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ОЦЕНКА ИСХОДНОГО БАЛАНСА МЕДИЦИНСКОГО СБЕРЕГАТЕЛЬНОГО СЧЕТА ДЛЯ ПОКРЫТИЯ РАСХОДОВ НА ЛЕЧЕНИЕ

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АННОТАЦИЯ

В статье анализируется медицинский сберегательный счет (МСС) как инструмент для финансирования расходов частных лиц на медицинские услуги в Польше. МСС, представляющий собой механизм финансирования здравоохранения, основан на накоплении личных сбережений с целью оплаты медицинских услуг в будущем. Автор рассматривает главным образом добровольные МСС, на которых аккумулируются сбережения и которые рассматриваются частными лицами как инструмент финансирования лечения из собственного кармана, в частности после выхода на пенсию. В статье сформулированы концепция и характеристики МСС, а также финансового продукта, сочетающего МСС с медицинской страховкой на установленную максимальную сумму, которую может уплатить больной самостоятельно (за определенные медицинские услуги в течение определенного периода времени; расходы сверх этого лимита выплачиваются программой медицинского страхования). Кроме того, используя актуарные методы, автор строит модель, позволяющую оценить сумму исходного баланса на МСС, т.е. одоразового платежа, вносимого на счет, для покрытия медицинских расходов в будущем без привлечения дополнительных средств. Дисконтированная стоимость медицинских расходов держателя МСС оценивается с учетом ожидаемых расходов, банковской ставки по вкладу и продолжительности жизни. Результаты моделирования могут быть использованы на практике, например при накоплении сбережений для покрытия личных медицинских расходов пенсионеров, которые, если будут производиться на постоянной основе, могут стать нелегким бременем для их семейных бюджетов.

Ключевые слова: медицинский сберегательный счет (МСС); медицинская страховка; расходы на здравоохранение; актуарные методы.

ESTIMATION OF INITIAL MEDICAL SAVINGS ACCOUNT BALANCE IN RELATION TO PERSONAL HEALTH CARE EXPENSES IN POLAND

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ABSTRACT

The purpose of this paper is to analyze Medical Savings Accounts as an instrument used to finance private health care expenditure incurred by individuals in Poland. An Medical Savings Account (MSA) represents a mechanism of health care financing, which relies on the accumulation of personal savings to cover the costs of health care services at the time of consumption. The paper focuses on voluntary MSAs, which – from an individual's perspective – can be considered as a tool for financing additional out-of-pocket medical expenses, especially after retirement. The concept and specific characteristics of an MSA and a financial product combining the Medical Savings Account with insurance against catastrophic health care costs are presented here. Next, with the use of actuarial methods, a model is proposed in order to estimate the amount of initial MSA balance, which represents

a single payment made to this account to cover future health care costs without additional contributions. In the analysis the discounted value of health care expenses of an MSA holder is estimated depending on expected health care expenses, assumed interest rate and mortality rates. The results of the conducted simulation analysis can be useful in practice, especially in the context of accumulation of savings to cover private medical expenses incurred by retirees, which – if are funded on an ongoing basis – can result in a significant burden for retirees' household budgets.

Keywords: Medical Savings Account; health insurance; health care expenses; actuarial methods.

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1. Introduction

In times of systematically rising health expenses and insufficient cover provided by publicly financed health systems, additional methods of private health care funding become more and more significant. An Medical Savings Account (MSA) represents an innovative and a relatively seldom used mechanism of health care financing, where individual savings for covering health care expenses are accumulated. MSAs are similar to bank accounts, but their purpose is to pay for health care expenses of an individual (or a family). From a theoretical point of view, the MSA concept helps to reduce the moral hazard occurring in health insurance systems, at the same time coping with the future challenges posed by demographic trends (ageing societies).

In the international scientific literature, the issue of Medical Savings Accounts has been discussed with varied popularity over the past few decades. It should be mentioned that the MSA concept was originally developed in the United States in the 1970s in response to problems associated with the private health insurance market, such as moral hazard, adverse selection and rising administrative costs. The introduction of the compulsory Medical Savings Accounts scheme in Singapore in 1984 had a significant impact on the further development of research in that area. Medisave — a scheme of compulsory individual MSAs was separated as a part of the Central Provident Fund (CPF) — a system of compulsory savings for pensions and other purposes. Next, in the United States in 2003, under the Medicare Prescription Drug, Improvement and

Modernization Act substantial tax relief has been introduced for people who established Health Savings Accounts linked to qualified high-deductible health insurance plans. These two facts exerted a great impact on the further development of scientific research concerning Medical / Health Savings Accounts.

A review of the scientific literature related to the issue of Medical Savings Accounts allows the observation that scientific studies with this respect focus on two mainstreams. One of them represents a macroeconomic approach to MSA issues and this is the dominant approach. Medical Savings Accounts and the associated health insurance are a subject of research in the context of the operation of the entire health care financing system and assurance of proper pursuit of its functions and goals (see e.g. Remler & Glied, 2006; Jung & Tran, 2011). The other stream comprises scientific studies where MSA issues are analyzed on the microscale, that is from the viewpoint of an individual (or a household). This approach is considerably less frequent. In this area, the object of the research includes among others: the phenomenon of moral hazard and negative selection with regard to MSAs (Cardon & Showalter, 2007), impact of MSAs on accumulating precautionary savings and individuals' attitudes towards preventive activity (Ma, 2008; Steinorth, 2011), application of MSAs as a mechanism of accumulating retirement savings (Query, 2000), and the optimal use of Health Savings Accounts within an individual's life cycle with the impact of taxation, income and age on the pattern of contributions to and withdrawals from the account (Peter & Steinorth, 2012). Despite the rich theoretical background, the practical scope of using Medical Savings Accounts remains relatively small. In practice, MSAs are applied only in a few countries in the world, where

they complement publicly financed health care systems (Singapore and China) or supplement private health insurance markets (the United States and South Africa).

In this paper, the issue of Medical Savings Accounts is considered in accordance with the latter approach (from the individual's perspective). The aim of the paper is to analyze MSAs as a mechanism for providing funds to cover additional out-of-pocket health expenses incurred by individuals in Poland. In the first part of the paper the concept and specific characteristics of an MSA and a financial product combining Medical Savings Account with insurance against catastrophic health care costs are described. Afterwards, with the use of actuarial methods, an attempt is made to estimate the initial MSA balance based on the discounted value of individual's future health care expenses depending on age, gender, and assumed interest rate.

2. Concept of Medical Savings Account

The Medical Savings Account can be defined as a personalized savings account on which compulsory or voluntary contributions are accumulated strictly to cover health care expenses. In other words, it is an instrument designed to cover health care expenses that enables to spread the financial risk of illness over time (Dixon, 2002). Detailed principles of the MSA system, including specific criteria for payments, interest earned and withdrawals, can vary considerably depending on the MSA's role in the health care system. As Schreyögg (2004) notes, in contrast to collective forms of financial security against the risk of illness, such as social health insurance, the system of MSAs provides for the risk to be covered by each individual. Although there is no redistribution of income in the case of MSAs, given the formation of capital reserves for emergencies characteristic of the insurance method, MSAs can be referred to as self-insurance.

As mentioned above, the concept of Medical Savings Accounts was originally developed in the United States in the 1970s in response to problems associated with the private health insurance market, such as moral hazard, adverse selection and rising administrative costs. Nowadays, MSAs can be used to supplement the

existing health care funding systems. They have generally been introduced for the following reasons (Hanvoravongchai, 2002; Thomson & Mosialos, 2008):

- To address the problem of moral hazard occurring in the health care sector;
- To encourage savings for the expected high costs of medical care in the future;
- To increase cost effectiveness of provided health care services;
- To mobilize additional funds for health care systems.

The MSA concept, unlike private health insurance and publicly financed health systems, is based on individual, rather than collective, responsibility in the area of health care spending. The principle of solidarity is replaced here by the principle of individual accountability. MSAs do not involve risk pooling. Consequently, they do not involve any form of cross subsidy from rich to poor, healthy to unhealthy, young to old, or working to non-working. Since the reimbursement of health care costs is limited to the value of savings accumulated on the account, MSAs do not protect against the risk of unexpectedly high medical expenses. The high-risk protection can be provided separately by the tax or contribution-based public system or by private health insurance. In practice, holders of voluntary Medical Savings Accounts are usually obliged to buy an appropriate private high-deductible catastrophic health insurance. Compulsory MSA system participants, in turn, are statutorily covered by a public catastrophic insurance scheme (China) or can volunteer to such a scheme (Singapore). Theoretically, it is also possible to combine voluntary MSA scheme participation with voluntariness in applying the auxiliary funding mechanism, yet this solution is not applied in practice. Figure 1 presents a typical MSA plan.

The insurance component of the MSA plan plays a significant role in its proper operation, which is frequently emphasized in the relevant literature (Dixon, 2002; Moser, 2005; Hurley & Guindon, 2008). As part of the existing insurance cover, the insurance company undertakes to refund exclusively the costs of specified medical therapies, which would expose the insured to a high financial risk (e.g. chronic disease

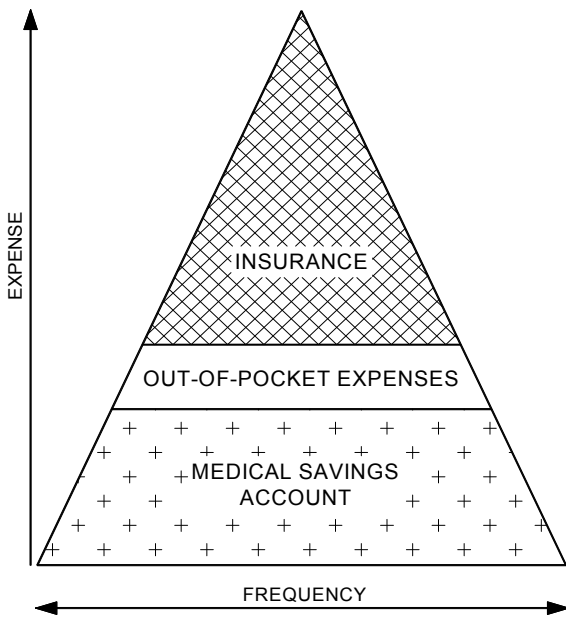


Figure 1: Representative Medical Savings Account plan

Source: National Center for Policy Analysis, 2004.

treatment), and (or) costs exceeding the specified limit of the insured’s participation (deductible). An MSA holder uses the savings accumulated on the medical account and other funds if the said savings prove insufficient to fund relatively common low health expenses, while the insurance part of the product is aimed at covering only rare catastrophic expenses. Depending on the defined scope of the insurance cover, the account holder might also be obliged to partly participate in certain health expenses refunded under the insurance.

3. Methodology

In the conducted analysis, the amount contributed to an MSA is directly conditional on the present value of health care expenses of the account holder. The calculation of the present value of an individual’s health care expenses can be done by the application of actuarial methods, in particular discrete life annuities models with the use of data about the probability of survival and death in the following periods.

The present value of health care expenses reflects a single contribution to an MSA. In other words, it expresses the initial MSA balance needed to cover future health care costs without any additional contributions. In the proposed

approach, the present value of health care expenses (PV_{MSA}) incurred at the beginning of each year, if an MSA holder survives, is expressed by the following formula:

$$PV_{MSA} = \sum_{k=h}^{\omega-x} c_{x+k} \cdot v^k \cdot {}_k p_x \quad (1)$$

where:

x — present age of an MSA holder; h — deferred period; c_{x+k} — expected health care expenses while an MSA holder is $x+k$ years old; v^k — discount factor; ${}_k p_x$ — probability that x -year-old person will survive next k years, ω — maximum lifespan (in the Polish life tables $\omega = 100$).

As follows from the formula (1), the present value of health care expenses is calculated as the actuarial present value of h -year deferred whole life annuity payable at the beginning of each year (Bowers et al., 1986). Based on the estimated values of PV_{MSA} and still using life annuities models, it is possible to calculate the annuity payments made to MSAs for various persons depending on gender, age and interest earned on the accumulated savings.

4. Data and results

The key determinants of health care expenses of an individual depend on the demographic and health sector-related factors. Unfortunately, in Poland there is no current published data on the health care expenses by gender and by age. In order to estimate an individual’s health care expenses, statistical data from representative household budget surveys in Poland conducted annually by the Central Statistical Office of Poland was used. According to the methodology applied by the Central Statistical Office of Poland (2013), household health expenses include out-of-pocket expenditure comprising in particular:

- spending on medical products, appliances and equipment (e.g. pharmaceuticals, corrective eye-glasses, orthopedic supports, hearing aids),
- payments for out-patient and traditional medicine services (e.g. consultations of specialists, dental services, diagnostic tests),
- payments for hospital and sanatorium services.

In order to estimate the future amount of health expenses funded from MSAs, data on average annual health expenses per person in a household was used. The average growth rate of such expenses calculated based on the data from 2000–2013 was 5.61 per cent, yet — due to the long time horizon of the simulation — the assumption that the expenses would increase at the stable rate of 4 per cent per year was selected after Mayhew (2000), who relied on the past 30 years experiences of the OECD countries, extrapolated the underlying rate of medical expenditure growth to about 4 per cent. Analogously, in the study of MSA savings of the elderly upon the retirement age in Singapore, Chia & Tsui (2005) assumed a flat annual growth rate of health care expenses accounting for 4 per cent. Similarly, in a numerical analysis concerning the future MSA balances in the United States, Query (2000) assumed that the cost of health care claims increased by 4.7 per cent annually.

In the next step of the analysis, ratios determining the share of average annual health expenses per capita incurred in a given age group in the total average annual health expenses per capita were applied. The values of those ratios were calculated based on the research conducted by Piekut (2008), where the author used the data of 2006. This is the most up-to-date data available which enables differentiation of individual health care expenses incurred in Poland by age. The obtained values of the share ratios (Table 1) were used for estimating the future health expenses depending on the age of an MSA holder.

The interest rate used to discount future health care costs was assumed at the level of 3.5 per cent annually. It is based on the amount of the maximum technical interest rates used by insurance companies in the calculations related to, among others, life insurance. In Poland, the

average value of maximum technical interest rates in the period 2003–2014 was 3.54 per cent (Polish Financial Supervision Authority, 2014). Mortality rates were calculated with the use of life tables prepared by the Central Statistical Office of Poland (2014) (the most recent life tables available concern 2013). Calculations were conducted for men and women separately.

Other assumptions adopted for the purpose of the conducted analysis are as follows:

- The retirement age is 67 for women and men alike. In Poland, the retirement age is being gradually increased from 60 for women and 65 for men to 67 for both genders, and therefore the target retirement age was assumed in the calculations.

- Two MSA variants were taken into account depending on the capacity to spend the funds accumulated on the account: in the first variant an MSA holder can spend the accumulated funds upon a 5-year deferred period, while in the second savings may be spent only after reaching the retirement age.

- In order to simplify the calculations, the capital income tax as well as administrative charges related to MSA products were ignored.

The simulation was conducted with several versions of age and gender of an MSA holder. The obtained results are presented in Table 2.

In both variants of spending the savings accumulated on MSAs and in all analyzed age groups, PV_{MSA} always takes values that are higher for women in comparison to the corresponding values calculated for men. This result arises from excess mortality of men in Poland, which is noticeable in all age groups. Obviously, in the first variant, which assumes spending MSA funds after a 5-year deferred period, PV_{MSA} values are higher than the corresponding values in the retirement variant. The highest PV_{MSA} value was

Table 1

The share of average health care expenses per capita by age in the average health care expenses per capita incurred by all respondents

Age (years)	30–39	40–49	50–59	60–69	70 and more
Share ratio	0.7395	0.6574	1.096	1.917	2.876

Source: author's own calculations based on data from (Piekut, 2008).

Table 2

**Present value of health care expenses as a single contribution
to an Medical Savings Account (in PLN)**

Present value of health care expenses (initial MSA balance)	Female age			Male age		
	30	40	50	30	40	50
PVMSA 1st variant (current) 5-year deferred payouts	65,116.10	57,926.83	49,903.26	48,560.96	42,631.14	36,305.99
PVMSA 2nd variant (retirement) payouts deferred until age 67	39,564.54	37,892.39	36,669.91	25,044.29	24,274.58	24,169.90

Source: author's own calculations.

Note: PLN 1 = EUR 0.237 (according to the average exchange rate of the National Bank of Poland as at 16 October 2014).

recorded for a 30-year-old woman in the first variant (PLN 65,116.10), and the lowest — for a 50-year-old man in the second variant (PLN 24,169.90). Along with age, the initial MSA balance needed to cover out-of-pocket health care expenses decreases, yet this drop is significantly smaller in the retirement variant in comparison to the current one.

5. Conclusions

In the circumstances of ageing societies, financial products which combine health insurance with Medical Savings Accounts might be an additional method for funding personal health expenses, in particular during the retirement period. With regard to Poland and other European countries, where health care financing systems have been functioning on a social solidarity basis for a long time now, MSA products implementation is possible only as a solution supplementary to the public funding. From the viewpoint of an individual, MSA application requires including this financing instrument in a long-term personal finance management strategy and in particular taking it into account in the decisions related to the intertemporal choice between consumption and saving.

The conducted analysis was aimed at estimating the initial MSA balance depending on the discounted value of a person's health care expenses determined by age, gender and assumed interest rate. The obtained results, although based on simulation, show that age and gender of an MSA

holder have the greatest impact on differentiating the obtained results, as these factors determine mortality rates and the length of the discounting period. When considering PV_{MSA} as a single contribution made to an MSA, it should be added that the obtained values are very high, especially for young people, and in most cases it would be difficult to finance them from the current households' incomes.

Taking into account the potential households' interest in MSA products, it can be expected that it will largely depend on factors such as: household's income and savings level (depending on age and education of the household head and the phase of the household financial life cycle), the amount of insurance premium in relation to the scope of the insurance cover, the deductible level (the insured's participation in treatment-related expenses), and numerous components determining the innovativeness of MSA products (e.g. paying from MSAs with mobile applications).

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