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 the technical basis (i.e. actuarial assumptions) fixed at policy issue. The goal of the Law is to ensure the accessibility to 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 and the difficulty to model future increases of health claims, the legislator introduced medical indices 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.

Keywords: Health care reform; Private health insurance; Age discrimination; Lifelong covers.

1   Introduction : Private health insurance in Belgium

Belgian mandatory health insurance is included in the social security system and 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 hospitalization claims, which can be very expensive mostly due to the supplementary fees charged by medical practitioners in case of single room hospitalizations [17]. The yearly premiums of health insurance contracts sold by private companies take into account the different characteristics of the insured risk profile. Major factors at play in the pricing process are the health status and the age of the insured at contract inception [18]. 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 generally also the case for policyholders with chronic diseases or with disabilities.

Health expenditure in Belgium represents 10.4% of GDP [**?**]. In 2015, Belgian out-of-pocket expenditures was one of the highest among the major European countries, with 17.7% of the total health expenditures. Together, in-patient, out-patient and dental care medical services represent about 46% of the out-of-pocket contributions [**?**]. On the other hand, voluntary private insurance in 2015 represented 4.9% of the total health expenditure in Belgium [**?**]. Hospitalization insurance, which is provided either by private health insurance companies or as an additional insurance by mutual insurers, allows to reduce the bill after a stay in a hospital. Based on the official figures of the National Bank of Belgium (NBB), 9.4 million health insurance contracts were in force in 2015 [**?**]. The total premiums of private health insurance amounted to 1.7 billion euros, with 28.08% coming from individual private contracts. The union of insurers *Assuralia* reports that 80% of the Belgian population has a hospitalization insurance, subscribed either individually, or through employers [**?**].
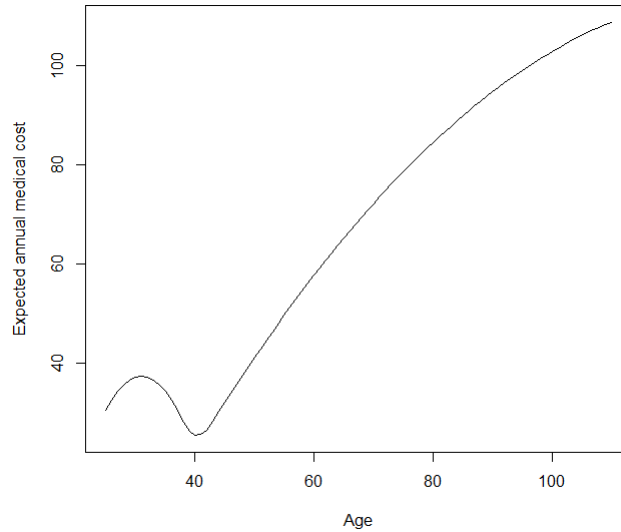
Figure 1: Typical shape of the expected annual medical costs (or yearly average claim payment) in function of age; see also [5]. These costs are increasing with respect to the age, except for some local phenomena such as the accident and childbearing hump.

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The purpose of the Belgian Law of 20 July 2007 is to ensure the accessibility of individual supplementary health coverage [12, 15]. 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 must be lifelong (with the exception of disability covers which extend to the end of the professional activity) with a fixed technical actuarial basis. 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 NBB).

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 combined with level premiums (over all ages, or over some age ranges) 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 at 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 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. 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

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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. 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 in case they are leveled, but the discussion is relevant to other components of the contract such as the deductible, for instance, and to some extent to the case where premiums are leveled per age category. 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]. These indices are constructed by comparing aggregate gross claim amounts at market level (i.e. claim amounts after intervention of social security, without taking into account insurance features such as deductibles) over two consecutive years. The proposed method has been approved and is currently in use, but some improvements are under discussion in order to take into account the specificities of each of the four medical services [10]. 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, which ever is higher, according to the methodology described in the subsequent Royal Decree of 1 February 2010 that implements the Law in practice [11].

One month before the publication of the Royal Decree of 1 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 [1]. The main reason of this cancellation was that the legislator had 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 [14]. The main difference between the new Royal Decree of 18 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 [19]. 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 $1.5 \times f\%$.

2 Aim, material and methods

The Royal Decree of 18 March 2016 allows insurers to adjust future premiums taking into account the impact of medical inflation on both the remaining premiums and the 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, 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. We also show how these two issues are linked.

This paper does not provide a quantitative analysis of the Belgian system for premium adjustments. Earlier studies have already shown that the updating mechanism proposed by the Royal Decree of 18 March 2016 can be conservative enough to ensure the solvency of insurers [5]. Other related actuarial studies attempt to improve the updating mechanism by considering cases where the reserves are transferable [9]. Moreover, we do not discuss possible conflicts between the Laws governing the Belgian system for private health insurance and European Union regulation. For such discussion, we refer to e.g. [**?**]. Instead, our purpose is to highlight some aspects of the current Belgian system for private health insurance contracts which deserve a careful attention.

In the analysis of the Belgian Law, we use national legislation and jurisprudence, as well as reports from the appointed Committees responsible for advising the legislator. The Belgian system is analyzed through the lens of the actuarial methods. In particular, the main concept which implicitly intervenes in the discussion is the *actuarial equivalence principle*. This principle ensures a balance between the present values of benefits paid by insurers and premiums collected from policyholders, where the present values are determined from some mathematical models.

In general, it is not straightforward to extrapolate the relevance of a study on a health care regime in a particular country to other countries. This is due to the fact that the role of private health insurance can vary substantially. Nevertheless, the discussion provided in this paper, and the lessons drawn from the Belgian system may be relevant to other countries. One example is the private health insurance market in Germany (providing a primary coverage and mostly targeting self-employed, civil servants and high-income individuals), which offers lifelong covers with level premiums [**?**]. These level premiums are also subject to revision for medical inflation over time. Unlike in Belgium where medical inflation is determined at market level,

German private insurers can rely on their own experience for premium adjustments, but they have to follow a defined methodology to that end.

3 Results

3.1 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 surrender values. 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 for life insurance business where the insurer is required to be transparent on the evolution of the surrender value over time [13].

On the other hand, the representatives of insurance companies claimed 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, would therefore be forced to claim from the relevant authority an adjustment of the premiums. However, even if this adjustment would be granted, the increase of the premiums might 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 Belgian 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. This situation is in contrast with the one effective in Germany since 2007 through the GKV-Wettbewerbsstärkungsgesetz act, which imposes the transferability of reserves to private insurers [?]. 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 might be to let the

reserve depend on the health status, such that policyholders in poor health can be allocated a higher surrender value.

3.2 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 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 explanation. In 2005, the consumers' representatives association Test-Achat/Test-Aankoop filed a complaint 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 [16]. 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.
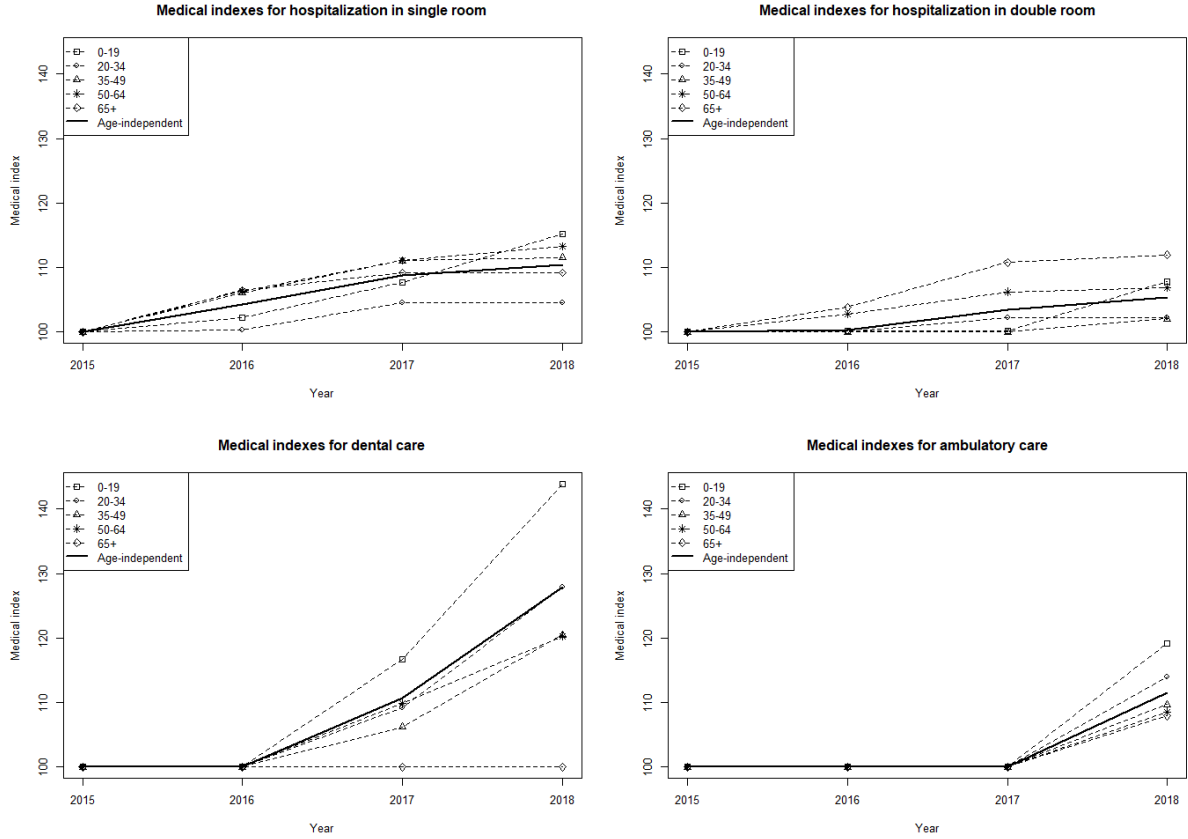
Figure 2: Official medical inflation indices for the four different medical services by age category from 2015 to 2018, obtained from `https://statbel.fgov.be/`.

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The first case is the *individual* updating mechanism, from which one can derive an individual updating factor α_x for each policyholder aged x at policy issue. Since each contract is treated individually, the updating factor inevitably depends on the age and on the seniority of the contract.

The second case is the updating mechanism based on pooling the risk of *new entrants*: policyholders starting their contracts 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, denoted by α_{ne} for new entrants, 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 study does not explicitly state the relation between the individual and this aggregate method. However, it is possible to show that the updating factor α_{ne} for new entrants is a weighted average of the individual updating factors α_x over all ages x in the cohort of new entrants. Therefore, the aggregate updating factor for new entrants will always be smaller than the highest individual updating factor, i.e. $\alpha_{ne} \leq \max_{x} \{\alpha_x\}$.

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. Here again, the resulting updating factor can be expressed as a weighted average of the updating factor from either the first or the second method.

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. This ordering has an important consequence on the aggregate method, because the highest α_x is reached for younger ages, and the aggregate factor α_{ne} is smaller than the highest individual updating factor. In the collective 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.

4 Discussion

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.

Theoretically, a potential solution to the problem stated above would consist in applying a uniform tariff for all ages. This solution echoes the risk-equalization scheme adopted in Slovenia after the 2005 reform [**?**]. However, such restrictive regulation might violate the principle of pricing freedom. Moreover, the European Court of Justice ruled against the 2005 Slovene Law in 2013 [**?**].

Another solution would consist in taking advantage of the Belgian *Twin Peaks* regulatory framework introduced in 2011. Under this framework, the NBB is in charge of the prudential supervision of insurance companies, and on the basis of the Belgian Law of 9 July 1975, can grant or require premium adjustments beyond what the medical indices suggest. On the other hand, for private health insurance companies, the *Financial Services and Markets Authority* (FSMA) has, among others, the competence to monitor the products in order to ensure fairness towards consumers. The analogue of the FSMA for mutual insurers selling hospitalization covers is the OCM/CDZ (*Office de Contrôle des Mutualités*, in French, and *Controledienst*

voor de Ziekenfondsen, in Dutch). Whereas the role of the NBB is unambiguously specified in the current Belgian Law on premiums adjustments, the role of the FSMA and the OCM/CDZ should be defined more clearly in the application of the index. In the current situation, the FSMA and the OCM/CDZ are in charge of collecting the data underlying the calculation of the medical indices. The task of monitoring premium adjustments could be entrusted to the FSMA and the OCM/CDZ, and their role in the updating mechanism could be crucial in order to avoid discrimination on the basis of age.

5   Conclusions

In Belgium, the introduction of a medical inflation index and an updating mechanism for lifelong 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 happen before the introduction of the Law of 20 July 2007. It should however be noted that this latter protection is not necessarily sufficient. As mentioned earlier, besides the adjustments related to the medical index, insurers can also request adjustments from the NBB. For instance, the Belgian insurer DKV increased in 2017 its level premiums by 9% on top of the medical index [**?**]. Thus, whether the current Belgian system really protects policyholders against sudden and sharp increases is subject to debate.

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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Appendix: A simple example describing the Belgian mechanism for premium adjustments in 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.

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:

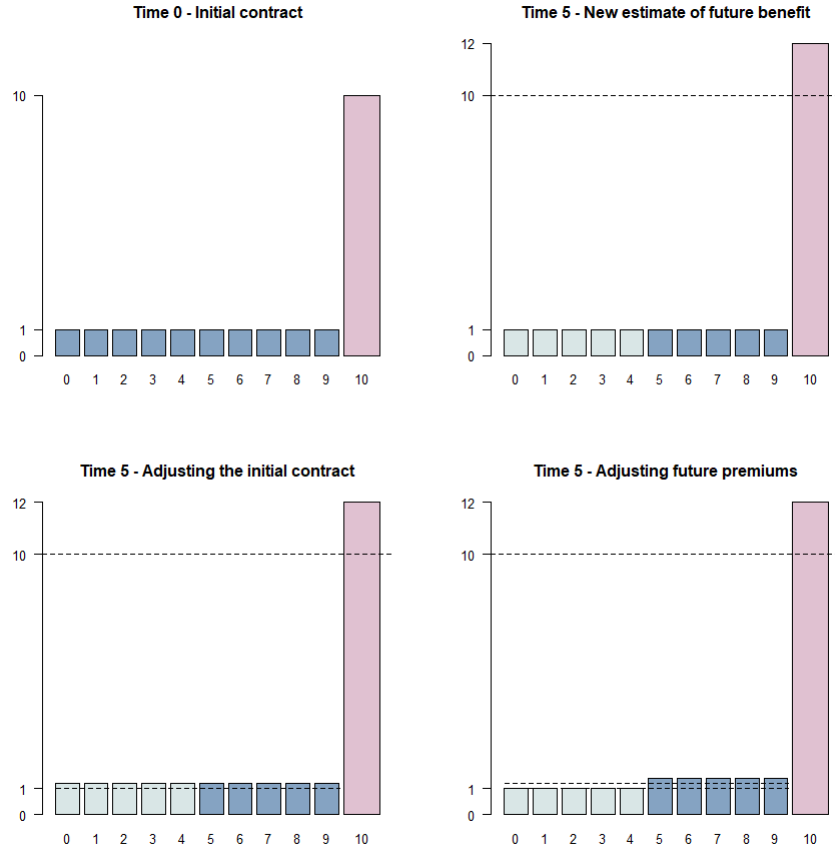$$\text{All adjusted premiums} = (1 + 20\%) \times \text{All initially estimated premiums},$$

Figure 3: Cash-flows of the insurance contract.
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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:

Adjusted remaining premiums $= (1 + \alpha \times 20\%) \times$ 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.