insurance policy, where the investment risks are assumed by the insurance company and the insurer invests the premiums in financial instruments with lower profitability, in the case of unit-linked insurance policies the investment risks are assumed by the insured person, but the benefits of the investment depend on the investment funds' evolutions. The unit-linked life insurance has two important components: protection and investment. The protection component refers to the insured sum in case of the occurrence of insured risks and the investment component refers to the policyholder's account that represents the present value of the units from the chosen investment funds (Gavriletea, 2009).

The objective of the study

The purpose of this paper is to develop a theoretical and empirical analysis regarding the investment in unit-linked life insurance. In order to fulfil this objective the authors have presented a comparative research regarding the investment in unit-linked life insurance and other types of alternative investments. This study aims to analyze the most profitable investment instrument.

This study contributes to the existing literature regarding the theoretical and practical research of investment alternatives, with an exclusive focus on the investment in unit-linked life insurance. A special place in this study is the presentation of investments in unit-linked insurance versus other types of financial investments: deposits, treasury bills, shares (BET), currency (EURO) and gold.

2. Literature review

There is an extensive literature on the pricing, hedging and risk management of these contracts. See for example: Boyle and Schwartz (1977), Brennan and Schwartz (1979), Hardy (2003), Argesanu (2004), Gaillardetz (2006), Romanyuk (2006), Reichenstein (2009), Augustyniak and Boudreault (2012), etc. Boyle and Schwartz (1977), and Brennan and Schwartz (1979) were the first articles that elegantly described some of the option elements of life insurance products and demonstrated how the relatively young option pricing theory of Black and Scholes could be applied to value these contracts. Hardy (2003) discusses the modelling and risk management for equity-linked life

insurance; the focus of his research is on stochastic modeling of embedded guarantees that depend on equity performance. Argesanu (2004) focuses on the risk analysis and hedging of variable annuities in incomplete markets. Romanyuk (2006) describes the problem of appropriate pricing of equity-linked life insurance contracts and hedging of the risks involved, and proposes the use of two types of imperfect hedging techniques: quantile and efficient hedging. Gaillardetz (2006) introduces a pricing method for equity-indexed annuities and values these products by pricing its death benefits and survival benefits separately.

3. Methodology and results of research

This section presents a comparative analysis of a unit-linked life insurance investment with other alternative investment strategies (Treasury bills, Deposits, Shares, Gold, FOREX- Euro currency).

Nowadays the insured persons have become more aware of investment opportunities outside the insurance sector. So policyholders want to enjoy the benefits of equity investment in conjunction with mortality protection, and insurers around the world have developed unit-linked contracts to meet this challenge (Hardy, 2003). The benefits of these products are linked to the performance of an equity market (Gaillardetz, 2006).

In order to perform a comparative empirical simulation of a unit-linked life insurance investment with other types of financial investments: a deposit, Bucharest Stock Exchange (BET) shares, treasury bills, Foreign exchange market (FOREX)- Euro currency and gold, the authors considered the following elements:

- the term of the contract: 10 years (2001-2010);
- the insured person is aged between 35 and 45 years old;
- the insurance sum in the event of a death: 25,000 lei;
- the insured person has chosen to invest the insurance premium in two investment programs: in the first period (2001-2008) the policyholder has chosen an investment fund portfolio which invests 25% in shares issued by companies from the European Union and 75% in instruments with fixed income denominated in national currency; and in the second period (2008-2010) the policyholder has chosen an investment fund portfolio which invests up to 100% in domestic instruments with fixed income.
- the account value at the maturity of the contract: 19,402.76 lei;

- the total investment cost (the sum of annual insurance premiums) for the entire period: 16,857 lei.

Table 1. Total cost for a unit-linked life insurance investment

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gross insurance annual premium (lei) - P_a	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
The accumulated amount of annual gross premiums (lei) - $\sum_{i=2001}^{2009} P_a$	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857

(Source: Authors' processing imported from Excel software)

Therefore the insured person pays an amount of 16,857 lei and obtains a capital gain of 2546 lei. In order to compare different types of financial investments the authors took into consideration the following indicators: annual interest rates for the deposits denominated in

national currency; logarithmic annual returns of BET index; annual yields for treasury bills denominated in national currency; logarithmic annual returns of exchange rates (EUR/RON) and logarithmic annual returns of gold prices.

Table 2. Investment in deposits

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
The deposited fund / year (lei)	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
The accumulated deposited fund(lei)	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857
Interest rate (%)	12.83	14.20	14.40	7.20	7.46	7.16	9.39	10.37	7.55
Interest/ year (lei)	140.36	369.39	654.16	509.97	707.12	871.16	1,445.61	1,990.81	1,777.69
Final balance (lei)	1,234.36	2,970.75	5,196.91	7,592.88	10,186.00	13,038.16	16,840.77	21,188.58	25,323.27

(Source: Authors' processing imported from Excel software)

In this case the investor obtains a capital gain of 8467 lei.

Table 3. Investment in BET shares

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
Initial balance /year (lei)	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
Accumulated initial balance (lei)	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857
Logarithmic annual returns (%)	78.75	26.93	69.80	41.14	20.07	19.93	-121.99	48.05	11.62
Capital gain / year (lei)	861.51	894.89	4,040.76	4,820.20	3,697.89	4,802.76	-38,134.66	-2,170.08	-503.17
Final balance at the end of the year (lei)	1,955.51	4,217.40	9,830.17	16,536.36	22,120.26	28,904.02	-6,873.64	-6,686.72	-4,832.89

(Source: Authors' processing imported from Excel software)

In the case of an investment in BET shares the investor loses 21,990 lei.

Table 4. Investment in treasury bills

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
Initial balance /year (lei)	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
Accumulated initial balance (lei)	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857
Yield rate (%)	17.30	18.00	16.40	5.40	-	7.85	14.23	10.00	6.87
Gain / year (lei)	189.26	477.05	770.69	397.22	-	912.19	2,118.76	1,936.52	1,625.35
Final balance at the end of the year (lei)	1,283.26	3,127.31	5,470.00	7,753.22	9,639.22	12,532.41	17,008.17	21,301.69	25,284.04

(Source: Authors' processing imported from Excel software)

In this particular situation the investor obtains a total gain of 8,427 lei.

Table 5. Investment in currencies (EUR)

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
Initial balance /year (lei)	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
Accumulated initial balance (lei)	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857
Logarithmic annual returns (%)	22.51	16.34	-3.60	-7.57	-8.37	6.54	9.88	5.92	1.33
Capital gain / year (lei)	246.24	442.34	-169.99	-487.39	-656.25	598.99	1,197.45	927.57	252.07
Final balance at the end of the year (lei)	1,340.24	3,149.58	4,551.59	5,950.21	7,179.96	9,759.94	13,314.39	16,598.96	19,208.03

(Source: Authors' processing imported from Excel software)

In this case the investor achieves a total gain of 2351 lei.

Table 6. Investment in gold

Period	2002	2003	2004	2005	2006	2007	2008	2009	2010
Initial balance / year (lei)	1,094	1,367	1,572	1,886	1,886	1,981	2,357	2,357	2,357
Accumulated initial balance (lei)	1,094	2,461	4,033	5,919	7,805	9,786	12,143	14,500	16,857
Logarithmic annual returns (%)	28.59	15.30	-6.59	22.39	2.43	22.04	18.54	27.98	33.30
Capital gain / year (lei)	312.82	424.38	-314.30	1,419.84	234.56	2,614.13	3,120.94	6,243.84	10,293.58
Final balance at the end of the year (lei)	1,406.82	3,198.20	4,455.90	7,761.74	9,882.30	14,477.43	19,955.38	28,556.22	41,206.80

(Source: Authors' processing imported from Excel software)

In the case of an investment in gold, the investor obtains a total gain of 24,350 lei.

4. Conclusions

Unit-linked insurance contracts are very popular in many insurance markets (United States, Canada, Asia, Europe) since the middle of 1970s (Argesanu, 2004). They provide either death benefit or maturity benefit or both. The benefits are linked to an underlying asset with or without certain guarantees so that the policyholders have the opportunity to participate in the financial market and (eventually) be protected from the downside development of the financial market (Li and Szimayer, 2011).

In recent years insurers have provided more flexible products that combine the death benefit coverage with a significant investment element, as a way of competing for policyholders' savings with other institutions, for example: banks, investment companies, stock markets, exchange markets, etc. Additional flexibility also allows policyholders to purchase less insurance when their finances are tight, and then increase the insurance coverage when they have more money available (Dickson et. al, 2009).

These products bear two different (independent) types of risk. First of all, we can look at the financial risk (related to the market). This risk was clearly stressed during the last few years, when the major stock market indices have dropped so much. On the other hand, the insurer deals with another type of risk - actuarial risk, related to the possibility of death for the insured (and hence the possibility of a claim) (Argesanu, 2004).

The results from Table no. 7 show that the most profitable investment strategy is the alternative investment in gold and the less profitable is the investment in shares. These results are linked to the global financial markets situation and it is known that since 2008 the Financial Crisis has negatively influenced the worldwide financial markets. As a consequence, investors try to reduce the investment risk and place their financial resources in bonds and other fixed income securities, and also in bank deposits, which generate a stable and secure gain.

Table 7. Summary of the comparative alternative investments

Types of investments	Unit-linked insurance	Deposit	Bet-shares
Initial balance- Effort (lei)	16,857	16,857	16,857
Final balance- Effect (lei)	19,402.76	25,323.27	-4,832.89
Gain (lei)	2,545.76	8,466.27	-21,689.89
Gain (%)	15.10	50.22	-128.67
Types of investments	Treasury bill	Currency - EUR	Gold
Initial balance- Effort (lei)	16,857	16,857	16,857
Final balance- Effect (lei)	25,284.04	19,208.03	41,206.80
Gain (lei)	8,427.04	2,351.03	24,349.80
Gain (%)	49.99	13.95	144.45

(Source: Authors' processing imported from Excel software)

After analyzing the unit-linked insurance investment strategy in comparison with the other alternative investments, the authors may conclude the fact that even if the financial crisis has affected negatively the financial sector, and implicitly the insurance sector, the investment in unit-linked life insurance has generated capital gain at the end of the contract. Although the total gain (2,546 lei - 15%) is not very significant comparing with the capital gains generated by the investment in gold, deposits and treasury bills, the insured person can benefit also from the protection component (the insured sum is 25,000 lei). The reason why unit-linked insurance funds have suffered a lower depreciation comparing to stock market indices is because the insurance companies have avoided investing the capital 100% in shares. Also the insured person has chosen to invest the insurance premium in two investment programs in order to reduce the investment risk.

Acknowledgement

This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSDRU/159/1.5/S/142115 „Performance and excellence in doctoral and postdoctoral research in Romanian economics science domain”.

References

- Example of book presentation*
 Dickson, M., Hardy, M. R. and Waters, H. R. (2009) *Actuarial Mathematics for Life Contingent Risks*
 Hardy, M. (2003) *Investment Guarantees. Modeling and Risk Management for Equity-Linked Life Insurance*, John Wiley & Sons, Inc. Hoboken, New Jersey.

Example of article presentation

- Augustyniak, M. and Boudreault, M., (2012) „An out-of-sample analysis of investment guarantees for equity-

linked products: Lessons from the financial crisis of the late-2000s”, *North American Actuarial Journal*, vol. 16, no. 2:183-206.

Boyle, P.P. and Schwartz, E.S. (1977) „Equilibrium Prices of Guarantees Under Equity-Linked Contracts”, *The Journal of Risk and Insurance*, vol. 54, no. 4: 639-660

Brennan, M. and Schwartz, E. (1979) „Alternative Investment Strategies for the Issuers of Equity Linked Life Insurance Policies with an Asset Value Guarantee”, *Journal of Business*

Gavriletea, M. (2009) „The future of investment done by unit linked insurance in Romania”, *Interdisciplinary Management Research V*

Li, J. and Szimayer, A. (2011) „The Uncertain Mortality Intensity Framework: Pricing and Hedging Unit-Linked Life Insurance Contracts”, *Mathematics & Economics*, vol. 49, no.3: 471(16)

Reichenstein, W. (2009) „Financial analysis of equity-indexed annuities”, *Financial Services Review*

Romanyuk, Y. (2006) „Imperfect hedging and risk management of equity- linked life insurance contracts”, *Library and Archives Canada, Published Heritage*.

Șerbănescu, C. (2009) „ Analiza SWOT la nivelul pieței asigurărilor”, *Actualitatea în asigurări*, no. 3.

Example of a document consulted on the Internet

Argesanu, G. (2004) „Risk analysis and hedging in incomplete markets”, available on-line at www.inftyreader.org/Risk_analysis_and_hedging_in_incomplete_markets.pdf

Gaillardetz, P. (2006) „Equity-linked Annuities and Insurances”, available on-line at <http://www.proquest.com/>.