

ONCE COVERED, FOREVER COVERED: THE ACTUARIAL CHALLENGES OF THE BELGIAN PRIVATE HEALTH INSURANCE SYSTEM

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Once covered, forever covered: The actuarial challenges of the Belgian private health insurance system

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Abstract

The Belgian Law of 20 July 2007 has drastically changed the Belgian private health insurance sector by making individual contracts lifelong with level premiums. The goal of the Law is to ensure the accessibility of supplementary health coverage in order to protect policyholders from discrimination and exclusion, essentially when these operate on the basis of age. Due to the unpredictable nature of medical inflation risk, the legislator introduced a medical index together with a specific updating mechanism, which aim at establishing standardized and fair premium adjustments across the sector. This paper considers two major issues of the current Belgian system. The first one is related to the transferability of the reserves, whereas the second one is related to age-discrimination. We discuss these issues and their interplay, and we address the conflict between the goal of the Law and the practical problems arising in the light of the actuarial techniques.

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1 Private health insurance in Belgium

The Belgian mandatory health insurance is included in the Social Security system and often provides only a partial cover of prescription drugs and medical services. Supplementary health insurance gives access to a more comprehensive spectrum of covered medical services, especially for claims following a hospitalization, which can be very expensive partly due to the supplements charged by medical practitioners and in case of single room hospitalizations. Whereas the yearly contributions for the mandatory cover tends to be homogeneous across the population, the yearly premiums of health insurance contracts sold by private companies take into account the different characteristics of the insured risk profile. Some major factors at play in the pricing process are the health status and the age of the insured at contract inception [16]. In case the contract is renewed on a yearly basis, as this is the case in many countries, the expected annual medical costs underlying the calculation of the yearly risk premiums will increase over time and may even become unaffordable at higher ages; see Figure 1. This is in general the case also for policyholders with chronic diseases or with disabilities.

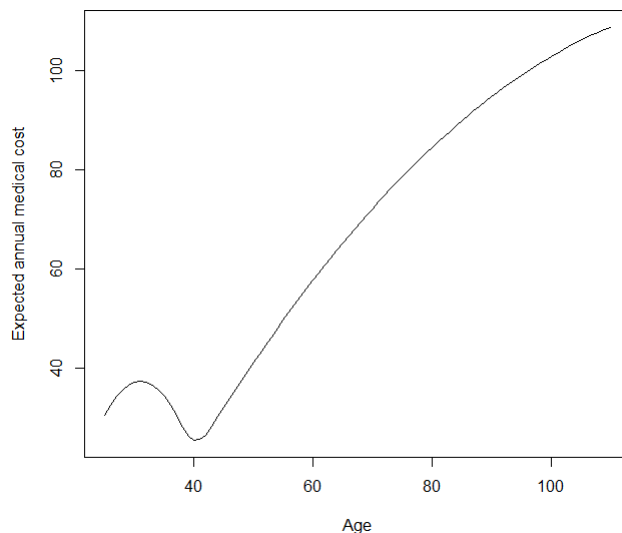


Figure 1: Typical shape of the expected annual medical costs in function of age; see also [9]. These costs are increasing with respect to the age, except for some local phenomena such as the accident and childbearing hump.

The purpose of the Belgian Law of 20 July 2007 is to ensure the accessibility of individual supplementary health coverage [11, 14]. Two important features have been included in order to protect policyholders from discrimination and exclusion, essentially when these operate on the basis of age (article 138*bis*). More specifically, these contracts are now lifelong (with the exception of disability covers which extends to the end of the professional activity) against a level premium which is fixed at contract inception. The legislator allows an adjustment of the premiums using the Consumer Price Index (CPI). In case the main characteristics of the insured risk change over time in a way that threatens the solvency of the insurer, it is allowed to adapt the premiums with the agreement of the relevant authority (i.e. the National Bank of Belgium).

Once covered, forever covered. This maxim which emerges from the Belgian Law has two

important technical consequences. First, from an actuarial perspective, the lifelong commitment implies that these contracts have to be treated technically similarly to life insurance products. This means that the insurer has to build reserves using the surpluses accumulated in the early years of the contract to cover the increasing costs for higher ages. Second, on top of the modeling of future survival probabilities which follows from the analogy with life insurance products, the insurer also has to perform a sound forecast of the future evolution of health claims. However, these evolutions are practically very difficult (not to say impossible) to forecast, meaning that insurers have to cope with a risk which is specific to the private health insurance sector, that is, *medical inflation* risk.

Medical inflation, or the unpredictable systematic changes in medical claim payments over the years, is driven by several inter-related causes [3]. A primary cause comes from the reimbursement structure of health expenditures in the Belgian context. The private health insurance is meant to cover part of the expenses which are not covered by Social Security. Therefore, in case the intervention threshold of the mandatory insurance decreases, e.g. due to some political decisions, claim expenses will inevitably increase for private health insurers. It is to be noted however that for many Belgian insurers, the extent of the covers is expressed as a multiple of this intervention threshold. Thus, a medical service which is excluded by Social Security will also not be covered by private insurers. Medical inflation is also caused by the interplay between both demographic and socio-economic factors. On the one hand, there is a decrease of the contributions to Social Security and an increase of the volume of health benefits for elderly due to population aging. On the other hand, the resulting medical progress might lead to the discovery of new diseases which have to be covered or to the discovery of new cures for known diseases which are often expensive. All these consequences of medical progress have an impact on life expectancy, taking us back again to the population aging issue.

Therefore, Belgian insurers have to anticipate a lifelong risk which can hardly be quantified mathematically. The solution proposed by the legislator is to transfer medical inflation risk back to policyholders by allowing an adjustment of the contract elements on a yearly basis. Note that throughout the paper, we will focus on the adjustment of the premium but the discussion is relevant to the other components of the contract such as the deductible, for instance. This solution appeared to be a compromise between insurers and consumers representatives, provided the adjustments are standardized across the sector. Therefore, the legislator introduced medical indices which are specific to the four main medical services covered in the Belgian private health insurance (hospitalization with stay in a private room, hospitalization with stay in shared room, dental care and ambulatory care) and to five age categories (0–19, 20–34, 35–49, 50–64 and 65+). Concerning the construction of these medical indices, the relevant governmental agencies have been solicited together with a team of actuarial experts [8]. The proposed method has been approved and is currently in use, but some improvements are under discussion [9]. Concerning the application of the indices, the amending Law of 17 June 2009 states that insurers are allowed to adjust the premium using the medical indices or the CPI, whichever is higher, according to the methodology described in the subsequent Royal Decree of 01 February 2010 that implements the Law in practice [10].

One month before the publication of the Royal Decree of 01 February 2010, the legislator solicited an advice from a committee made up of representatives of both insurers and consumers [6]. However, the concerns of the committee were not fully taken into account and the content

of the Royal Decree could not meet the demands of neither of the parties. In 2011, the Council of State canceled this Royal Decree in response to an action by Assuralia, an institution which represents insurance companies [1]. The main reason of this cancellation was that the legislator has omitted the reserves from the updating mechanism without providing any justification. The legislator introduced the Royal Decree of 18 March 2016 which is similar to its predecessor in a number of points, but the reserves have been included in the adjustments [13]. The main difference between the new Royal Decree of 16 March 2016, which is the one currently implemented in practice, and its predecessor is the introduction of an *updating factor* α , the purpose of which is to account for the impact of medical inflation on the reserves. A more detailed explanation of the Belgian updating mechanism is presented in the Appendix. Based on a prior academic study which builds upon some specific assumptions, the updating factor α is set equal to 1.5 [17]. Roughly speaking, if the official medical index is equal to $f\%$, the insurer is allowed to adjust the remaining premiums with an index up to $1.5 \times f\%$. The introduction of this updating factor α allows insurers to transfer back to the policyholders the impact of medical inflation on both remaining premiums and accumulated reserves.

Nevertheless, several concerns expressed about the first Royal Decree by the representatives of both parties remain valid for its new version [7]. Some of these are related to the principle of pricing freedom and the data collection methodology. However, there are two issues in the current Belgian system which we deem to be of major importance in the debate about the coherence between the initial goal of the Law and the practical constraints of the actuarial techniques.

The first issue arises from the technical analogy between Belgian health insurance contracts and life insurance contracts. In particular, in Section 2 we discuss the challenges related to the transferability of the reserves from the viewpoints of both parties. The second issue is related to the initial and main purpose of the Law of 20 July 2007, that is, advocating a system protecting policyholders against age discrimination in health insurance by ensuring affordable covers to all ages. Section 3 is devoted to this discussion where we will also show how the first issue is linked to the second one.

2 Transferability of the reserves

One of the concerns expressed by consumers representatives is that a systematic adjustment of the premiums might lead to business practices diverging from the objectives of the lifelong nature. This issue is particularly sensible given that the reserves of private health insurance contracts are currently not considered as a surrender value. Consumers representatives provided in the report of the committee of 2010 the example of contracts sold to young policyholders against attractive premiums, but these premiums would increase too much over time [6]. Moreover, policyholders at higher ages for whom the premium becomes too expensive would lose their accumulated reserves in case they lapse. Therefore, in order to provide a better protection for policyholders, consumers representatives propose to treat the reserve as a cash surrender value, further pushing the analogy with life insurance contracts. In this sense, the current legislation for lifelong health insurance contracts which does not impose the transferability of the reserves

differs from that of life insurance business where the insurer is required to be transparent on the evolution of the surrender value over time [12].

On the other hand, the representatives of insurance companies claim that their reserving techniques are based on a collective solidarity principle, and thus, the reserves are assigned to a group of policyholders rather than to individuals [6]. In fact, a substantial issue which arises from collectivizing the reserves is adverse selection. Young, and likely to be healthier, policyholders who leave the insurer's portfolio for another company would increase the risk of that insurer. The latter which would then be exposed to a higher insolvency risk will therefore be forced to claim from the relevant authority an adjustment of the premiums. However, even if this adjustment is granted, the increase of the premiums may draw other young policyholders away from the portfolio.

These considerations on the reserves lead to the following question: to whom should they belong? In the current situation, the reserves belong to the insurer and policyholders who do not cancel their contract benefit from the collective scheme at the expense of those who do. However, both viewpoints can be argued. The main drawback of the non-transferability is that policyholders become in some sense binded to their initial insurer. Nevertheless, this non-transferability has the advantage that insurers might include in their tariff information about the expected surrender rates, which eventually results in a discount for policyholders. Note however that estimating surrender rates can be challenging due to the potential influence of future economic factors. On the other hand, a drawback of the transferability is that only healthy policyholders can benefit from it, since it may be difficult for unhealthy policyholders to find another cover. Thus, policy cancellation may have a negative impact on the principle of pooling at portfolio level. In order to cope with this problem, a possible solution is to let the reserve depend on the health status such that policyholders in poor health can be allocated a higher surrender value. This is currently under study at *UC Louvain*, and would consist in linking the allocation of the reserves to the experience of the insurer via a credibility system.

3 Age discrimination

In 2010, one of the main issues of the representatives of insurers was that the first Royal Decree of 01 February 2010 only allowed the indexation of the remaining premiums. Recall that in the lifelong setting imposed by the legislator, the policyholder generally pays level premiums which are higher than the actual yearly insured risk during the first years of the contract but lower when the policyholder reaches a higher age. Therefore, in order for the updating mechanism to be *actuarially fair*, the updated estimates of future benefits has to be reflected on the whole premium plan and not only on the remaining premiums; see the Appendix section, as well as [8] and [5]. This concern has been addressed in the new Royal Decree of 2016 where the legislator introduced the updating factor α discussed earlier in this paper.

Behind these technicalities lies an even more important issue which requires some more explanation. In 2005, the consumers representatives association Test-Achat/Test-Aankoop submitted an application against the leading Belgian provider of private health insurance DKV before the Court of Trade. Test-Achat/Test-Aankoop was claiming that DKV applied unfair

premium adjustments which were increasing with respect to age [15]. Note that a similar conflict which is not discussed here occurred in 2010, shortly after the publication of the first Royal Decree [2]. DKV was ordered in 2005 to repay the extra-payments because the Court has ruled that the increases were discriminatory. The insurer appealed against this decision in 2006, and ultimately, the Court held in favor of the insurer [4].

The distinction between the medical index (denoted above by f) and the updating factor (denoted above by α) is crucial in order to understand the challenge. First, the legislator does not promote an age-independent indexing by defining different indices for each age category. Therefore, as long as the medical index f is different for each age category, the updating mechanism will be age-dependent. However, the medical index is not necessarily *increasing* with respect to the age; see Figure 2. Moreover, age-independent indices are also published, and their application seems to be supported by both parties [7]. Second, the updating factor α which is used to account for the adjustment of the reserves, can technically also be age-dependent. More precisely, the reserve of a policyholder at a given updating time depends upon the seniority of the contract and the age of that policyholder. Therefore, the factor α is necessarily age-dependent in case the reserves are treated in an individual way. Nevertheless, some insurers claim that they are treating the reserves in a collective way, and the legislator introduced a constant updating factor through the “1.5 rule”. Thus, why setting age-independent medical indices and updating factor would not close the debate?

Attempting to answer this question turns the discussion towards the updating factor α and highlights the overlap with the discussion on the transferability of the reserves. A recent academic study has shed light on a drawback of the collective reserving scheme based on the actuarial equivalence principle, i.e. equality between the present values of premiums and eventual benefit payments [5]. Assuming a constant medical index, the study analyzes the updating factor α and the evolution of the adjusted premiums over time in three different cases. The first case is the *individual* updating mechanism. Each contract is treated individually and the updating factor inevitably depends on the age and seniority of the contract. One important finding here is that the individual method often leads to higher adjusted premiums for young policyholders. Intuitively, a policyholder aged 50 who started the contract at age 25 has a higher reserve than a policyholder with the same age who started the contract at age 50. Therefore, the impact of adjusting the reserves (which is precisely that captured by the updating factor) is higher for the first policyholder who has a higher reserve. The second case is the updating mechanism based on pooling the risk of *new entrants*: policyholders starting their contract in the same year will share the medical inflation risk, and thus, will have the same premium adjustments (without necessarily having the same level premium). This situation introduces solidarity between a group, regardless of their age. The consequence is that the updating factor does not depend on the age, but on the distribution of all ages among the new entrants, as well as on the seniority of their contracts. The third case generalizes the setting to an updating mechanism based on pooling the risk at the level of an *existing portfolio*, i.e. the updating factor is the same for all policyholders in the portfolio, regardless of their age and the seniority of their contracts.

The comparison of the evolution of the adjustments in these three cases questions the use of methods based on pooling in order to protect policyholders from age discrimination. Indeed, it is found that in the individual scheme, policyholders who start the contract early tend to have higher future adjustments compared to those who start at an advanced age. In the collective

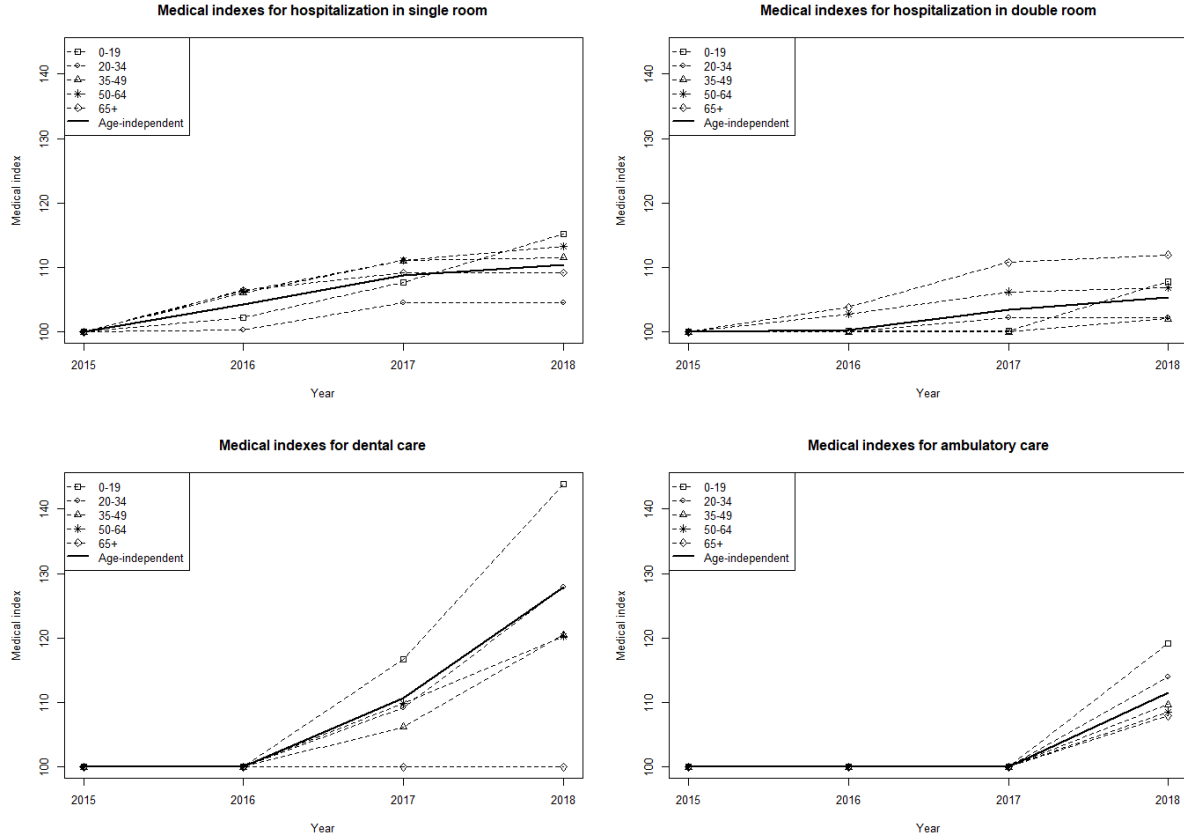


Figure 2: Official medical inflation indices for the four different medical services by age category from 2015 to 2018, obtained from <https://statbel.fgov.be/>.

scheme, this implies that young policyholders could contribute more in the medical inflation risk than policyholders with higher ages. Thus, elderly can benefit from the collective adjustments only in case of a high concentration of old policyholders in the pool. However, since the reserves are not transferable, it is likely that new entrants in portfolios of private insurers will often be relatively young.

To sum up, the discussion about discrimination on the basis of age seems to be closely linked to that of the transferability of the reserves. Managing the reserves in a collective way leads to more favorably priced contracts and supports the uniform adjustments across the different age groups. However, this solidarity implies that elderly are likely to pay for the medical inflation risk of young policyholders. This effect exacerbates when we take into account that the collective reserving constrains the transferability of the reserves, and thus, is likely to lead to a concentration of young new entrants. In the opposite case where the reserves are managed individually, policyholders bear only their own medical inflation risk. However, this leads to non-uniform adjustments across ages, and opens room for the type of business practices pointed out by consumers protection [6]. In particular, with the individual reserving scheme, some insurers could exclude policyholders with a high risk profile (typically elderly or individuals with chronic diseases) from their portfolio by applying too high adjustments.

4 Conclusion

In Belgium, the introduction of a medical inflation index and an updating mechanism for life-long private health insurance is a compromise between insurers and policyholders. On the one hand, insurers can cope with the unpredictable future evolution of health claims due to medical inflation by transferring this risk back to policyholders. On the other hand, policyholders are guaranteed a lifelong cover and protected from sudden and sharp increases that could have happened before the introduction of the Law of 20 July 2007.

In this paper, we have discussed the motivations behind the Belgian regulatory framework for private health insurance contracts, as well as how the concerns raised by both insurers and policyholders have shaped the regulation. A particular focus has been placed on the transferability of the reserves and on the potential age discrimination that may occur under the new mechanism for premium adjustments. Should the reserves be treated as surrender values, and should the premium adjustments be age-independent? The actuarial techniques can provide insights on the consequences of each system. However, answering these questions is not straightforward, and the final decision is likely to be based upon political issues rather than technical arguments.

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References

- [1] Arrêt du conseil d'état numéro 217.085 du 29 décembre 2011, numéro de rôle a. 196.306/vii-38.279.
- [2] <http://www.lesoir.be/442088/article/soirmag/actu-soirmag/2014-02-14/tres-cheres-assurances-hospitalisation%E2%80%A6>.
- [3] J-C. André-Dumont and C. Devoet. *L'assurance maladie privée*. Anthémis, droit des assurances edition, 2012.
- [4] Recueil de la jurisprudence. Arrêt de la Cour (quatrième chambre), affaire C-577/11, 7 mars 2013.
- [5] Michel Denuit, Jan Dhaene, Hamza Hanbali, Nathalie Lucas, and Julien Trufin. Updating mechanism for lifelong insurance contracts subject to medical inflation. *European Actuarial Journal*, 7:133–163, 2017.
- [6] Commission des assurances DOC C/2009/11. Avis de la commission du 7/01/2010 sur le projet d'arrêté royal déterminant les indices spécifiques visés à l'article 138bis-4, de la loi du 25 juin 1992 sur le contrat d'assurance terrestre.

- [7] Commission des assurances DOC C/2015/3. Avis de la commission du 09/09/2015 sur le projet d'arrêté royal portant modification de l'arrêté royal du 01 février 2010 déterminant les indices spécifiques visés à l'article 138bis-4, de la loi du 25 juin 1992 sur le contrat d'assurance terrestre.
- [8] Pierre Devolder, Michel Denuit, Xavier Maréchal, B-L Yerna, J-P Closon, C. Léonard, A Senn, and I Vinck. Construction d'un index médical pour les contrats privés d'assurance maladie, KCE report 96B.
- [9] Jan Dhaene and Hamza Hanbali. Measuring medical inflation for health insurance portfolios in belgium. *European Actuarial Journal*, in press, 2019.
- [10] Moniteur Belge du 08/02/2010. Arrêté royal déterminant les indices spécifiques visés à l'article 138bis-4 de la loi du 25 juin 1992 sur le contrat d'assurance terrestre.
- [11] Moniteur Belge du 10/08/2007. Loi du 20 juillet 2007 modifiant, en ce qui concerne les contrats privés d'assurance maladie, la loi du 25 juin 1992 sur le contrat d'assurance terrestre.
- [12] Moniteur Belge du 14/11/2003. Article 16 de l'arrêté royal relatif à l'activité d'assurance sur la vie.
- [13] Moniteur Belge du 25/03/2016. Arrêté royal portant modification de l'arrêté royal du 01 février 2010 déterminant les indices spécifiques visés à l'article 138bis-4 de la loi du 25 juin 1992 sur le contrat d'assurance terrestre.
- [14] Moniteur Belge du 30/04/2014. Loi du 04 avril 2014 relative aux assurances, remplaçant la loi du 25 juin 1992 sur le contrat d'assurance terrestre.
- [15] Tribunal du commerce de Bruxelles. ASBL Test-Achats contre SA DKV Belgium, 7 mars 2005.
- [16] Ermano Pitacco. *Health insurance: basic actuarial models*. Springer, berlin edition, 2014.
- [17] Ward Vercruysse, Jan Dhaene, Michel Denuit, Ermano Pitacco, and Katrien Antonio. Premium indexing in lifelong health insurance. *Far East Journal of Mathematical Science*, 2013.

Appendix : A simple example describing the Belgian updating mechanism for lifelong private health insurance contracts

We illustrate the necessity of the factor α in the updating mechanism by considering a simple example of an insurance contract paying a random benefit at time 10. We assume that the policyholder who buys this contract pays 10 equal premiums (i.e. level premiums) at times 0, 1, ..., 9, and that these premiums are determined at time 0. We work in a setting zero interest

rate and zero mortality. This means that all the uncertainty in the contract comes from the random nature of the benefit at time 10. From an actuarial viewpoint, a more realistic setting would include a non-zero interest rate and the uncertainty on whether the policyholder will survive until time 10.

In order to determine the level premiums at time 0, the actuary has to estimate the outcomes of the random benefit. Suppose that an estimate of this benefit (e.g. its expected value) is equal to 10. In our simple setting without interest rate and without mortality, the level premium is equal to 1 (i.e. $\frac{10}{10} = 1$). The *expected* cash-flows of the contract determined at time 0 are displayed in the top-left panel of Figure 3, where the dark blue bars correspond to the future premiums and the pink bar corresponds to the future benefit.

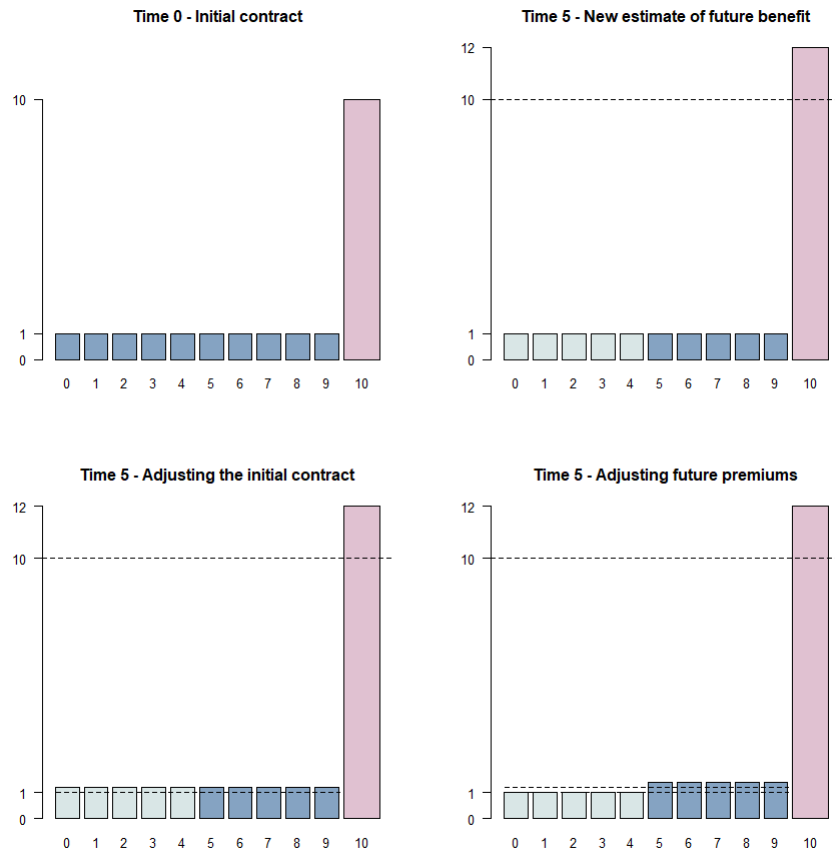


Figure 3: Cash-flows of the insurance contract.

Suppose that we arrived at time 5. We are now in the situation described in the top-right panel of Figure 3. The policyholder has already paid 5 premiums (i.e. the light blue bars), and still has to pay 5 more premiums (i.e. the remaining dark blue bars). The actuary uses the new information available at time 5 to re-estimate the future benefit. Suppose that, due to some cause which could not be predicted at time 0 (such as medical inflation), the new estimate is equal to 12, i.e. the pink bar increases by 20%.

Since the estimate of the benefit has changed due to an unpredictable cause, the insurer is allowed to adjust the level premiums accordingly. At first sight, we might be tempted to increase the premiums as follows:

$$\text{Adjusted remaining premiums} = (1 + 20\%) \times \text{initially estimated remaining premiums},$$

which is similar what the Royal Decree of 01 February 2010 was prescribing for updating level premiums of private health insurance contracts subject to medical inflation. However, the initial level premiums of 1 were calculated on the basis of the initial estimate of the benefit (i.e. 10). This means that the unforeseen 20% increase of the estimate has to be reflected on all premiums, i.e. not only the remaining ones but also those which were already paid. Therefore, an appropriate adjustment is as follows:

$$\text{All adjusted premiums} = (1 + 20\%) \times \text{All initially estimated premiums},$$

which is illustrated on the bottom-left panel of Figure 3. Indeed, the total premiums adjusted in this way (i.e. 10×1.2) would then be equal to the re-estimated benefit (i.e. 12).

Now, the problem is that the premiums at times 0, 1, 2, 3 and 4 were used to build a reserve. Note that at time 5, this reserve is equal to $5 \times 1 = 5$. Thus, this updating scheme where only the future premiums are adjusted implies that policyholders are covering the impact of medical inflation on the remaining premiums, and that the insurer is covering the impact of medical inflation on the already paid ones (or equivalently here, on the reserve). Of course, there is no technical constraint in applying such updating mechanism. However, the initial goal of the legislation is to transfer the unpredictable part of the risk back to the policyholders, such that private health insurance companies bear only the predictable part.

Therefore, an updating mechanism which meets the initial goal of the legislator would consist in increasing the remaining premiums with more than 20%, and hence, by applying an updating factor α to the unpredictable increase of 20%. As it is illustrated on the bottom-right panel of Figure 3, the Belgian updating mechanism prescribed by the new Royal Decree of 16 March 2016 is such that:

$$\text{Adjusted remaining premiums} = (1 + \alpha \times 20\%) \times \text{Initially estimated remaining premiums}.$$

From an actuarial point of view, the value of α has to take into account different characteristics of the contract, and also whether the updating mechanism is implemented at individual or at group level. In practice, the Belgian Royal Decree sets an upper bound for α . Loosely speaking (disregarding some technical elements), this upper bound is equal to 1.5.