

# Pricing Private Health Insurance Products in China

Chen Tao\*

## Abstract

In this paper an overview of how to price private health insurance products in China is given. In the beginning the Chinese private health insurance market and products are analyzed. Then the statistical data and assumptions in pricing are discussed. Following it, the actuarial models and premium calculating methods used in pricing process in China are described. The regulations of private health insurance business in China, especially the regulation of pricing are also involved in this paper. The perspective of Chinese private health insurance and some recommendations to develop health actuary are given in the end of this paper.

## Keywords

Private health insurance products                      pricing                      health actuary

## 1. Products and market of private health insurance in China

Following the economic and social reform towards a modernized country with free-market, China has begun to adjust its health care system since the early 1980s. After a very long and hard period, a new social health insurance program called “Urban Worker’s Basic Medical Insurance System (UBMS)” has been fully in place in all Chinese cities. According to the announcement held by the Chinese Ministry of Labor and Social Security (CMLSS), about 100 million urban workers were covered by UBMS at the end of 2002 and the coverage will gradually expand to all the urban laborers (about 170 million) in the near future. In the year of 2000, the UBMS’ contribution rate for employer is about 6% of their employee’s total amount wage. The employee pays 2% of his wages as a personal contribution. The UBMS has a model of pay-as-you-go risk pooled fund combined with a personal medical saving

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\*Chen Tao Ph.D. Associate Professor, School of Insurance, Southwestern University of Finance and Economics, No 55, Guang Hua Cun Street, Chengdu, 610074, P. R. China; Email: dr\_chentao@hotmail.com

account. The personal saving account is used for out-patient service fee. The mutual fund reimburse for the insured's hospital service expense with a deductible of 500-1000 Yuan RMB and a coinsurance of 20%-30% for each hospital stay. The yearly reimbursement also has a maximum equals four times of the employee's average annual wages. The maximum is different from place to place. For example, in 2002 it is 70000 Yuan RMB in Shanghai and 40000 Yuan RMB in Chengdu.

Because the UBMS just provides the urban employee a basic protection from medical expense. The private health insurance has an important role in the national health care system in China. The compensation of UBMS has limitation in the item of medical service and a maximum. So even covered with UBMS the employee must find some additional insurance plan for their self payment above the maximum or in excess of reimbursement. For those unemployed dependents and employees have not join the UBMS, the private health insurance is a good replacement to the social health insurance.

According to the report from Statistical Center of Chinese Ministry of Health Care, total health care spending was 508 billion Yuan RMB in 2001, which is 5.3% of GDP. Among the resource of health care spending, the contribution of private expenditure is 61.2%. So the ratio of public to private financing of health care in China is 2:3. It is much higher than the OECD average 3:1 in 1998. Some professionals estimate the private health insurance market in China had a volume above 300 billion RMB Yuan in 2001, but the data from Chinese Insurance Regulation Committee (CIRC) showed the actual premium income among the whole health industry is just 22.27 billion Yuan RMB in 2001. Excluded the premium income from critical illness business the number is only 6.5 billion Yuan RMB. So although private health insurance has a brilliant future in China, there are still some challenges in developing this kind of business. The first is that the Chinese domestic Life Insurance Company lack of professional and experience to manage this kind of business. The second is that there are no effective regulations in health service market and the service price keep rising yearly. The third is that the regulation of insurance also must be innovated to keep up with the rapid progress in health insurance industry.

In the China Health Insurance Development Forum which was hold in Beijing on October 18-19, 2003, the CIRC announced that there are 29 life Insurance companies and 8 property insurance companies providing over 300 health insurance products in China in 2002. Most of them are critical disease and medical expense insurance. And no insurer provides the long-

term care and disability income products really now in China. Among the health insurance products three kinds are predominant in market. The first category is critical illness insurance including cancer insurance. The second is hospital indemnity insurance which consists of hospital daily allowance and inpatient medical expense insurance. The third is supplemental major medical insurance, which is the Supplementary plan to Social Health Insurance, especially reimburse for the hospital expense over the maximum of UBMS.

## **2. Data resource and actuarial assumptions of pricing**

To price health insurance products, health actuary can rely on two kinds of statistical data: external data and internal data. In general the external data can not supply the actuaries with the information needed for premium calculation due to the different basis of observation. Because of the very short history for most Chinese insurer to manager health insurance business, the internal data is very limited. The health actuaries have to rely on external data at an emerging market in China. For example, the morbidity and health cost data from the first and second National Investigation of Health Service in 1993 and 1998 have been used by some insurer to make the expected hospitalization rate and other actuarial assumption for several years. Some actuaries question the authority of the data, due to the difference between the insured and the uninsured. Until now most Chinese domestic life insurance company still have not got enough professionals and IT system to accumulate or analyze the real claim record of their health insurance business. The health actuaries still have difficulty to make assumption from their own company data so they will have to relying on the above external data in the near future.

Building a data base is only the first step for pricing. When pricing a health insurance product the actuary must make some sound actuarial assumptions. In pricing yearly renewed products they are morbidity, margin, expense and profit. Among them morbidity is the most important one. The term morbidity here is not justly referring to the likelihood of injury and illness of the insured. It is the total amount of financial loss due to injury and illness that the insured incur over a certain period. It can be separated into two aspects: frequency and severity. Frequency is how often a loss occurs during a year and is expressed by morbidity table in U.S. Severity is the average amount of loss and is called continuance table by American actuary. Lacking experienced claim data from the insured, the Chinese health actuaries use external data from Report on National Investigation of Health Service in 1993 to form the morbidity and continuance table (Table 2. 1 and Table 2. 2).

Table 2.1: Hospitalization rate in China (‰)

Age	Urban resident		rural resident	
	Men	women	man	women
0-4	60.69	51.96	51.40	33.97
5-9	22.78	26.73	20.99	12.39
10-19	16.75	12.96	17.26	11.52
20-29	24.33	79.55	20.24	47.48
30-39	31.24	50.18	26.04	35.04
40-49	40.79	49.68	30.61	36.67
50-59	67.67	77.93	38.43	48.05
60-	111.00	64.80	50.31	42.37

Table 2.2: Average hospital stay of inpatient in China (days) \*

Age	Urban inpatient	Rural inpatient
0-4	12.38	7.42
5-9	17.26	12.44
10-19	18.37	12.75
20-29	20.48	14.32
30-39	33.49	16.30
40-49	34.08	18.92
50-59	35.51	17.27
60-	43.40	15.93

Except for a conservative morbidity assumption, Chinese health actuaries also introduce a contingency margin into the premium calculation to avoid the situation that the claims significantly exceed the expected. In practice this safety loading is from 30% to 200% of the risk premium. Chinese health actuaries have realized that a sound expense assumption is necessary for an enough and competitive price. But until now they can not divided sales expense, acquisition and maintenance expense into every health insurance product. So in practice they have to make it a proportion of net or total premium. In China, the actuaries usually could not add an amount for profit or surplus to the premium like their foreign colleague, they make higher assumption of morbidity and expense to get them. Because of the tax exemption policy on private health insurance, there is no taxes assumption in private health insurance in China now.

When pricing a long term or life long health insurance product, a level premium rating is adopted. The actuaries estimate not only the current benefits, but also the whole benefit to the end of the contract. Additional assumptions such as mortality, interest, lapses rate and trend factor must be set. In 1996 the primer regulator of insurance industry in China, the People's Bank of China (PBOC) issued the experienced life table which must be adopted by life insurance industry. Now the health actuaries use a mortality model from the three annuity

table, CL4-CL6 (1990-1993) to express the probability of the death of the insured. The technical rate of interest is an important factor to get the cash value of premium income and the claim cost when calculating level premium. According to the regulation in China the technical rate of interest must not exceed 2.5% but most Chinese insurers use the maximum to form the assumption. Lapse rate is also important in rating a long term or life long products. Actuaries must make an assumption of persistency rate to express the probability of lapses. It would be better if the assumption is based on insurer's own experience, but now in China the actuaries usually can not get enough and correct data to make it.

The Chinese actuaries have known from their experience that the probability of hospitalization and the days of hospital stay are relatively steady, but the medical service cost kept rising. Data from the National Investigation of Health Service and from Information Center of Chinese Ministry of Health Care approve this trend (Table 2.3, table 2.4). So when estimating the expected amount of claim in future, the rising medical service cost must be taken into account.

Table 2.3: The trend of hospitalization rate in China (%)

Residences	1998	1993
Urban/men	4.71	4.62
Urban/women	4.94	5.45
Rural/men	2.79	2.87
Rural/women	3.44	3.25
total	3.54	3.56

Table 2.4: The trend of medical cost in China (Yuan RMB)

Year	Average expense per outpatient visit	Average expense per hospital Stay	Average days per hospital Stay
1995	39.9	1668.0	13.3
1996	52.5	2189.6	12.8
1997	61.6	2384.3	12.3
1998	68.8	2596.8	11.7
1999	79.0	2891.1	11.4
2000	85.8	3083.7	11.0
2001	93.6	3245.5	10.7
2002	99.6	3597.7	10.1

In China the health actuaries usually apply a correction factor which is called trend factor. During the past ten years, the yearly average rising rate of medical expense is about 10-15% in China, so the actuary usually adopts this data as the amount of trend factor in future.

### **3. Actuarial model and pricing process in practice**

There are four principles that an actuary must follow in setting the premium rate of private health insurance products: adequacy, reasonableness, competitiveness and equity. Due to the insufficient data and experience, Chinese health actuaries emphasized the principle of adequacy as the most important principle. In order to keep the amount of premium enough to cover the benefit payment and the cost of administration, they made a very conservative premium rate. In current market, the customers are difficult to review if the coverage they get is worth the premium they paid. So the health actuary gives less attention to the principle of reasonableness and the complaints of higher price of health insurance products in China. Though the competitiveness in China is not like some other mature health insurance market, the actuaries still considered about this principle and keep their price not to be significantly higher than that from other insurers for the same coverage. For the principle of equity, the price of most medical expense insurance in China differs for people of different genders and ages. In order to keep the premium each insured pays agree to the expected claim to get, health actuary must get the help from the health underwriter to review the health status of the insured.

The first step of pricing a health policy is predicting the amount of claim payments. The annual claim cost, the risk premium, is the product of the frequency of occurrence and the amount of the average claim. The net premium is the risk premium plus safety loading which can cover the unexpected large amount of benefit payments. Finally, many types of expense were added together to the net premium to make up the necessary amount of a premium which is the final price of the policy, the gross premium. The Chinese actuaries usually make the expense a percentage of the gross premium to simplify the calculation.

The pricing process of critical illness insurance is similar with life insurance. In China the life actuaries have done a very good job in this kind of business. The calculation of level premium rate of long-term or whole life medical insurance is more complex because the benefit for each year is different. Except for the estimation of claim payments, the actuaries have to use the assumption of interest rate to calculate the cash value of premium and claim cost. Then they can get annual net level premium. At the beginning, most Chinese individual health insurance products are yearly renewable policies, so the health actuaries have small opportunity to calculate the level premium like German health actuaries. But later some of them got the chance. Several years ago the Pacific-Anta Life Insurance Company lunched a

life long hospital daily allowance product in Shanghai. When calculating the level premium rate of whole life hospital expense insurance, more difficulties rose, except for the establishment of aging reserve, the actuary must find a mechanism to make the newly enrolled people to bear the more medical cost in future which exceeds the assumption.

In current China most group health insurance products are yearly renewable medical expense insurance, especially hospital expense insurance. When pricing a group product health actuary can employ three kinds of models to set up the premium rates: manual rating, experience rating and blended rating. Manual rating is based on average benefit payments and used for small groups. When the group is large enough, experience rating model is applied. The group's premium rate is based on its own claim experience. The blended premium considered both the claim experience of insured and average risk level of all groups. The bigger the group size, the more weight of the experience premium. The smaller the group size, the more weight of the manual premium. At the beginning, Chinese health actuaries usually used the manual rating methods to price the group health insurance because of the regulation reasons. In 1998, the method of experience rating and blended rating has been used by some Chinese actuaries to price group Supplemental Major Medical insurance.

The setting of the initial premium rate is not the end of pricing health insurance. The re-rating process will repeat yearly or time to time. For most insurers who provide the medical expense coverage and group coverage in China, initial rate usually guaranteed for 12 months. The actuary will monitor the development of the claims and identify significant changes in administration or other factors which will affect the operation. According to the suggestion of actuaries, the insurer will adopt a higher premium rate when the policy was renewed. In practice, the insurer in China stop sell the old products which need a rate increase and replace it with a new product.

#### **4. Actuarial regulation of pricing private health insurance business in China**

In China, by the Insurance Law of 1996, health insurance business can only operated by life insurance company. The 2002 revised Chinese insurance law allows property insurance company to operate short term health insurance business after get the authorization from the regulator. Now the development of health insurance product is subject to the insurance laws and a number of regulations even through the regulation system are still incomplete in China. Firstly, health actuaries must submit to insurance regulator for review and approval the

following documents: contract and premium tables of the new product, actuarial assumptions in pricing, the methods and formula in calculating the premium, reserve and cash value, advertisement and other support material for selling the new product. The pricing process of health insurance must follow the Actuarial Regulation of Health Insurance issued by CIRC in 1999. The stipulate is applicable to medical expense insurance, illness insurance and income protection business in China. Among them the prevision for short term health insurance is rather simple. According the regulation the assumption of morbidity can be made from the insurer's own claim experience, data from the reinsurer or other external statistic. The maximum of the proportion of expense to total premium is 35% in individual business and 25% of group business. Other restrictions are same with the actuarial regulation of accident insurance business. The provisions for long term health insurance, such as life tables, interest and expense rate are referring to long term life insurance according to the Chinese Actuarial Regulation of Health Insurance.

Although pricing health insurance product is restricted by regulation strictly in China but really it is not mature. So here is still the need for some innovations. Firstly, an actuarial standard of health insurance must be introduced to the health insurance industry. This actuarial standard will be a professional criterion of health actuary in China. Secondly, the situation that the regulators lack experience and knowledge in health insurance must be improved. Finally, the regulations in health insurance should be made separately and follow the suggestion from real health insurance professionals.

## **5. Future of private health insurance and health actuary in China**

Because the current social health insurance system just provides the urban employee a basic protection from medical expense in China. It needs a complementary private health insurance industry to fulfill national health care system. After China enters the WTO, the private health insurance gives Chinese domestic life insurance company, the joint-venture life insurance company and the branch of some foreigner life insurance company the chance to make money. But the provider also has to know that the industry is changing dramatically. The provider must have the ability to handle the risk of this business, or he will not get the profit.

Most Chinese actuaries employed by life insurance company and work in life insurance or annuity business. The health insurance industry differs from life industries in pricing, contracts and risk management. Health actuary is responsible for the price process. According



to the investigation charged by the author, there are only less than 30 health actuaries in Mainland China. All of them work for insurance or Reinsurance Company and most of them do a part time job. The Chinese health actuaries are still young, just like the private health insurance industry in China, but the emerging market also offers many natural experiments to aid of the progress of these young health actuaries.

Above we just discuss premium calculation, the most important issues in pricing health insurance product. Actually the pricing of private health insurance product is involved with many aspects such as the management of anti selection and moral hazard, stinting, uncertainty and risk aversion, the demand for health insurance, agency relationships, information disparities, regulation, supply-side and demand-side selection. Among them, the anti selection and moral hazard is the most important factor to be considered, for example, the average frequency of hospitalization for Chinese is about 3-5% and the average of a hospitalization cost is about 3000 Yuan RMB in 2000, but the experience from some insurer shows that the real data from the insured is double. So some actuaries said that pricing health insurance product is the most difficult among all insurance business. And the Chinese health actuaries would say that pricing this business in China is impossible because of its insufficient data, unsound regulation and dramatically changing environment.

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