

Analysis of Medical Savings Accounts as a Mechanism for Financing Private Health Care Expenses in Poland

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ABSTRACT

The purpose of this paper is to analyse medical savings accounts as an instrument for financing private health care expenses incurred by individuals in Poland. A 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 of a financial product combining the medical savings account with insurance against catastrophic health care costs are presented here. After, with the use of actuarial methods, a model is proposed in order to estimate the amount of the annuity payment made to an MSA depending on the discounted value of a person’s health care expenses, age, gender and investment variants. 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 funded on an ongoing basis – can result in a significant burden for retirees’ household budgets.

Keywords: Medical savings account, health insurance, health care expenses, health care financing.

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. A medical savings account (MSA) represents an innovative and 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 the 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 as 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 was 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 and health savings accounts.

The majority of papers published on MSAs, in particular those that are mainly theoretical, belong to the area of American science (Scheffler and Yu, 1998; Cardon and Showalter, 2007); however, the MSA concept was also considered in Europe from a scientific viewpoint (Henke and Borchardt, 2003) and from a practical perspective (Dixon, 2002; Johannssen, 2003; Schreyögg, 2004; Thomson and Mossialos, 2008) over the last decade. Consequently, there are positive and negative findings about the possible effects of implementing this form of financing in contemporary health care systems (Saltman, 1998; Hurley et al., 2008; Borda, 2011). Despite the rich theoretical background, the practical scope of using medical savings accounts remains relatively small. In practice, medical savings accounts are applied in only 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).

A review of the literature related to the issue of medical savings accounts allows the observation that scientific studies in this respect focus on two main streams. One represents a macroeconomic approach to MSA issues and this is the dominant attitude. Medical savings accounts and associated health insurance are subjects 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 and Glied, 2006; Jung and Tran, 2011). The other stream comprises scientific studies where MSA issues are analysed on the microscale, that is from the viewpoint of an individual (or a household). This approach is considerably less frequent. In this area, the objects of research include among others: the phenomenon of moral hazard and negative selection with regard to MSAs (Cardon and 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 and Steinorth, 2012).

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 analyse 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 of a financial product combining the medical savings account with insurance against catastrophic health care costs are described. After, with the use of actuarial methods, an attempt is made to estimate the amount of the MSA contribution based on

the discounted value of an individual's future health care expenses depending on age, gender and selected investment variants.

It should be mentioned that health care in Poland is funded from both public and private sources with the prevailing share of the former in the form of contributions to compulsory social health insurance. The public health care system theoretically provides universal coverage for all citizens, yet in practice there are significant difficulties with access to specialized health care. Public sources are unable to cover all health care expenses and therefore the use of additional private sources is necessary. Consequently, we can observe an increasing participation of individuals in health care financing, more in the form of out-of-pocket payments than in the form of voluntary private health insurance. In 2011, as much as 79.42% of private health care expenses in Poland was out-of-pocket household expenses (WHO, 2014). It should also be added that the growth trend in the share of cash expenses from the population income in health care funding is noticeable not only in Poland but also in other Central and Eastern European countries, and it occurs not so much due to system changes but as a result of insufficient funding from public sources.

In Poland, and in other European countries alike, where health care systems have been functioning for years based on the principle of social solidarity, the liberal and market-oriented MSA concept has a chance to be implemented only as an additional health service funding mechanism that is supplementary to public systems. The implementation of MSAs in the Polish health care system could result in a reduction of current out-of-pocket expenses incurred by households and an increase in individual savings for future health care needs.

2. CONCEPT OF MEDICAL SAVINGS ACCOUNTS

The medical savings account can be defined as a personalized savings account in 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 the financial risk of illness to be spread 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 existing health care funding systems. They have generally been introduced for the following reasons (Hanvoravongchai, 2002; Thomson and Mossialos, 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 the 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.

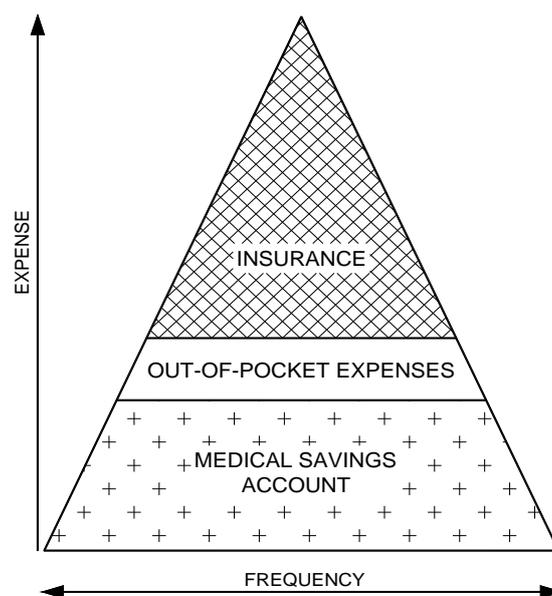


Figure 1. Representative Medical Savings Account Plan

Source: National Center for Policy Analysis (2004).

The insurance component of the MSA plan plays a significant role in its proper functioning, which is frequently emphasized in the relevant literature (Dixon, 2002; Moser, 2005; Hurley and 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 high financial risk (e.g. chronic disease treatment), and (or) costs exceeding the specified limit of the insured's participation (deductible). An MSA holder uses the savings accumulated on the 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.

Another important characteristic of MSAs is that they enable accumulation of individual savings for the expected high costs of health care in the future. It can be noted in the life cycle of saving capacity and health spending pattern that average income and saving capacity are usually higher during economically active years than during the retirement period. In contrast, the average level of health care expenses is usually low at younger ages and increases during later years of life. Along this line of reasoning, the MSA system creates additional savings for covering future health care costs without the intergenerational burden that exists in pay-as-you-go systems, which seems to be more and more significant due to demographic trends (ageing societies). In the shorter term, such individual savings also allow a person to accumulate resources during good times that can be drawn upon during subsequent bad times (Hanvoravongchai, 2002).

3. ANALYSIS OF POTENTIAL CONTRIBUTION TO AN MSA IN RELATION TO OUT-OF-POCKET HEALTH CARE EXPENSES

3.1. 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, assuming that income will be sufficient to make regular annual contributions to the MSA. 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 using 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 the 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.

In the conducted analysis it was assumed that contributions to an MSA will be made regularly at the beginning of each year until retirement age. The amount of a first-year

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contribution (A) was calculated using the relation between the actuarial accumulated value of health care expenses paid from an MSA and the actuarial accumulated value of the contributions to an MSA, both calculated at the beginning of retirement age:

$$PV_{MSA} \cdot (1+r)^n \cdot \frac{1}{{}_n P_x} = \sum_{k=0}^{n-1} A \cdot (1+i)^k \cdot (1+r)^{n-k} \cdot {}_k p_x, \quad (2)$$

where: A – first-year contribution to an MSA made at the beginning of the year; r – annual interest rate; i – annual growth rate of the annuity payment; ${}_k p_x$ – probability that x -year-old person will survive the next k years; n – number of years from the present age of an MSA holder to retirement age.

3.2. Data and results

The key determinants of health care expenses of an individual depend on demographic and health sector-related factors. Unfortunately, in Poland there is no current published data on 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, orthopaedic 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%, yet – due to the long time horizon of the simulation – the assumption that the expenses would increase at the stable rate of 4% per year was selected after Mayhew (2000), who relied on the past 30 years' experience of the OECD countries, extrapolated the underlying rate of medical expenditure growth to about 4%. Analogously, in the study of MSA savings of the elderly upon retirement age in Singapore, Chia and Tsui (2005) assumed a flat annual growth rate of health care expenses accounting for 4%. Similarly, in a numerical analysis concerning future MSA balances in the United States, Query (2000) assumed that the cost of health care claims increased by 4.7% 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 total average annual health expenses per capita were applied. The values of those ratios were calculated based on research conducted by Piekut (2008), where the author used data from 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 future health expenses depending on the age of an MSA holder.

Table 1. The share of average health care expenses per capita by age in 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).

The interest rate used to discount future health care costs was assumed at the level of 3.5% annually. It is based on the amount of the maximum technical interest rates used by insurance companies in 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% (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 after a 5-year deferred period, while in the second savings may be spent only after reaching retirement age.
- The value of a single contribution to an MSA was calculated on the assumption that contributions are made regularly at the beginning of each year until retirement age is reached. In order to maintain the real value of the contributions, they are subject to annual indexation with the application of the 2.32% interest rate. This value was determined as the average inflation rate based on annual inflation rates calculated from 20 years' data for all European Union member states (Eurostat, 2014). The contributions made to MSAs are subject to interest with the following investment variants taken into consideration:
 - 1) the low risk variant – the effective annual interest rate of 4% (adopted based on average profitability of 52-week Treasury bills in Poland in the period from March 2003 to March 2012),
 - 2) the balanced variant – the effective annual interest rate of 9% (estimated based on the average annual rate of return of Open Pension Funds in Poland in the period 2000–2013, which amounted to 8.9%).
- In order to simplify the calculations, 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 taken into consideration. The obtained results are presented in Tables 2 and 3.

In both variants of spending the savings accumulated on MSAs and in all analysed 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.

Table 2. Present value of health care expenses as a single contribution to a medical savings account (in PLN)

Present value of health care expenses (initial MSA balance)	Female age			Male age		
	30	40	50	30	40	50
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
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).

The highest PV_{MSA} value was 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. In general, 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 current household income.

Table 3. Estimated first-year contributions to an MSA by gender and by age (in PLN)

MSA variants		Female age			Male age		
		30	40	50	30	40	50
1st variant (current)	low risk strategy	1,993.66	2,383.53	3,183.82	1,550.90	1,844.57	2,443.57
	5-year deferred payouts	659.12	1,095.05	1,983.15	503.65	834.84	1,507.97
2nd variant (retirement)	low risk strategy	1,211.35	1,559.17	2,339.53	799.84	1,050.31	1,626.75
	payouts deferred until age 67	400.48	716.32	1,457.26	259.75	475.37	1,003.90

Source: author's own calculations.

The data presented in Table 3 shows the amounts of first-year annuity payments put into MSAs at the beginning of the year. Each successive payment made until age 67 is indexed by the annual inflation rate ($i = 0.0232$). The obtained results allowed the following relations to be observed:

- By analogy with the PV_{MSA} calculation, the first-year annuity payment always takes higher values for women when compared to the corresponding values calculated for men in all examined age groups, which results from the difference in mortality rates.
- The value of a single contribution to an MSA increases with age, which makes MSA saving a considerable financial burden for 50-year-olds, particularly women.
- The selection of the retirement variant permits a reduction of a single contribution but at the same time it limits the period for spending the accumulated savings.
- With reference to all analysed MSA holders, applying a higher income rate (the balanced investment strategy) permits a considerable reduction of a single contribution, which confirms the general conclusions drawn based on simulation research on saving within long-term saving plans, for example for retirement purposes.
- The lowest first-year contribution to an MSA is observed for a 30-year-old man using the retirement variant of an MSA with the balanced investment strategy (PLN 259.75), and the highest amount of this contribution is recorded in the case of a 50-year-old woman using the current variant of an MSA with the low risk strategy (PLN 3,183.82). Additionally, it can be seen that the first-year contribution to MSA accounts for more than 5% of the average annual salary in Poland (which was PLN 43,800 in 2013) only for women aged 40 and 50 and men aged 50 in the current variant of an MSA with the low risk strategy as well as for women aged 50 in the retirement option of an MSA with the low risk strategy. In all other cases, the annual payment to MSA ranges from 0.59% to 4.55% of the average annual salary.

4. CONCLUSIONS

In the context 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 functioned on a social solidarity basis for a long time, the implementation of MSA products is only possible as a solution supplementary to public funding. From the viewpoint of an individual, MSA application requires this financing instrument to be included in a long-term personal finance management strategy and in particular to be taken into account in decisions related to the intertemporal choice between consumption and saving.

The conducted analysis was aimed at estimating the amount of the annuity payment made to an MSA depending on the discounted value of a person's health care expenses, age, gender and investment variants. The obtained results, although based on simulation, allow the following general conclusions to be drawn:

- In all analysed MSA variants, the contribution to the account always takes higher values for women when compared to the corresponding values calculated for men, which results directly from the difference in mortality rates by gender. In practice, this means that having a medical savings account might involve a greater financial

burden for women, which can additionally be affected by the lower earnings of women on average and their more frequent use of health services in comparison to men.

- The medical savings account is an instrument for systematic and long-term saving for health purposes. The younger an MSA holder is, the lower the contributions made to the account. However, it should be added that younger people are normally characterized by limited financial capacity – their income is relatively lower and is mainly used for current consumption without the need to save on a long-term basis for future retirement or health purposes.
- A significant factor which influences the value of the MSA contribution is the interest rate estimated over a long time horizon. Applying a higher interest rate permits a considerable reduction in the contribution amount, at the same time involving a higher level of investment risk. The sensitivity of MSAs to the situation on financial markets and the general economic situation is connected with the risk of losing the already generated income or even decreasing the value of the contributed capital, which in turn might – especially in a period of economic crisis – significantly reduce the health service financing capacity from the funds accumulated on the account. Due to the intended use of the accumulated funds (health care purposes), it is recommended to make their investment safe in the first place and only later profitable. In practice, it would be a good solution to adapt the investment strategy to an individual investment profile of a given MSA holder with the time horizon of the investment and attitude towards investment risk taken primarily into account.

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