A COMPARISON OF THE U.S. AND GERMAN HEALTH INSURANCE SYSTEMS

Philipp A. Meves

135 Pages August 2005

This thesis describes main characteristics of the U.S. and German Health Insurance System and compares differences and similarities, focusing on the range of products and calculation of premiums and reserves.

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The twentieth century has show that health insurance coverage is a very important issue. However, different countries handle this in different ways. The objective of this thesis is to describe and compare the health insurance systems of the United States and Germany, focusing on offered insurance plans and their provided benefits.

In the United States, health insurance by the government is provided only for elderly and needy people. All other citizens can purchase individual health insurance or obtain coverage by a group health plan. Group health plans are typically provided by employers for their employees. For both individual and group plans coverage can be obtained in four main categories: Medical expense insurance, long-term care insurance, disability income insurance and accidental death and dismemberment insurance. Not only commercial insurance companies offer health care plans, but also service providers are in the market. Service providers are health insurance providers that provide benefits on a service-type basis, i.e. the insured is not reimbursed for medical expenses, but benefits are provided in the form of medical services.

The German health insurance market is characterized by the coexistence of two systems which provide broad coverage: statutory and private health insurance. The former is the larger one covering the majority of the population, whereas the latter one typically provides better benefits. Statutory health insurance is compulsory for all employees and is provided by non-profit organizations under public law. Private health insurance is provided as substitute or supplement to the statutory system and can be purchased by high income employees who may choose to opt out of the statutory system and by self-employed individual and civil servants who are not covered by the statutory system.

Furthermore, different types of reserves are described, focusing on claim and contract reserves. Finally, different regulations in the two Countries are presented.

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A Thesis Submitted in Partial
Fulfillment of the Requirements
for the Degree of

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CHAPTER I

INTRODUCTION

Health Insurance is an important issue for all industrialized countries in the world. While the need for health insurance is common to all of them, the way how it is organized and how protection is provided differs from country to country. The objective of this thesis is to describe and to compare the health insurance systems of the United States and Germany.

The United States have a health insurance system that is mainly based on private health coverage – either on a group plan basis or on an individual basis (Dearborn, 1994). The chapter about the U.S. health care system describes several aspects that are important to understand the system. A general introduction is given to the available types of health care plans and their coverage. According to Dearborn (1994), the main areas are medical expense plans, disability income plans, accidental death and dismemberment plans and the newest form of financial protection which is coverage for long-term care. People can purchase health insurance on an individual basis, receive coverage within a group insurance plan or obtain benefits from a state or federal government sponsored program. Providers for individual and group health insurance are commercial insurers and health service providers which are described in further detail. Government programs are restricted to the elderly and needy people and are also described in that chapter. The government

programs do not provide coverage for the working part of the population, but many working individuals are covered by an employer's group plan (Bluhm, 2003). Since the available coverage for group plans does not differ from individual plans, only special characteristics and advantages of group health insurance are described.

Health plans are characterized by their provisions and exclusions (Dearborn, 1994). Important, for example, is the provision of renewability. Some contracts are designed to provide coverage for one year and are not renewable, while others are guaranteed renewable at the insured's choice. An overview of the most popular provisions will be given in Chapter II, followed by an introduction to the ratemaking process of health insurance. Individual plans are calculated on a level premium basis, i.e. premiums are designed to remain unchanged as long as medical costs do not increase, and group plans are typically priced using experience rating which means that the premium is adjusted each year based on past claim experiences.

Chapter III, thereafter, describes the main features of the German Health Insurance System. Germany provides comprehensive health insurance for almost the whole population, even though not everybody is covered by the statutory system (Schneider, 2002). Every worker is a compulsory member of the statutory health insurance system and has the obligation to contribute to the social insurance. However, high income employees may choose to opt out of the system and purchase private health insurance coverage. This type of insurance is meant to be substitutive coverage and is offered by commercial insurance companies, whereas statutory health insurance is provided by nonprofit organizations under public law. Self-employed individuals and civil servants are

also not covered by the statutory system. The employers of civil servants bear a certain percentage of the costs for medical care. For the remaining part of the expenses, private health insurance can be purchased. Self-employed individuals have the choice to become a voluntary member of the statutory system or purchase private health insurance.

It is a characteristic of the German system that two different systems co-exist side by side and provide a broad range of benefits (Schneider, 2002). Private insurers typically provide even benefits in excess of the statutory coverage. They also offer private health coverage as a supplement to the statutory insurance. An important characteristic of private health insurance is that it is virtually impossible for insureds to return to the statutory system. This is possibly only in exceptional cases and by the age of 55. Statutory health insurance is provided lifelong and, consequently, private health insurers must also guarantee a lifelong coverage. In addition, contributions to the statutory system are independent of the insureds age and this is also expected from private policies. Hence, private health insurance in Germany is similar to life insurance. As a result premiums are calculated similar to life insurance premiums and insurers have to establish contract reserves (Schneider, 2002).

Chapter IV discusses different types of reserves and specifics of the U.S. and German system. The two most important types are claim reserves and contract reserves. The former are the predominating type in the U.S., whereas the latter are the most important form in Germany. Most insureds in the U.S. are covered by a group health insurance plan (Black and Skipper, 2000). These plans are typically priced by experience rating on an annual basis. Moreover, risk is shared by the group and premiums are established

based on the risk of the whole risk. Thus, the need for contract reserves is minor compared to the need for claim reserves. Claim payments are assigned to the beginning of illness and provided even after termination of the contract. In Germany, contract reserves are very important due to the fact that health insurance is priced on a long-term base (Schneider, 2002).

Chapter V deals with the different regulations in the two countries. For the U.S. the focus is on policy provisions and rules regarding the portability and continuation of insurance coverage in case of lost protection. A model law regarding the actuarial bases of calculations is also described. The section about German regulation is primarily concerned with the regulatory environment and techniques to alleviate the effects of generally increased health expenses.

Chapter VI, finally, compares the main characteristics and features of the U.S. and German Health Insurance System.

CHAPTER II

THE U.S. HEALTH INSURANCE SYSTEM

The purpose of this chapter is to describe the main features and properties of the Health Insurance System in the United States. A brief description of the historical development provides an overview of the origin of today's system. The special types of health insurance coverage and the different forms of providers are described in further detail thereafter. Medical Expense Insurance, Long-Term Care Insurance, Disability Income Insurance and Accidental Death and Dismemberment Insurance are the main categories of coverage (Dearborn, 1994). The description of how health insurance can be purchased includes Individual Health Insurance, Group Health Insurance, as well as Social Security and Medicare (the last one is a social insurance program administered by the federal government). The providers of non-governmental health insurance are commercial insurance companies and service providers. Service providers are health insurance providers that provide benefits on a service-type basis, i.e. the insured is not reimbursed for medical expenses, but benefits are provided in the form of medical services. These providers either have contracts with health care providers, such as physicians and hospitals, or provide medical services by themselves (Dearborn, 1994).

2.1 Historical Development

The development of health insurance in the United began in the middle of the 19th century. Initial health insurance plans primarily covered disability arising from accidents. The first insurance against loss due to illness and injury was offered in 1847. These early attempts, however, were not very successful and companies quickly went bankrupt. Insurance companies started to provide benefits for individual disability insurance in 1890 (MSN Encarta, 2005). At that time, also, the first Group Insurance contracts were offered (Bluhm, 2003). Around the turn of the century, European countries began to develop compulsory insurance for at least some parts of their citizens, whereas most people in the United States still believed that health insurance is unnecessary.

A few years later, coverage for medical treatment was issued in 1910 and benefits for nursing care began in 1916 (O'Grady, 1988). The following years were characterized by rising costs of medical care due to higher standards and quality and, therefore, a growing demand for health insurance.

After the Great Depression that started in 1929, an increased number of life insurance companies entered the health insurance sector in the 1930s and 1940s. The fist idea of guaranteed hospital care for a fixed pre-payment had a group of teachers in Dallas in 1929 which had a contract with Baylor Hospital to make this care available. The early 1930s were affected by several other developments: Blue Cross (for the costs of hospital care) and Blue Shield (for physician payments) were the first non-profit service providers that offered pre-paid care on a service-type basis (MSN Encarta, 2005). This was advantageous for both the insureds on the one hand and hospitals and physicians on the other

hand. The reason is that Blue Cross and Blue Shield had contracts with hospitals and physicians to provide medical services at pre-negotiated rates which were typically lower than average. So, the insureds benefited from lower costs and hospitals and physicians could rely on a certain number of patients. The last was true (and is still true nowadays) because medical services from health care providers that had no contract with Blue Cross/Blue Shield were not covered.

In the years that followed, the growth of Group Insurance accelerated due to the fact that companies wanted to provide their employers some benefits other than increasing wages. In particular, during World War II this was a very welcome method because of legislation (Stabilization Act of 1942) that prohibited the increase of wages (Bluhm, 2003). As a result of the success of Group Insurance, medical expense insurance became more and more popular. This was the time of substantial increase in the number of contracts for every type of health insurance.

In the 1950s and 1960s the government recognized the importance of health insurance and expanded its own programs. Namely, coverage for loss of disability was introduced within Social Security in 1954. Medicare (social insurance health coverage for the elderly people, retirees aged 65 and older) and Medicaid (social assistance benefits for the needy) programs were developed in 1965 (MSN Encarta, 2005).

In the second half of the 20th century, the focus drifted to Group Insurance (Bluhm, 2003). The reason is a very favorable taxation treatment in comparison to individual health insurance contracts. Furthermore, managed health care plans displaced fee-for service plans because disadvantages of them were realized. Among the providers

were Health Maintenance Organization (HMO) and Preferred Provider Organizations (PPO).

2.2 Basic Forms of Health Insurance Coverage

The objective of this section is to give an overview of the different categories of health insurance coverage. Medical Expense Insurance is the major way of having insurance against financial costs due to illness or injuries. The special costs for nursing care of the elderly are covered by a Long-Term Care Insurance. Financial protection against the loss of income because of a disability is provided by Disability Income Insurance. The fourth class of health insurance coverage is Accidental Death and Dismemberment Insurance which pays a lump-sum or income replacement benefit in case of an accidental death or dismemberment (Dearborn, 1994).

2.2.1 Medical Expense Insurance

Medical Expense Insurance offers protection against financial impacts arising from medical care for injuries and illness. There are two different primary types of coverage (confer Dearborn, 1994):

1. Basic medical insurance and
2. Major medical insurance.

Basic plans mainly offer coverage for hospital expenses, surgical expenses and non-surgical treatment through physicians. Typical for basic medical plans is that the number of covered types of service is limited and that the maximum reimbursement may

be very low, e.g. $10,000 or $25,000. However, they reimburse 100 percent of the covered expenses and provide first-dollar coverage which means that the policy owner does not have to pay a deductible (Dearborn, 1994).

Coverage for hospital expenses (Dearborn, 1994) includes the reimbursement for costs of room, food and other services needed for the treatment of patients at a stay in hospital. The duration of benefit payments ranges from 21 days up to 365 days. Amounts of reimbursement are stated as fixed dollar amounts per day or depend on the concrete costs. Apart from this, hospital expense benefits are also provided for miscellaneous expenses, like operating room, X-rays, medicines, laboratory services and surgical dressings. The maximum benefits for these miscellaneous expenses are expressed in a schedule of allowable amounts. There may be a cumulative maximum for all miscellaneous expenses together and individual (lower) ceilings for each item (Dearborn, 1994).

Assume John owns a basic medical expense insurance that covers miscellaneous charges for up to $2,000 with maximum amounts of $200 for the use of the operating room and $100 for medicines. He broke his leg and needs a surgery and very expensive pain relieving drugs. The costs for the use of the operating room are $150 and the expenses for his drugs total up to $125. The insurance company will reimburse the full operating room costs but pays John only $100 for drugs. He has to come up with the remaining $25 on his own.

According to Dearborn (1994), the costs for a surgery itself are not included under basic hospital expense insurance. This is covered under basic surgical expense insurance that includes coverage for the cost for the surgeon, the anesthesiologist and for any care

that is necessary after the surgery. The fees for a plastic surgery are usually not covered and must be paid at everyone's own expenses. Insurance companies usually pay benefits based on a surgical schedule. Similar to the maximum amounts for miscellaneous expenses, there is a maximum benefit defined for each surgical procedure. The list of procedures may contain more than 100 items and the maximum amount that is paid for them. Such surgical schedules, nevertheless, contain only the more common procedures and non-listed operations are reimbursed on the basis of comparable severity (Dearborn, 1994).

The third plan that is usually included in basic medical expense insurance is a basic physicians' expense plan (or medical expense insurance) (Dearborn, 1994) that provides benefits for non-surgical treatment. It pays the fees for health care at a doctors' office or for a non-surgical treatment in a hospital. Usually, these plans have a maximum per-visit benefit and sometimes may not pay for the first two or three treatments because of sickness. The reason is to avoid small claims which are very expensive to process.

In addition to the three mentioned basic medical expense plans, two other plans may be offered. Both of which are related to the recovering from an accident or sickness. Nurses' expense benefits are provided for costs of nursing care in a hospital due to a doctor's order. Convalescent care facility insurance pays for fees that arise from confinement in a nursing facility. It provides a maximum daily benefit for a specified recovery period (Dearborn, 1994).

An extension to the basic medical expense insurance is major medical expense insurance (Dearborn, 1994). It provides a wide coverage and financial protection against

expenses from almost all forms of medical care. Among the provided coverage are benefits for hospital stays, hospital extras, surgery, physicians' fees, private duty nursing in-hospital or at home, diagnostic x-ray, laboratory services, blood, oxygen, artificial limbs and organs, prescription drugs, ambulance services and many more. Usually, the medical care must be prescribed by a licensed physician and necessary for the treatment in order to be reimbursed by the insurance company. In comparison to basic plans, major medical expense plans have much more generous benefit limits, if any. For example, a policy may have a relatively high lifetime maximum of $500,000 or $2,000,000.

To avoid adverse selection, both basic and major medical expense plans usually exclude the payment for preexisting conditions. That means if a policyholder suffered from an illness or physical condition before the policy is effective and does not notify the insurance company about this, medical care for these is not covered. Usually, there is a time limit for this exclusion, e.g. two years. After expiration of this time, the preexisting conditions will be covered in full (Dearborn, 1994).

Two different types of insurance plans to purchase major medical expense insurance are explained by Dearborn (1994):

1. Supplementary major medical plan or
2. Comprehensive major medical plan.

Supplementary major medical expense insurance is intended to enhance the benefits provided by a basic medical expense plan. It covers benefits that are not included under a basic plan or pays the costs in excess of a policy or procedure limit.

Recall the example of John who has basic medical expense insurance and needs a surgery because of a broken leg. The basic plan does not pay the full amount of $125 for medicine because of a policy limit of $100 for drugs. Assume now that John also purchased supplementary major medical insurance. This plan would cover the additional $25 in excess of the policy limit. Assume, furthermore, that the fracture is very complicated and John has to be in hospital for six weeks. If the basic plan provides benefits for hospital room and board for up to 30 days, the supplementary plan pays for the additional costs beginning on the 31st day.

Another way of achieving this coverage is comprehensive major medical expense insurance. The advantage of such a plan is that it covers practically all types of medical care services and supplies and provides benefits for all expenses under a single policy (Dearborn, 1994).

Major medical expense insurance is much more expensive than a basic plan, because the broad coverage and benefits for expensive care causes high costs for the insurance company (Dearborn, 1994). Therefore, there exist two features to reduce the costs for the insurance company and to involve the insured in the payment of these costs: deductibles and coinsurance. A deductible is a fixed amount of the covered expenses that the policyholder has to pay before benefits are paid. If the costs for a medical treatment are lower than the deductible, the insurance company will pay nothing. There are two different types a deductible can be based on. The deductible can apply to every single sickness or injury. That means that the insured may have to satisfy the deductible several times. Under an all cause basis the insured has to pay the amount only once regardless

from how many different sicknesses or injuries he suffers. This deductible usually must be met each calendar year. If the deductible is satisfied in one year, the insured does not have to pay it again (Dearborn, 1994).

Assume Linda has a medical expense plan with a deductible of $250 and suffers from a cold. The medical care at a doctor's office costs her $75. Later on she accidentally sprains her ankle and incurs $190 expenses. If the deductible applies per cause she does not meet the deductible in both cases and has to pay the total costs of $275 on her own. However, on an all cause basis the deductible is exceeded and the policy covers the $65 excess.

The above described deductible is a flat deductible, usually ranging from $100 to $500. Another form of deductible is a corridor deductible which is typical for supplemental major medical expense insurance. In this case the policy will pay in full for the expenses covered by the basic plan and the deductible applies to the costs covered by the supplemental plan (Dearborn, 1994).

Another form of sharing the costs with the insured is coinsurance (Dearborn, 1994). Coinsurance is percentage participation after the deductible is met. The policy would pay a high percentage of the expenses, usually 75 or 80 percent, and the insured has to come up with the remaining part. Some policies provide an out-of-pocket limit to prevent the insured from incredibly high charges. That means that the coinsurance is eliminated after the policyholder has paid a specified amount, usually $1000 to $2000.

Assume, Peter has a major medical plan and incurs expenses for a surgery of $8000, which are covered by his policy. Included in the policy are a $500 deductible and

an 80/20 coinsurance. Peter pays the first $500 as the deductible and 20 percent of the remaining $7500 for a total of $2000. The policy covers the left $6000 which is 80 percent of the expenses exceeding the deductible. If the policy has an out-of-pocket limit for coinsurance of $1000, Peter's payments are limited to $500 as deductible plus $1000 as coinsurance.

Deductibles and coinsurance are typical for major medical expense insurance, but are unusual for a basic plan. As described earlier a basic expense policy has maximum payable amounts or a limited time for which benefits are provided (Dearborn, 1994).

Another very special plan should is mentioned by Dearborn (1994). Limited risk (or specified disease) plans provide coverage for certain specified diseases. They are intended to be an inexpensive way of providing coverage for the high medical expenses associated with dread diseases, such as cancer.

Finally, the way of paying benefits should be considered. Medical expense policies usually pay benefits as reimbursements, i.e. the insurance company reimburses the insured for the actual medical expenses incurred, subject to any policy limits. Another way of providing benefits to the insured is the indemnity approach: A specified fixed amount is paid for medical care, regardless of the actual expenses. An example for an indemnity-type contract is a hospital indemnity policy. This plan provides benefits, usually on a daily basis, for hospitalization. A predetermined amount is paid for each day the insured is in hospital and is meant to be a supplementary coverage (Dearborn, 1994).

Assume Erika has a reimbursement-type contract that provides benefits for hospitalization. She incurs expenses of $5,000 for a stay in hospital of five days. The policy

will cover the full $5,000. Michael, in contrast, has a hospital indemnity plan that pays $100 per day while he is hospitalized. He also incurs medical expenses of $5,000 for a hospital stay of five days. This time, the insurance company will pay five times $100, $500 in total.

2.2.2 Long-Term Care Insurance

With an increasing proportion of the population being old, the need for Long-Term Care (LTC) insurance increases. It is a burden of nature that the ability to perform the activities of daily living decreases while getting older. These people usually need medical, social or personal support for an extended period of time (Black and Skipper, 2000). This support is called long-term care. Not only old people may seek long-term care, but also people with a mental or physical illness at all ages. All theses people have in common that they need assistance to perform the essential activities of daily living (ADL). An insured who is unable to perform two basic activities of daily life is usually eligible to receive benefits form the long-term care insurance. Common activities of daily living are bathing, dressing, toileting, continence, transferring and feeding. This assistance can be provided in a nursing home or at home by a skilled nurse or family members. In this case there is a distinction drawn between nursing home care and community care, respectively. If a person is living in a nursing home, then in accordance with Black and Skipper (2000) the need for care is categorized as

1. Skilled nursing care,
2. Intermediate nursing care or

3. Custodial care.

Skilled nursing care means that the person needs 24-hour assistance with all activities provided by a licensed professional. Intermediate nursing care is an alleviated form of skilled nursing care. The difference is that the patient does not need day and night assistance but is still dependent on intensive care. Custodial care is assistance with the basic activities of daily life. It may be provided by a non-professional assistant, but must be supervised by a skilled nurse. All these levels of nursing care received at a nursing home must be prescribed and supervised by a physician (Black and Skipper, 2000).

Care that is not provided in a nursing home is classified as community care and the following categories are distinguished by Black and Skipper (2000):

1. Home health care,
2. Adult day care and
3. Respite care.

Skilled nursing care provided in the insured's home is referred to as home health care. This care includes nursing, physical therapy and assistance with basic activities of daily living. It is usually provided on a part-time basis. Adult day care, provided at day care facilities or long-term care centers during the day, includes assistance with activities of daily care and social support. It is intended to provide care in times of absence of the family members. Whereas adult day care replaces the primary caregivers for a day, respite care means that a professional care provider takes on the home care for a while, maybe a week (Black and Skipper, 2000).

Professional nursing care in any way, apparently, is very costly. For example, the average cost for nursing home care per day in 1998 was $153 (retrieved 05/30/2005 from http://www.aarp.org/research/longtermcare/nursinghomes/aresearch-import-669-FS10R.html). Long-Term Care Insurance is designed to cover these costs and provides benefits for all of the above described levels of nursing care. Usually, benefits are paid as indemnity of a specified amount for a fixed period of time. According to Black and Skipper (2000), the benefit period is typically up to five years, but also lifelong benefit payments are offered sometimes. A benefit period of five years might sound too short, but, in fact, in 1997 only 14 percent (retrieved 05/30/2005 from http://www.aarp.org/research/longtermcare/nursinghomes/aresearch-import-669-FS10R.html) of people lived in a nursing home for more than five years. It is common that provided benefits for community care are less than the benefits for nursing home care due to lower costs. 50 percent reduction is not unusual (Black and Skipper, 2000). Another two provisions regarding benefit payments are offered by insurance companies: The policyholder can elect to have a waiting period up to one year before benefits are paid, which results in lower premiums. Furthermore, some form of inflation protection may be offered. That simply means that benefits will increase over the years to preserve their real value. Increases at a fixed rate or tied to a price index are possible (Black and Skipper, 2000).

Not everybody can purchase long-term care insurance. In fact, there are almost no restrictions regarding medical conditions, but age limits are not unusual. An insurance company might issue a policy only to certain age groups. Minimum ages range from 18 to over 50 and maximum ages can be far above 80 (Black and Skipper, 2000).

2.2.3 Disability Income Insurance

Disability Income Insurance is an important part of health insurance. Its intention is to provide a regular payment in case of disability. If the insured is disabled due to an accident or sickness disability income insurance replaces lost income to a certain degree with a stated periodic payment. Usually the insured cannot choose any amount as policy benefit. Insurance companies limit the payment to the regular income prior to disability or even less. Most insurance companies have a ceiling at 60 percent of earned income (Dearborn, 1994).

According to Dearborn (1994), there are two methods of defining benefits. One is to define the replacement income as a percentage of the regular income. This often takes into account payments from other disability income plans. Suppose a disability income plan provides a 50 percent replacement income and an insured earns $5,000. If he is disabled and receives a disability income of $1,000 from another source, the plan would provide benefits of $1,500 which is 50 percent of $5,000 less than $1,000. The other method of defining policy benefits is to specify a flat amount that is paid in case of disability. The approach is common for individual disability income insurance.

Benefits are not always paid from the first day of disability on. Similar to a deductible there may be an elimination period, such as 30 days or even one year, where no payments are made. The reason is to prevent the insurance company from small claims, which are cost-intensive to process, and to lower premiums. Usually an insured person is able to finance the first time of disability by its own means and needs a replacement income in the long run only. This rule is not used in case of recurrence of one and the same

disability within a specified time period. This clause is called delayed disability provision and assumes the recurrence is a continuation of the preceding disability if it resumes within this period. After this time the recurrence is supposed to be a new impairment and, therefore, the insured has to bear another elimination period (Dearborn, 1994).

As well as there is an elimination period, a disability income plan may have a maximum benefit period. The benefit period is a limited time span for which payments are made. This can be two or five years, or until the insured reaches a specified age, e.g. 65.

Important for disability income insurance is to define when a person is eligible to receive disability benefits. To obtain the full benefit amount the insured must be totally disabled. What is total disability? Insurance companies use different definitions to define total disability which mainly differ in their level of restrictiveness. According to Dearborn (1994), there are the two common definitions:

1. Any occupation and
2. Own occupation.

"Any occupation" is a very restrictive way of defining total disability. To receive full benefits the insured must be "unable to work in any occupation for which he/she is reasonably suited to by reasons of education, training or experience." Less restrictive is the "own occupation" definition which states that the insured must be unable to perform the duties of his/her own occupation. Insurance companies also apply hybrids to define total disability. Here, own occupation will be used to determine the first benefits for a limited period of time, e.g. two or five years. For the time thereafter, the policy would contain a

more restrictive definition to determine whether the beneficiary is eligible to continue receiving benefits.

For some impairments of health it is assumed that the insured is totally disabled. In this case, the full benefits are provided regardless of any further definition of total disability. Even if the insured is able to work there is no limitation to the full benefit because it is assumed that the person is permanently disabled. Among these presumptive disabilities is loss of speech, deafness, blindness and loss of at least two limbs (Dearborn, 1994).

Total disability is not the only condition in which disability income benefits are provided. An accident or sickness does not always result in total disability, but also partial disability is possible. Usually this results in a partial loss of income because the insured can only work on a part-time basis. As a matter of course the policy would not provide full benefits as for a total disability but the insured is still able to collect some benefits. The disability plan makes payments either proportional to the loss of income or provides a predetermined fixed amount (Dearborn, 1994).

Payments proportional to the loss of income are called residual disability benefits. The following formula (O'Grady, 1988) is used to calculate the benefits:

$$\left(1 - \frac{\text{reduced income due to disability}}{\text{regular income}}\right) \cdot \text{benefits for total disability}$$

Instead of the regular income, an average of monthly incomes prior to disablement or other averages are also used to determine a basis for the benefits. Usually this formula is applied if the proportion of the reduced to the regular income ranges from 20 to 80 percent. Other limits, such as 25 to 75 percent, are also used. If the reduced income is less

than 20 percent of the regular income, the insured is assumed to be totally disabled and full benefits are paid. On the other hand, if the reduced income is above the upper bound the policy provides no benefits because no disability is assumed (Dearborn, 1994). It is also common to specify a minimum benefit for the first month of benefit payments, e.g. 50 percent of the indemnity for total disability. In contrast to that, a policy can offer partial benefits at a level, predetermined amount. This amount is usually a fixed percentage of the benefits provided for total disability, e.g. 50 percent.

Consider the following example for a disability replacement income with residual benefits: Assume the policy provides payments of $3,000 for total disability and residual benefits are paid if the reduced income is within a range of 20 to 80 percent of the regular income which is $5,000. The elimination period is one month. In addition the policy includes a provision for minimum payments of 50 percent of total disability benefits for three month. Table 1 shows a possible development of earned income and the resulting payments made by the insurance company. There are no benefits in February because of the elimination period. Moreover, a payment of $1,500 is made in June because of the provision that residual benefits are at least 50 percent of the indemnity for total disability for three month.

Table 1
Example for the Development of Residual Disability Benefits

Month	Income	Disability Benefit
January	$5,000	$0
February	$300	$0
March	$0	$3,000
April	$500	$3,000
May	$1,200	$2,280
June	$2,800	$1,500 (instead of $1,320)
July	$3,500	$900
August	$4,500	$0

Source: author's own calculation

For some policies it is also important to analyze the cause of disability. The disability income plan may determine its payment depending on the situation in which disability came into being. It may distinguish between an accidental cause for the impairment and an accidental result of a certain situation. In case of a dangerous situation where disability is the result of a negligent behavior, a policy that requires an accidental cause would not provide benefits.

Similar to medical expense insurance, a disability income plan is designed to exclude preexisting conditions from instant coverage and, therefore, to avoid adverse selection. In the probationary period the policy provides no payments for a specified time,

usually 30 to 45 days. The exclusion of payments applies only to disability from any illness. Accidental disability is covered from the policy's effective date on (Dearborn, 1994).

Another provision deals with delayed disability, i.e. there is a time gap between an accident and the development of disability. In this case, coverage is provided for disability if there is not too much time between these to points in time. The tolerated delay may be 30 to 90 days (Dearborn, 1994).

Some supplemental benefits that can be purchased with disability income insurance are mentioned by Dearborn (1994) and described in the following. Very important is the rider for Cost of Living Benefit Adjustment (COLA). It is understandable that the real value of benefits decreases because of inflation if the insured draws them for a long time. To avoid this problem the payments will be adjusted, typically yearly, by purchasing this rider. It exist different approaches for the adjustment. Some policies state the additional benefit as a fixed percentage of the predetermined indemnity. The benefit is increased by this amount each year. For example, if the basic benefit of a policy is $5,000 and the additional benefit is five percent of this, the total benefits are $5,000 per month for the first year of disability, $5,250 for the second year, $5,500 per month for the third year and so on. However, the incremental factor can be variable. Typically, it is linked to the Consumer Price Index (CPI) with a specified minimum and maximum percentage change. COLA benefits may be sold with a ceiling for the benefits. This is to avoid overinsurance if payments are made for a long period of time.

A waiver of premium rider exempts the policyholder from paying premiums while receiving benefits for total disability. Usually, this exemption does not apply if the policyholder reaches a certain age. In this case the insured will have to pay premiums again which are lower than prior to beginning of the disability because the insurance company faces no additional risk (Dearborn, 1994).

Unique for disability income insurance is the opportunity to purchase a guaranteed insurability rider. This feature allows the policyholder to purchase additional amounts of coverage. This is reasonable because an increasing income may require a higher replacement income. However, the insured cannot purchase any amount of coverage, but is still subject to a maximum limit which will increase with increasing income (Dearborn, 1994).

2.2.4 Accidental Death and Dismemberment Insurance

Accidental Death and Dismemberment Insurance is a form of health insurance that provides a benefit if the insured dies in an accident or loses hands or feet or the sight in one or both eyes in the event of an accident (Dearborn, 1994). Benefits are typically paid as a lump-sum. The amount paid in case of accidental death is called principal sum benefit and represents the maximum benefit of the policy. Benefits in case of accidental dismemberment are expressed in relation to the principal sum. For example, benefits for the loss of both hands, both feet or the sight of both eyes are equal to the principal sum. A loss of one hand or one foot typically results in the payment of one half of the principal sum.

2.3 How Is Health Insurance Purchased?

This section is intended to describe the different ways in which health insurance can be purchased. People can purchase health insurance on an individual basis, receive coverage within a group insurance plan or obtain benefits from a state or federal government sponsored program (Dearborn, 1994). Providers for individual and group health insurance are commercial insurers and health service providers. Among the health service providers exist managed care organizations that act as a medium between the members of these organizations and networks of health care providers. The ways of purchasing health insurance are almost the same on an individual basis and a group basis. Therefore, they are described for the individual way and only the special features of group insurance are mentioned thereafter. All governmental provided programs are described in a separate section

2.3.1 Individual Health Insurance

When purchasing individual health insurance from a non-governmental source there are two ways of doing this (Dearborn, 1994). On the one hand there are commercial health insurance companies that offer protection against the financial loss through medical expenses. These companies usually follow the indemnity approach. That means that they reimburse (or indemnify) the insured for any covered costs of medical care, subject to deductibles and coinsurance. These out-of-pocket costs may be substantial. It is common that the insured does not have to pay the bills for medical care at first and ask for

reimbursement, but the insurance companies pay the health care facilities directly. There is almost no restriction for choosing the health care providers.

On the other hand there are service providers that offer the desired protection. A service provider works a little different compared to an insurance company (Dearborn, 1994). Members of them are not reimbursed for their medical costs but obtain medical services as benefit for their premiums. However, out-of-pocket expenses in terms of deductibles and coinsurance may still apply. Blue Cross and Blue Shield are one of these service providers. Historically, Blue Cross offered coverage for the costs of hospital care and Blue Shield covered expenses from a surgery or a visit at a doctor's office. Both are non-profit organizations that offer prepaid services. Nowadays, both are usually merged into one association that provides comprehensive coverage. Blue Cross and Blue Shield have contracts with various health care providers, such as hospitals and physicians, which determine the charges for medical services. Payments for services that an insured makes use of are made directly to the health care provider by Blue Cross or Blue Shield. Services from health care providers that have no contract with Blue Cross or Blue Shield are not covered and the insured has to pay the costs.

Health Maintenance Organizations (HMO) are another type of service provider (Dearborn, 1994). A HMO is a network of health care providers that not only provides the financial service as Blue Cross and Blue Shield, but also offers the health care service on its own. Sometimes HMOs are formed by groups of doctors. Members of these organizations receive medical services on a prepaid basis. Since there are usually very low deductibles or coinsurance payments the premium is all the members have to pay. For

this reason, HMOs try to keep their costs for medical service down and stress preventive care. There are two different types of HMOs that characterize the way of how the organization provides the health care service (HealthInsurance.info, 2002):

1. Individual Practice Association (IPA) and
2. Employer-type HMO.

An IPA is a type of HMO that is a network of health care providers who have a contract with the HMO and offer medical service in their own facilities (HealthInsurance.info, 2002). They mostly work on a part-time basis for the HMO and the charges for the medical care services are pre-negotiated. Every physician is eligible to join this network. An employer-type HMO, in contrast, owns the health care facilities and employs its own doctors. The medical services are provided in these facilities (Dearborn, 1994).

Typical for a HMO is the fact that members must choose a primary care physician (PCP). The PCP must be visited at first with any health problem and may refer the patient to a specialist for further care. In general it is not possible to use health care providers out of the network. These costs are not covered by the organization (Dearborn, 1994).

The system of a HMO is called managed care. Managed care means that a network of health care providers offers medical services within its organization and tries to keep costs low (Dearborn, 1994). Another organization that offers health care according to the managed care approach is a preferred provider organization (PPO). A PPO is also a network of health care providers, but they do not offer their services on a prepaid basis. In this case, the covered persons are not a member of the PPO as they are in a HMO network. The PPO rather has contracts with employers, health insurance companies, other

service providers, such as Blue Cross and Blue Shield, or other forms of groups. The health care providers that belong to the PPO offer their services on a fee-for-service basis at pre-negotiated rates to their contractual partners. These rates are significantly lower than the usual charges. In return for the discounted rates the members of the contractual partners are referred to the PPO. The advantage for the health care providers is that they have a high number of patients and the contractual partners benefit from the fact that they can provide health care services to their members at reduced rates. For the insured persons this type of health insurance coverage is less restrictive than participation in a HMO because they are not forced to visit the health care providers of the PPO. However, services from others than members of the organization usually result in higher out-of-pocket expenses for the insured. Reduced benefits are also typical in this situation (Dearborn, 1994).

Another form of managed care organization is a point-of-service network (POS). This is a hybrid of HMO and PPO. Usually the insured must choose a primary care physician which is typical for a HMO, but does not have to use only health care providers of the network which is typical for a PPO. Nevertheless, benefits for out-of-network services are usually reduced.

Why are preferred provider organizations mentioned in this section about individual health insurance? The reason is that the above mentioned manage care organizations are often a plan type of an insurance provider. In this case, an individual purchasing insurance coverage from a company, which has a contract with a PPO, can choose PPO as a plan type, e.g. a PPO plan to cover medical expenses.

Service provider organizations may have contracts with health care providers to take some risk. These provider payment arrangements are intended to lower the costs of the service organization. Health care providers which participate in the costs have an incentive to control utilization of health care services. The degree of such an arrangement can vary, with capitation being the strongest form. All risk is transferred to the health care provider in a capitation model, because the service organization pays only a specified amount per month per enrollee (Black and Skipper, 2000).

In general, the difference between indemnity type health insurance coverage and the managed care approach is that indemnity plans provide free choice of health care providers while managed care plans require lower out-of-pocket payments.

Another way of receiving health insurance coverage is self-insurance (Dearborn, 1994). This is a way how companies, labor unions and other groups self-insure their members. They set up a self-funded plan to provide medical expense or disability income coverage to their members. The administration and claim settlement is often arranged with an outside organization, such as insurance companies or other service organizations. These are so called administrative services only (ASO) arrangements. To protect themselves from catastrophic claims some groups purchase a minimum premium plan (MPP) that covers exceptionally large claims. This is kind of a stop-loss insurance which is provided by insurance companies.

2.3.2 Group Health Insurance

Group Health Insurance is health insurance provided to a group of individuals who have a certain kind of relationship. Eligible are groups generally if they have a professional or business relationship and are not solely formed to obtain group health insurance coverage (Dearborn, 1994). The most typical group is employees of a single employer. The employer may want to attract his employees with additional benefits and decides to gain coverage for the group. Other examples are labor unions and fraternities. Debtor/Creditor group plans are contracts that cover the debt of the debtor. In case of death or disability of the debtor, payments are made to the creditor. Some group insurance plans require a minimum number of group members, such as 10. This can be a problem for small companies with only a few employees. These small companies are allowed to form so called multiple-employer trusts (MET) if they work in the same business (Black and Skipper, 2000). This is a joint venture to obtain a sufficiently number of members to be eligible to purchase group health insurance.

A characteristic of group health plans is that they provide coverage for a group under one policy, the master policy. This policy is issued to the policyholder, for example the employer or the multiple-employer trust. The policyholder chooses the coverage and benefits that are provided by the insurance plan. The beneficiaries, for example the employees, have usually no choice and all of them have the same coverage. However, different types of benefits may be provided for different types of employees. A typical differentiation is the position in the company or the income level. The insurance company issues a certificate of insurance to the members of the group which states the covered

expenses and explains the features of the plan. The certificate of insurance is for information purposes and is not a policy, because the only policy is issued to the master policyholder (Dearborn, 1994).

Coverage is provided on a group basis. The underwriting process, therefore, reduces to group underwriting, which reduces sales costs significantly, and no individual underwriting is required (Dearborn, 1994). However, some insurance companies preserve the right for individual underwriting of a group with a small number of members, in which case the risk is too high that one person may cause high above-average benefit payments. An insurance company is always interested in a homogeneous group that represents real morbidity and mortality rates as much as possible. This is in line with the requirement that a high percentage of the group members participate in the program. It is not always the case that all members seek coverage. To understand this, it is important to know how premiums for the group plan are paid. A plan where members of the group are required to pay a part or the entire premium is called contributory plan. This is done by payroll deduction. If the policyholder pays for the entire premium one refers to this plan as a noncontributory plan. It makes sense that the group members have the choice whether to join a contributory plan or not (Dearborn, 1994). Generally, insurance companies require that all group members participate in a noncontributory plan and that at least 75 percent participate in a contributory plan. Some members of the group, who are in very good health, may be able to obtain health insurance at lower rates on individual basis. They probably do not want to join a contributory plan. To avoid the problem of hav-

ing only bad risks insured, the insurance companies specify the minimum percentage of participation.

However, not every member of the group is always eligible to join the plan. Usually, there are some minimum requirements for participation (Dearborn, 1994). For example, employees must be full-time workers. The policy also may include a probationary period clause. That means that new hired employees have to wait a certain period of time until they can elect to join the group health plan. After expiration of this period they typically have 31 days to make their decision. This is called the enrollment period (Dearborn, 1994). Employees, who reject to join the plan within the enrollment period and change their mind later on, may have to prove evidence of insurability. Insurance companies have a good reason for individual checkups in that case because they want to avoid adverse selection. It is very likely that an employee discovers some form of illness and tries to get cheap health insurance with that plan.

What are the advantages of group insurance plans? First, group insurance plans are usually offered at lower rates than individual policies. The reason is that underwriting and administration costs are substantially lower for the insurance company. It is much cheaper to administer a large group of insured persons than administrating a large number of individual contracts (Dearborn, 1994). Moreover, members of the group do not have to prove evidence of insurability which saves money for the insurance company and is attractive for the group members. Lower rates in connection with the fact that the employer typically pays at least a part of the premium enables employees to gain health insurance coverage at very favorable rates compared to individual health plans. Group insurance

plans also provide better benefits than individual plans. That includes higher maximum limits, longer benefit periods and lower out-of-pocket expenses for the insured.

Those are some of the advantages of group health insurance over individual health plans. Another one is taxation of group insurance benefits (Dearborn, 1994). General speaking, contributions made by employers are tax deductible for them. This is to attract employers to provide a group health plan. These employer's payments are also not taxable as employee's income. However, contributions made by an employee to a contributory plan are taxable. This is compensated by the fact, that benefits that are attributed to the employee's payments are not taxed. Instead of that, benefits that are attributed to the employer's contributions are taxable. The taxation of benefits applies mainly to disability income and AD&D benefits. Benefits from a medical expense plan, in general, are not taxable, because they are a reimbursement for incurred losses.

All types of individual health coverage described above are available on a group basis, too. That comprises group medical expense insurance with a basic coverage including hospital and surgery expenses, and physician's care. Basic medical expense policies typically include a broader coverage on a group basis than solely for individuals. Among these are dental and vision care. This is a big difference to individual health insurance where coverage for theses expenses is usually not offered. The coverage for dental care usually includes normal diagnostic and preventive maintenance. Vision care covers the costs of eye examinations. If vision care includes benefits for the costs of eyeglasses or contact lenses this is usually limited to a payment every two years. Replacement of broken glasses in the meantime is mostly excluded. Out of the insurance companies power is

the obligation to include maternity benefits. It is federal law that a group health insurance policy treats pregnancy related benefits exactly as sickness benefits for a company with 15 or more employees. Maternity benefits are costly and, therefore, usually excluded in individual health insurance policies (Dearborn, 1994).

Major medical expense insurance can be purchased as supplement to a basic plan or as comprehensive coverage. Cost sharing with the insured is typical here as it is for individual health insurance policies. A corridor deductible for a supplemental plan and a flat deductible in a comprehensive plan must be borne by the insured. A comprehensive policy usually is also subject to coinsurance up to an out-of-pocket maximum.

It should be mentioned that not only the member of the group is covered by group medical expense insurance but also the spouse and dependent children. Dearborn (1994) points out that this feature causes one problem: if both spouses are working and covered under a group health care plan, they could be reimbursed twice for one bill. This is also the case if an insured has multiply employers. Coordination of Benefits (COB) is used to coordinate which plan is primary. This plan covers all costs and the other plan(s) reimburse for expenses that are not covered or exceed the limits of the primary plan.

One problem arises for people relying on their group health insurance and who have no individual coverage. If they loose their coverage due to a reduced number of hours of work, a job loss or any other qualifying event, they end up having no health insurance. This, for example, also applies to dependent, covered relatives if the primary insured dies. In this case, the Consolidated Omnibus Budget Reconciliation Act (COBRA) requires employers with 20 or more employees to offer the person, loosing the

coverage, to continue their coverage for up to 36 months (Dearborn, 1994). However, the employee is not required to pay for the costs. The insured can be asked to pay up to 102 percent of the premium that would be charged to the employer if coverage had continued. The extra 2 percent are a surcharge to cover administration costs. Labor Unions offer multi-employer plans to solve this problem. Policyholder is the union and employees can work for different companies and keep their coverage and benefits.

Disability income insurance is offered on group basis as well. The most features of group disability insurance are similar to an individual plan. More precisely, total disability is usually defined by the own occupation clause and stricter definitions may apply if the beneficiary wants to continue receiving benefits after a certain time, such as two years. Both benefits for total disability and residual benefits for partial disability are provided, whereas total disability is typically assumed if loss of income is more than 80 percent and no disability is assumed if income loss is less than 20 percent. Unlike individual disability plans, benefits are usually expressed as percentage of income rather than as a fixed amount (Dearborn, 1994).

In group disability insurance, short-term disability (STD) and long-term disability (LTD) income protection are distinguished (Bluhm, 2003). Short-term disability plans are designed to provide an income replacement for a short period of type, such as 13 or 26 weeks, and pay benefits weekly. These plans usually include a very short elimination period for disability from sickness benefits, e.g. one week. Most STD plans have benefit limits regardless of the income level.

In contrast, long-term disability plans provide coverage for an extended period of time, typically two to five years or up to age 65. Often STD and LTD coverage is sold together. In this case, the elimination period of the LTD contract is specified in accordance with the STD contract, thus 13 and 26 weeks are typical. But also longer or shorter elimination periods are not unusual if a LTD plan is purchased on its own. Benefits, normally up to 60 percent of the regular income, are paid monthly (Bluhm, 2003).

Accidental death and dismemberment policies are rather offered with a group life insurance contract but may also be included under group health coverage. Sometimes AD&D is not included in the group plan by default, but the insured can elect to receive coverage and has to pay for it. This plan type is called voluntary AD&D. Apart from this specific feature, characteristics of group AD&D are equal to AD&D insurance purchased on individual basis (Dearborn, 1994).

Special group health insurance plans are mentioned by Dearborn (1994) and include blanket health plans and cafeteria plans. Blanket health plans are sold to groups with a high fluctuation of their members. Thus, it is not reasonable to communicate their names to the insurance company. Travel organizations may consider this plan type to cover their travelers. A cafeteria plan is a synonym for the fact that the members of the group have a choice between different benefit plans. They still do not have the opportunity to adjust the coverage to their needs, but can elect that plan that fits best to their wishes. The employer, for example, may offer three different plans and the members have the choice of selecting exactly two plans or none of them. Another possible combi-

nation is that the different group health plans are offered, such as one HMO plan and one PPO plan. Then the members have the choice between these two.

2.3.3 Social Insurance

The U.S. Government provides several insurance programs to provide basic financial protection (Dearborn, 1994). The Social Security program administered at federal level is the biggest program. It provides benefits for retired workers, surviving dependents of a deceased covered person and disability. It is the so called "Old-Age, Survivors and Disability Insurance" (OASDI) program. Another program at federal level is Medicare that provides health insurance. At state level, Medicaid and Worker's Compensation are programs to support needy persons and those who are injured at work, respectively.

The Social Security System, in the following referred to as OASDI, is a system financed by Federal Insurance Contributions Act (FICA) taxes (Dearborn, 1994). The tax is paid in equal amounts by employee and employer and is compulsory. According to Social Security Online (http://www.ssa.gov/pubs/10003.html), the amount is 6.2 percent of income up to $90,000 for both of them. It provides benefits for three situations of financial needs (Dearborn, 1994). First, OASDI provides an old-age pension for retired workers. Second, in case of death of a person who is eligible for benefits it provides a lump-sum payment and annuities for dependent relatives. Third, it provides benefits in case of disability. Covered are almost all workers, except for most of railroad workers (they have their own retirement system) and most federal civilian employees who were hired before 1984. Unemployed people are not covered.

However, to be covered does not mean to be eligible for all benefits (Dearborn, 1994). Eligibility to receive Social Security benefits depends on the "insured status". The insured status is determined by the number of earned "quarters of coverage". Determination of the quarter of coverage (QC) amount is described on the website of the U.S. Social Security Administration (http://www.ssa.gov/OACT/COLA/QC.html). The calculation involves consideration of average wage indices which are expressed in Table 2.

Table 2
National Average Wage Indexing Series, 1951-2003

Year	Index	Year	Index
1951	2,799.16	1978	10,556.03
1952	2,973.32	1979	11,479.46
1953	3,139.44	1980	12,513.46
1954	3,155.64	1981	13,773.10
1955	3,301.44	1982	14,531.34
1956	3,532.36	1983	15,239.24
1957	3,641.72	1984	16,135.07
1958	3,673.80	1985	16,822.51
1959	3,855.80	1986	17,321.82
1960	4,007.12	1987	18,426.51
1961	4,086.76	1988	19,334.04
1962	4,291.40	1989	20,099.55

Table 2
National Average Wage Indexing Series, 1951-2003

Year	Index	Year	Index
1963	4,396.64	1990	21,027.98
1964	4,576.32	1991	21,811.60
1965	4,658.72	1992	22,935.42
1966	4,938.36	1993	23,132.67
1967	5,213.44	1994	23,753.53
1968	5,571.76	1995	24,705.66
1969	5,893.76	1996	25,913.90
1970	6,186.24	1997	27,426.00
1971	6,497.08	1998	28,861.44
1972	7,133.80	1999	30,469.84
1973	7,580.16	2000	32,154.82
1974	8,030.76	2001	32,921.92
1975	8,630.92	2002	33,252.09
1976	9,226.48	2003	34,064.95
1977	9,779.44		

Source: Social Security Online, http://www.ssa.gov/OACT/COLA/AWI.html

According to the SSA, the quarter of coverage amount in one year is $250 times the ratio of the wage index for the second year preceding the year of consideration to the

wage index of 1976. This amount is rounded to the nearest multiple of $10. For example, the quarter of coverage amount in 2005 is $920. This is the amount of earnings needed to earn one quarter of coverage, i.e. in 2005 a quarter of coverage is earned with each full $920 of annul earnings. The amount needed increases yearly with increase in the national average wage index.

A maximum of 4 quarters of coverage can be earned each year. The insured status is now determined as follows (Myers, 2002):

1. "Fully insured" is who earned a total of 40 quarters of coverage or one quarter of coverage for each year since attaining age 21, subject to a minimum of 6 quarters of coverage. For example, a 30 year old worker who has already earned 9 quarters of coverage is fully insured. However, if no quarter of coverage is earned in the following year this status is lost.
2. "Currently insured" are workers who earned six quarters of coverage over the 13-quarter period prior to death including the quarter of death.

Full OASDI benefits require fully insured status, except for disability benefits. Eligibility for disability benefits requires fully insured status and another 20 quarters of coverage in the 40-quarter period ending with the quarter in which the worker became disabled. A currently insured worker is eligible only for survivor benefits for dependent children and parents and for a lump-sum death benefit.

The full retirement benefit is equal to the "primary insurance amount" (PIA), which serves as basis for the calculation of all benefits (Dearborn, 1994). The PIA is calculated from average indexed monthly earnings (AIME) using a special formula. AIME

is an individually determined special average of earlier wages and accounts for inflation and increasing incomes by adjusting them.

The U.S. Social Security Administration (SSA) describes the calculation of the PIA on its website (http://www.ssa.gov/OACT/COLA/piaformula.html). The SSA expresses the PIA formula as follows: "The PIA is the sum of three separate percentages of portions of average indexed monthly earnings. The portions depend on the year in which a worker attains age 62, becomes disabled before age 62, or dies before attaining age 62." Important for calculation of these portions is again the National Average Wage Index (see Table 2).

The portions of the AIME are determined by so called "bend points". These bend points are calculated by the following formulas:

1. First bend point: $180 times the ratio of the wage index for the second year preceding the year of consideration to the wage index of 1977. This amount is rounded to an integer dollar amount.
2. Second bend point: $1,085 times the same ratio as for the first bend point. This amount is also rounded to an integer dollar amount.

The SSA describes further, that the first portion of the AIME is the dollar amount of the first bend point. The second portion is the dollar amount of the difference between the first and second bend point. The last portion is the dollar amount exceeding the second bend point. Then the PIA is the sum of the three portions with weights 90 percent, 32 percent and 15 percent, respectively. This amount is rounded to the next lower multiple of $0.10.

For an insured who becomes eligible for retirement or disability benefits, or who dies, the PIA will be calculated to determine the benefits provided by OASDI. Consider the following example from the SSA: If someone retires in 2005 and is eligible for full retirement benefits, then the bend points are calculated as follows:

1. First bend point is \$180 times \$34,064.95 divided by \$9,779.44, which is equal to \$627.
2. Second bend point is \$1,085 times \$34,064.95 divided by \$9,779.44. This is equal to \$3,779.41, which rounds to \$3,779.

Assume now that the person has an AIME of \$5,000. Then the PIA is

$$90\% \cdot \$627 + 32\% \cdot (\$3{,}779 - \$627) + 15\% \cdot (\$5{,}000 - \$3{,}779) = \$1{,}756.09 .$$

This amount is rounded to \$1,746.

Usually benefits (especially annuities) are paid in full if the recipient attained the normal retirement age (NRA). The NRA is 65 for persons who were born before 1938, and increases to 67 for someone who is born in 1960 and later (Myers, 2002).

The system of who receives benefits of which amount is very complicated and the most important regulations (confer Myers, 2002) will be pointed out next.

Old-Age benefits: The monthly benefits for a retired worker are equal to the PIA if the insured attained the NRA. Workers are eligible to receive benefits from the age of 62 on, subject to a reduction if they choose to retire before the NRA.

Survivor benefits: A widow or widower at the age of 60 or older receives monthly benefits in the amount of the PIA, with a reduction if she or he decides to receive benefits before attaining the NRA. Children receive monthly payments of 75 percent of the PIA

until they turn 18. If they were disabled before the age of 22, they receive a lifelong benefit of that amount. Dependent parents are qualified to receive benefits if they are 62 or older. If only one parent is alive, that person receives a benefit of 82.5 percent of the PIA. Benefit for two dependent parents is 75 percent of PIA for each of them. In any case, there is a lump-sum death benefit of $255.

Disability benefits: A disabled worker is eligible to receive a payment equal to the PIA if disability incurs before NRA. The payments are subject to a five month waiting period.

Both, a spouse, aged 62 or older, and children under 18 of a retired or disabled worker are entitled to receive a monthly payment in the amount of 50 percent of the PIA. A child receives a lifelong income if it is disabled before the age of 22 (Myers, 2002).

Apart from the Social Security System, there is another federal government program to provide financial protection (Dearborn, 1994). This program is called Medicare and is designed to cover medical expenses for people aged 65 and older who are eligible for OASDI benefits, recipients of disability benefits from Social Security and those who need dialysis or kidney transplant (CMS, 2004). Medicare consists of two parts. Part A provides hospital insurance and covers mainly inpatient care at hospitals and skilled nursing facilities if medically necessary. Participation in Part A is compulsory for all workers and, just as well as the Social Security System, financed by Federal Insurance Contributions Act (FICA) taxes. The tax is published on Social Security Online (http://www.ssa.gov/pubs/10003.html) and must be paid in equal amounts by employee and employer. The amount is 1.45 percent of income with no limit. Retired workers who

are not eligible to receive OASDI benefits and, therefore, are not covered by Medicare Part A may purchase this coverage for a monthly premium, which depends on the number of earned quarters of coverage. Someone who earned 30-39 quarters of coverage has to pay $206 per month in 2005. The premium is $375 per month for less than 30 earned quarters of coverage.

Part B provides Supplementary Medical Insurance and covers physician's care and outpatient hospital care. Some services that are not covered under Part A are covered under Part B. Part B of Medicare is a voluntary coverage that can be purchased for extra payments. The monthly premium is $78.20 in 2005 (see Social Security Online).

Since Medicare is intentionally created to provide basic coverage it has a number of gaps and high out-of-pocket expenses. To fill these gaps, private insurance companies offer so called Medigap plans. The government has designed 10 standardized Medigap plans to make the range of offered products more comparable (Dearborn, 1994). Recently, the government started to offer so called Medicare Advantage Plans that replace the original Part A and B and fill the gaps. Medigap coverage cannot be purchased in combination with a Medicare Advantage Plan.

Medicaid is a state-run system, though financed by state and federal government, which offers broad coverage for financially needy people (Dearborn, 1994). The provided benefits range from in- and outpatient hospital care, physician's services, skilled nursing home and home care, coverage for medicine to laboratory services and x-ray. Because the program is state-run, neither the provided services nor the definition for eligibility are the same in all states. Therefore, any listening of services and covered people are just of gen-

eral nature. To be eligible for Medicaid benefits, very restrictive criteria must usually be met, especially in terms of neediness. However, generally eligible are families with a low income, children under age 21, aged, blind, and disabled persons and pregnant women.

Medicaid provides benefits for nursing home care. So, people could think that Medicare is sufficient for long-term care and that long-term care insurance is unnecessary. However, the reverse is true, because Medicaid pays not until a person is needy. Without long-term care insurance, therefore, the person in need of care would have to spend all savings paying for nursing care before drawing benefits from Medicaid (Dearborn, 1994).

So far, there is no special coverage for employees who are injured or disabled at work. This is organized under state worker's compensation (WC) programs (Dearborn, 1994). Worker's compensation removes liability from employers for any work related accident regardless of fault. Under most states law, companies are required to purchase worker's compensation insurance. Usually, companies purchase this coverage from commercial insurers. Some states, however, have monopolistic state funds which are the only source for workers compensation coverage. Worker's compensation provides a broad coverage for medical expenses and substantial protection for loss of income.

2.4 Characteristics of Health Insurance Contracts

Every health insurance policy has a couple of provisions and exclusions. The intention of this section is to give an overview of the most important provisions that are

stated by Dearborn (1994). Foremost, the renewability provision is a central element of insurance policies. There are five different categories:

1. Cancelable
2. Optionally renewable
3. Conditionally renewable
4. Guaranteed renewable
5. Noncancellable

An insurance company can cancel a cancelable policy at any time and already paid premiums are refunded. Optionally renewable policies give the insurer the right to cancel the policy at pre-specified dates, such as policy anniversary or premium due dates. These two categories are not very common and not allowed for individual health insurance. Nowadays, the policies must contain a provision that allows the insured to continue the coverage as long as premiums are paid. The following provisions are therefore typically found in an insurance policy. A conditional renewable policy gives an insured the right to renew the policy under the insurer's option to terminate it for some conditions that are stated in the policy. These conditions must not deal with the insured's health. For example, the policy can be terminated on individual basis if the insured reaches a certain age or changes to a more hazardous occupation. A guaranteed renewable policy cannot be canceled by the insurance company as long as premiums are paid timely, i.e. it is automatically renewed. However, the insurer has the right to increase premiums for all insured of the same class. Almost all long-term care policies are issued with the guaranteed renewable provision and it this nowadays also the most popular provision for other forms of

health insurance plans, such as medical expense. Finally, a noncancellable gives the insurer neither the right to terminate the policy nor to increase premiums. The noncancellable category is usually only used for disability income insurance (Dearborn, 1994).

Typically, renewable policies are renewable to age 65. Like this, the term of noncancellable policies is typically to age 65. Guaranteed renewable and noncancellable policies provide a conditional renewal provision from age 65 to 75 for the case that the insured continues working on a full-time basis after age 65 (Black and Skipper, 2000).

Renewable policies always give the insurer the right to increase premiums for a class of insureds, but not for an individual whose health has changed. In this way, for example, the insurer can account for an increase in medical care costs. A policy can include a provision that gives the insurer the right to change premium rates or benefits for an individual insured. The change of occupation provisions allows for adjustments should the insured change occupation. If the insured changes to a more hazardous occupation maximum benefits can be reduced and the premium rate can be reduced if the insured changes to a less hazardous occupation. This provision is often included in disability income insurance policies (Dearborn, 1994).

As once mentioned above, renewability of policies depends on a timely payment of premiums. Likewise, a noncancellable policy remains in force only if payments are made on time. Health insurance policies must include a so called grace period provision that allows a premium payment delay of 31 days. The grace period may be shorter for monthly or weekly premium payments. The insured is still covered during the grace period and benefits for a claim must be paid, but may be reduced by the delayed premium.

However, a policy that is lapsed may be reinstated under certain conditions. A reinstatement provision must be included in policies and states that at least two conditions for reinstatement. First, the policyholder is required to pay the due premium. The policy is reinstated automatically if the premium is accepted by the insurance company. But the insurer may require another application and proof evidence of insurability. This is to avoid adverse selection (Dearborn, 1994).

Preexisting conditions are usually excluded from coverage if the insurance company is aware of them. The exclusion must be explicitly included in the policy and is in force for the policy's duration. Coverage for preexisting conditions that are not explicitly excluded (e.g. because the insured did not notify the insurer and the insurer did not discover it) are excluded under a preexisting condition provision. However, in this case there is a time limit for the exclusion because policies must include a provision that states that the policy is incontestable after a certain period of time, usually two years (Dearborn, 1994).

Another provision regarding the misstatement of age may be included. This provision allows the insurer to adjust benefits if the insured's age is found to be misstated. Under the misstatement of age provision, the benefit payable is the benefit that the premium would have purchased at the correct age (Dearborn, 1994).

The last provision that is mentioned by Dearborn (1994) is a conversion privilege for dependents. If dependent family members are covered under the insured's policy and loose this coverage because they are not longer dependent family members they have the right to purchase a conversion policy without evidence of insurability. For example, chil-

dren that reach the limiting age for children's coverage or a divorced spouse are not longer dependent family members.

2.5 Introduction to Ratemaking in Health Insurance

This section provides an introduction into the process of determining premiums for health insurance contracts. It is composed of two parts. First, the way of establishing initial premiums is explained. In doing so, it is slightly easer to establish premiums of one-year term polices compared to long-term plans which usually have a level premium for the whole policy duration. A special approach for the pricing of group insurance plans is described in the second part. The pricing of group insurance is often adjusted each policy anniversary for incurred claims.

2.5.1 Establishing Premiums

The pricing of Health Insurance involves many factors (Black and Skipper, 2000), especially regarding the features and design of the policy. Of particular importance are the renewability provision and the insurance plan type. Guaranteed renewable or noncancellable plans typically charge a level premium until termination of the policy. For these plans and other long-term policies premiums are calculated similar to life insurance, i.e. the premium at the effective date of the policy is calculated in a way that the present value of expected future benefits is equal to the actuarial present value of future premium payments. Just as the renewability provision has the type of insurance a strong impact on

premium calculations. Managed care plans, foremost HMO plans, are calculated differently than indemnity plans.

HMOs usually calculate their premiums on a per-member, per-month (PMPM) basis. This calculation does not distinguish between gender, age, occupation or even insurance coverage of the insured network members. This method is called community rating (Bluhm, 2003). A differentiation between various risk classes, such as gender or age, is possible. Yet every member within one class is still paying the same premium in community rating by class. The method to develop the premium rate is called actuarial cost method. That is, for each type of service covered by the HMO plan is an average claim cost estimated. The average claim cost is the product of the expected annual utilization of that service and the cost of providing that service. The factor cost of service is fairly ease to determine for a HMO because they either provide the service by themselves or have pre-negotiated rates with the health care providers connected with the network. Then the average claim costs for each provided service are added to determine the net premium. The computed rate is thereafter increased for administrative costs, profit margins and other expenses and adjusted for possible co-payments or benefit limits. A HMO may have payment arrangements with the health service providers to transfer some or all risk. This fact must be taken into consideration when calculating the premiums (Bluhm, 2003).

Common for the pricing of all health plans is the need for determination of the average annual claim cost (O'Grady, 1988). The claim cost may depend on various factors, such as age, gender, occupation, geographical area and, of course, the insurance

plan. Covered expenses, benefit periods, maximum benefit amounts, co-payments (i.e. deductibles and coinsurance), and elimination periods are features of a policy that affect the annual claim costs. That is way claim costs are considered for each benefit type separately. The factors age, gender, occupation and geographical area may or may not have a significant influence on the average costs. For example, while age and sex are very import for estimation of benefits for medical expense insurance, they are less influential on benefits for accidental death and dismemberment since accidental rates do not change a lot. Also the influence of occupation depends on the policy. An individual working in a hazardous environment is very likely to be disabled or incur high medical costs. Workers compensation, however, may pay for work-related injuries or disablement and most health policies exclude these benefits. Occupation in that case is of minor importance. The geographic region of the insured's residence is very significant for determining the annual claim costs. Hospital rates, for example differ in rural and urban areas (O'Grady, 1988).

The calculation of average annual claim costs involves two factors: average claim frequency and average loss severity. The following formulas (Brown, 2001) define these values.

$$\text{Average claim frequency: } f := \frac{\text{number of incurred claims}}{\text{number of earned exposure units}} \text{ and}$$

$$\text{Average loss severity: } s := \frac{\text{dollar amount of incurred losses}}{\text{number of incurred claims}}.$$

Then the average claim (or loss) cost is the product of both:

$$\text{Loss cost: } f \cdot s := \frac{\text{dollar amount of incurred losses}}{\text{number of earned exposure units}}.$$

These values can be calculated using the insurance company's own morbidity experience. If the company is too small or has no experience rates due to other reasons, regularly published morbidity tables or claim cost studies provide a data source for various types of benefits. The Centers for Disease Control and Prevention, for example, publish weekly morbidity and mortality tables. Another source is the National Association of Insurance Commissioners (NAIC) which publishes disability tables (Black and Skipper, 2000).

To measure the effect of elimination periods (i.e. the time the claimant has to wait until benefits are paid) to use of continuance tables is helpful. These tables contain the probability of claim continuance according to the duration of benefit payments. Using continuance tables insurance companies can also compute the average loss severity (Black and Skipper, 2000).

Once the average claim costs are determined, they can be used to establish premium rates. For health insurance policies that are issued on an one-year basis the average claim cost can be used directly for establishing the premium (Black and Skipper, 2000). The net premium per exposure unit for this case is equal to the average claim costs. The finally charged gross premium must include a loading for expenses and a profit margin. Various types of expenses must be accounted for, such as commissions, underwriting costs, administrative costs, claim settlement costs and taxes. A method for doing this is the loss ratio method (Brown, 2001): Let the Expense Ratio be the percentage of the

gross premium which is used to pay expenses and that accounts for a profit. The reminder is the

$$\text{Permissible Loss Ratio} = 1 - \text{Expense Ratio},$$

i.e. the portion of the gross premium that is used to pay claim costs. Thus,

$$\text{Gross Premium Rate} = \frac{\text{Average Claim Cost}}{\text{Permissible Loss Ratio}}.$$

If the calculation includes expenses that are expressed as a percentage (c) of the gross premium and expenses that are fixed (F) per exposure unit, then the formula for the gross premium is (Brown, 2001):

$$\text{Gross Premium Rate} = \frac{\text{Average Claim Cost} + F}{1 - c}$$

This is the gross rate per exposure unit and needs to be multiplied with the desired coverage.

Consider the following example. An insurance company offers a hospital indemnity plan and earned 2,000,000 exposure units, with $1 daily benefit being the unit of exposure, during the past year. The number of incurred claims was 220,000 with a total loss of $1,320,000. The insurance company can compute the average claim cost using this data:

$$\text{Loss freguency} = \frac{220{,}000}{2{,}000{,}000} = 0.11$$

$$\text{Loss severity} = \frac{\$1{,}320{,}000}{220{,}000} = \$6$$

The loss severity is the average claim per $1 daily benefit. Thus, the average annual claim cost per $1 daily benefit was $0.11 \cdot \$6 = \$0.66$. Assuming that the average claim frequency and severity will not change in the following year, this data can be used to calculate the premium. Let the Permissible Loss Ratio (PLR) be 0.75, i.e. 25 percent of the gross premium are used to cover the insurer's expenses. Then the gross premium rate is

$$\frac{\$0.66}{\text{PLR}} = \frac{\$0.66}{0.75} = \$0.88 \text{ per \$1 daily benefit.}$$

The calculation of a net premium is also fairly easy for accidental death and dismemberment insurance. The benefit consists of a single payment of a pre-arranged amount. Note that the death benefit (i.e. the principle sum) is the amount of insurance purchased. Let r_x be the accidental death rate at age x and m the percentage of claims that are resulting from death. According to Black and Skipper (2000), the net premium per exposure unit ($1 principle sum) at age x is calculated as

$$P_x = \frac{r_x}{m}$$

As mentioned above, accidental death rates vary only slightly with age and one premium can therefore be charged for all ages.

The method of determining a premium for long-term policies which have a level annual payment is more complicated (O'Grady, 1988). Values of annual claim costs are required to be known for every age now, or at least for several age ranges. Besides the annual claim costs (i.e. the morbidity), there are other factors that have an effect on the premium, such as mortality, lapse and interest rates. The consideration of lapse rates is crucial, because there are no non-forfeiture benefits upon withdrawal. The gross rate, in

addition, depends on expenses, taxes and a margin for profits and contingency. The following notation will be used in the formulas:

x = age

ω = age until termination of policy

l_x = expected number of policies at age x

q_x = death rate at age x

w_x = lapse (or withdrawal) rate at age x

S_x = average annual claim cost at age x

e_k = per policy expenses paid at time k

c_k = fraction of premium paid for expenses at time k

i = effective rate of interest

$v = \frac{1}{1+i}$ is the discount factor and $l_{x+1} = l_x \cdot (1 - q_x - w_x) = l_x \cdot p_x$ is the formula for persisting policies. The value $p_x := 1 - q_x - w_x$ is called the persistency rate.

Note that it is also common to use multiple decrement notation for death and lapse rates. In this case, $q_x^{(1)}$ is the notation for the death rate at age x and the lapse rate is denoted by $q_x^{(2)}$.

The first step in determining a policy premium is to calculate a Net Level Premium (*NLP*) using the equivalence principle, i.e. such that the Actuarial Present Value of Future Annual Claim Costs (APVFACC) equals the Actuarial Present Value of Future Premiums (APVFP). This involves the use of commutation functions (O'Grady, 1988):

- $D_x = l_x \cdot v^x$ is the life commutation function including lapse rates.
- $N_x = \sum_{k=0}^{\omega - x} D_{x+k}$
- $H_x = S_x \cdot \frac{D_x + D_{x+1}}{2}$ This formula assumes that claims are paid at mid-year.
- $K_x = \sum_{k=0}^{\omega - x} H_{x+k}$

Then the APVFP at age x is $\sum_{k=0}^{\omega - x} NLP \cdot v^k {}_k p_x = NLP \cdot \sum_{k=0}^{\omega - x} \frac{D_{x+k}}{D_x} = NLP \cdot \frac{N_x}{D_x} =: NLP \cdot \ddot{a}_x$,

where $\ddot{a}_x$ is the actuarial present value of an annuity due of 1 paid at the beginning of each year. The APVFACC at age x, A_x, equals

$$\sum_{k=0}^{\omega - x} S_{x+k} \cdot \frac{D_{x+k} + D_{x+k+1}}{2} \cdot \frac{1}{D_x} = \frac{K_x}{D_x} = A_x .$$

Therefore, the equation APVFP = APVFACC can be solved to obtain the

$$NLP = \frac{K_x}{D_x} \cdot \frac{D_x}{N_x} = \frac{K_x}{N_x} .$$

Persistency rates do not always depend on the insured's age, but depend on the duration of the policy. An approach to handle this is to disregard mortality rates (O'Grady, 1988). This approach is sometimes used because health insurance policies usually provide coverage at most until age 65 and mortality rates are significantly lower than lapse rates in these ages and may therefore be neglected. Lapse rates could be increased slightly to handle this. Define $\bar{l}_k$ as the number of policies in force at duration k and $\bar{l}_0$

as the number of issued policies. Then the persistency rate at duration *k* is $\frac{\bar{l}_{k+1}}{\bar{l}_k}$ and the probability of persistency from issue of the policy until duration *k* is $\frac{\bar{l}_{k+1}}{\bar{l}_0}$. An analogous calculation as above leads to the net level premium using these considerations.

The gross premium is also calculated using the equivalence principle similar to life insurance ratemaking. However, expenses are taken into consideration this time. One the one hand, this can be done using the loss ratio method described above, i.e. determining an expense ratio and dividing the net level premium through the permissible loss ratio. One the other hand, one can differentiate between two types of expenses (confer Bowers et al., 1997): Per policy expenses and per payment expenses. Per payment expenses are expressed as a fraction of the gross premium. Expenses are typically higher in early policy years due to high underwriting and sales costs. For simplicity, assume the expenses in renewal years are level and different for the first year. Let c_0 be the fraction of the first premium paid for expenses and c_1 the respective fraction of renewal premiums. Likewise, e_0 are the first years per policy expenses, and e_1 are per policy expenses for renewal years. Then the gross premium is obtained by (Bowers et al., 1997)

$$G\ddot{a}_x = A_x + e_0 + e_1(\ddot{a}_x - 1) + c_0 G + c_1 G(\ddot{a}_x - 1),$$

where *G* is the gross premium. This equation solves for G as

$$G = \frac{A_x + e_0 + e_1(\ddot{a}_x - 1)}{\ddot{a}_x - c_0 - c_1(\ddot{a}_x - 1)}.$$

Taxes can be considered as expenses and are usually included in the per premium expenses. Finally, the actually charged premium contains a loading for profits and contingencies. This can be done explicitly or implicitly. Doing this explicitly means that the premium is increased by a certain percentage, i.e. per premium expense factor is increased. Under the implicit approach the premium is obtained by using conservative values for the input factors morbidity, mortality, lapsation, interest and expenses (Black and Skipper, 2000).

2.5.2 Experience Rating for Group Insurance

Experience rating is a process in group insurance in which premiums are adjusted depending on the past claim experience (Black and Skipper, 2000). Premium adjustment based on one group's own experience is done if the individual group has a reasonable number of participating members in the group health plan. Insurance companies use so called pooled rates for small groups, i.e. the experience of a whole industry or all groups of a similar type is used to adjust premium rates of these small groups.

For experience rating two different methods are distinguished (Bluhm, 2003). Retrospective rating bases the premium rate for one period on the claim experience during that period. That means that the group is hold financially responsible for a bad claim experience and they are given the financial benefit of a good claim experience in that specific period. An excess for good experience can be refunded or accumulated in a premium stabilizing reserve. That reserve also covers shortcomings of a bad experience.

On the other hand, prospective experience rating bases the future premium rates on the past claim experience. Only incurred claims up to a certain stop-loss limit are included in the calculation of claim experience. This stop-loss limit is either applied on an individual basis or an aggregate basis for the group. The use of a stop-loss limit accounts for exceptionally large claims. These catastrophic claims are pooled for all insured groups together and not accounted for the individual group's experience. An average charge is accounted for in establishing the next year's premium rate (Black and Skipper, 2000).

The next years charge is not completely based on the past experience. The determination of it makes use of a credibility factor (Bluhm, 2003). The insurance company determines how reliable the past experience is for the future and assigns it a credibility factor. The size of the group and the number of past claims may affect this factor. A large group's experience is in this connection more credible than that of a smaller group. Then the claims charge is a weighted average of incurred claims and expected claims. If c is the credibility factor, then (Bluhm, 2003)

$$\text{claims charge} = c\cdot(\text{incurred claims}) + (1-c)\cdot(\text{expected claims}).$$

The incurred claims consist of the paid claims and the change in the claim reserve for the experience period, i.e. the claim experience. The expected claims are a pooled average of claims that the insurance company incurred.

CHAPTER III

THE GERMAN HEALTH INSURANCE SYSTEM

Germany has a worldwide unique health care system. Health insurance in Germany is provided by the government and by commercial insurance companies (Schneider, 2002). Statutory health insurance is compulsory for all working people and, therefore, mostly the primary form of coverage. It is part of a widespread social security system which will be briefly outlined later on. However, in Germany high income employees may opt out of the statutory system and purchase individual health insurance as primary protection. Private health insurance is also offered as supplementary plan in addition to a statutory plan. The dual system and lifelong protection through statutory plans requires private insurers to also offer lifelong protection at guaranteed rates. Because of this, Private health insurance in Germany has the character of life insurance. The principles of pricing are discussed at the end of this chapter.

3.1 Historical Development

Social security in Germany has a long tradition. The craftsmen' guild system of the late Middle Ages can be seen as a precursor of today's Private Health Insurance. For the guilds supported their members in case of an emergency with the assets they gained from contributions.

The first statutory systems were developed in the middle of the 19th century. In 1845 Prussia accepted the formation of health insurance funds and entitled the townships to force skilled workers and journeymen to join them. Uniform rules for the German Empire came up in 1876 (PKV 2002).

However, the main foundations of today's system were laid in 1883 with the social security legislation by Chancellor Otto von Bismarck. The National Parliament passed the Law concerning Health Insurance for Workers on June 15, 1883. The law introduced compulsory insurance for certain types of workers (PKV, 2002). The benefits provided with this insurance included physician care, pharmaceuticals and technical aids; sickness benefits; hospital care; death benefits and maternity aid. In 1884 the Accident Insurance Act followed and covered workers in especially dangerous businesses. The last law in line with this legislation was the Law concerning Disability and Old Age Insurance of 1889. The three statutes were combined in the "Reichsversicherungsordnung" (this can be translated to Reich Insurance Code) in 1911 and founded the Statutory Health Insurance scheme. Nowadays the Reich Insurance Code is part of the Code of Social Law (Deutsche Sozialversicherung Europavertretung, 2005d).

One aspect of Bismarck's social security legislation was that only certain types of workers were covered. Because of this the other classes of population started to develop similar institutions and the first commercial insurers were founded – the beginning of Private Health Insurance. After World War I, especially in the middle of the 1920s, the Private Health Insurance took a significant upturn. Several laws supported this development in the following years (PKV, 2002).

In 1927 the Law on Employment Service and Unemployment Insurance was enacted as the forth part of Germany's social security system. This type of insurance provides benefits for people who lost their job and, for example, need financial assistance to find a new job (Deutsche Sozialversicherung Europavertretung, 2005g).

After the end of World War II the Private Health Insurance System collapsed and some companies were back at zero. In the following years the Association of Private Health Insurers were founded step by step in the zones of occupation. From 1949 on the Association was present in the whole Federal Republic of Germany.

The last major change took place in 1995: The fifth pillar of the German Social Security System, the Law on Nursing Care Insurance, was introduced. Moreover deregulation brought significant modifications for the commercial insurance companies (PKV, 2002).

3.2 Two Systems

As mentioned above, Germany has two health insurance systems that exist side by side. The majority of people are compulsory covered by a statutory health system and people who meet certain eligibility criteria are allowed to opt out of the system and purchase private health insurance coverage. According to OECD data (Colombo and Tapay, 2004), the statutory system covered more than 90 percent of the population and the public health expenditures accounted for 75 percent of total health expenditures in 2000.

3.2.1 Statutory Health Insurance

Statutory Health insurance is compulsory for all employees in Germany. That does not apply to employees with a high income, civil servants and self-employed individuals. The costs for health care of civil servants are partially paid by the employer and the remaining part can be covered by purchasing private health insurance. Health insurance companies offer special plans for civil servants. The employer covers at least 50 percent of the medical expenses and this fraction increases if the civil servant has children.

Self-employed individuals are not forced to have statutory health insurance coverage and employees can choose to opt out of the system if their monthly income exceeds €3,900 (BMGS, 2004). They usually purchase private health insurance or become voluntary members of the statutory system. However, if they choose to purchase private health insurance they have almost no chance to return to the public system. The only situation in which employees may return to the statutory system is if the monthly income falls below the ceiling and the employee is still younger than 55 years. Elderly employees and self-employed individuals have no chance for return (Schneider, 2002).

The statutory health insurance system is part of the German social security system which offers a broad protection for financial distresses. Deutsche Sozialversicherung Europavertretung (2005b) provides an overview of the different classes of the social security system and provided benefits are briefly outlined. The following five classes form the social security system:

1. Health Insurance

2. Workers Compensation
3. Retirement Pension Insurance (incl. Disability Insurance)
4. Unemployment Insurance
5. Long-Term Care Insurance

Workers Compensation provides benefits in case of injury or disability at work, while traveling to and from the work place and for occupational diseases (Deutsche Sozialversicherung Europavertretung, 2005a). These benefits include a daily indemnity and a replacement income if disability lasts for longer periods. Benefits are often higher than benefits for statutory health insurance because it is the prior intention to recover the employee's ability to work. Contributions are made solely by employers.

Retirement Pension Insurance provides pensions for retired workers, disability replacement income and monthly benefits for dependent survivors if the insured deceases (Deutsche Sozialversicherung Europavertretung, 2005f). Contributions are proportional to the income and independent from the provided benefits. 19.5 percent of the monthly income is paid up to an income limit for assessment of contributions (€5,200).

Unemployment Insurance covers the costs of job-seeking and provides monthly benefits in case of job loss (Deutsche Sozialversicherung Europavertretung, 2005g). An amount of 6.5 percent of the monthly income has to be contributed for this insurance. The assessment ceiling for contributions is the same as for Retirement Pension Insurance, i.e. €5,200. This type of insurance is provided by the federal employment office which also pays for health insurance in case of unemployment. Self-employed people who become

unemployed must change to the statutory system and the employment office takes the premiums over.

Long-Term Care Insurance covers the expenses that arise from care at home or in a nursing home to assists with activities of daily living (Deutsche Sozialversicherung Europavertretung, 2005e). The amount of benefits depends on the degree of need for nursing care. The assessment ceiling for contributions is €3,525 and 1.7 percent of the monthly income must be paid for this insurance. This type of insurance is compulsory for all German citizens. However, not everybody is covered by the statutory health insurance because coverage has to be provided by the individual insurance provider. People who purchase private health insurance obtain long-term care coverage from their insurance company.

The amount of contributions for health insurance is not uniquely determined, but specified by each insurance provider (Deutsche Sozialversicherung Europavertretung, 2005c). As for all lines of insurance of the social security system, the contributions are proportional to the income and independent of the provided benefits. There is also an income limit for assessment of contributions which is €3,525. The least rate that presently can be found on the market for statutory health insurance is about 12.1 percent of the gross income and the average percentage is slightly larger than 14 percent. The maximum amount of contribution is therefore about €500 on average.

It is common for all parts of the social security system (except for workers compensation) that contributions are divided evenly among employee and employer, i.e. the insured bears half of the stated premium. The income limit is not fixed but is adjusted

almost every year according to the development of incomes. The amount is specified by the government through administrative directives. The ceilings for assessment of contributions are published by the "Bundesministerium für Gesundheit und Soziale Sicherung" (Federal Ministry of Health and Social Security), for details see (BMGS, 2004).

The statutory health insurance system is standardized in several matters (Schneider, 2002). Not only are the premiums independent of the individual's health and age, but also the range of benefits is prescribed by law and equal for all covered persons. The broad range of benefits includes inpatient and outpatient medical treatment, drugs, technical aids, sickness benefits and dental care.

Health insurance that is standardized and regulated as in the statutory system can hardly be provided by commercial health insurance companies because competition is impossible (Schneider, 2002). Therefore, statutory health insurance is made available by non-profit organizations under public law. At the end of 2004, 267 of such organizations existed in Germany, whereas more than 1200 of them were in the market in 1991 (confer http://www.heute.de/ZDFheute/inhalt/19/0,3672,2281203,00.html, retrieved June 17, 2005). Supervisory boards have to be established for each of them and the members of these boards are elected evenly by employers and employees and work on a voluntary basis. An executive board is elected by the members of the supervisory board and is employed on a full time basis. The operations of these non-profit organizations are supervised and regulated by federal state governments.

The statutory health insurance system is financed on a pay-as-you-go basis, i.e. the total annual premiums cover the total annual benefits for the pool of insureds. For this reason, there is no need to establish any contract or claim reserves.

A few more things should be mentioned about the statutory health system in Germany:

1. Dependents are covered at no extra charge: The employee's spouse and dependent children are covered automatically if they do not have an own income that requires participation in the statutory system on their own. The income ceiling is €400.
2. Insureds have an almost free choice of physician and hospital. However, some physicians do not provide treatment for insureds with statutory health insurance. To be more specific, the insured would have to pay for the expenses. Nowadays, some insurance providers begin to introduce gatekeeper models to reduce the costs of health care. In this model insureds are required to choose a primary care physician who is visited at first with any health problem and may refer the patient to a specialist for further care.
3. All physicians and hospitals that provide medical care for insureds under statutory health insurance are paid directly by the health insurance providers for costs of their services. Payments for services rendered to patients are stated in fixed fee schedules. The insureds are not billed by the physicians or hospitals, but receive their benefits in form of medical services.

The duty of the statutory health insurance is to take care of the insured's health and in doing so to fulfill the insured's entitlement to benefits. The objective is not to make any profits. The only problem is a growing number of old people in the society. Medical care for elderly individuals is on average more expansive than for younger ones and the costs for the whole system increase therefore. So ways must be found to lower the increase of contributions for all insureds.

3.2.2 Private Health Insurance

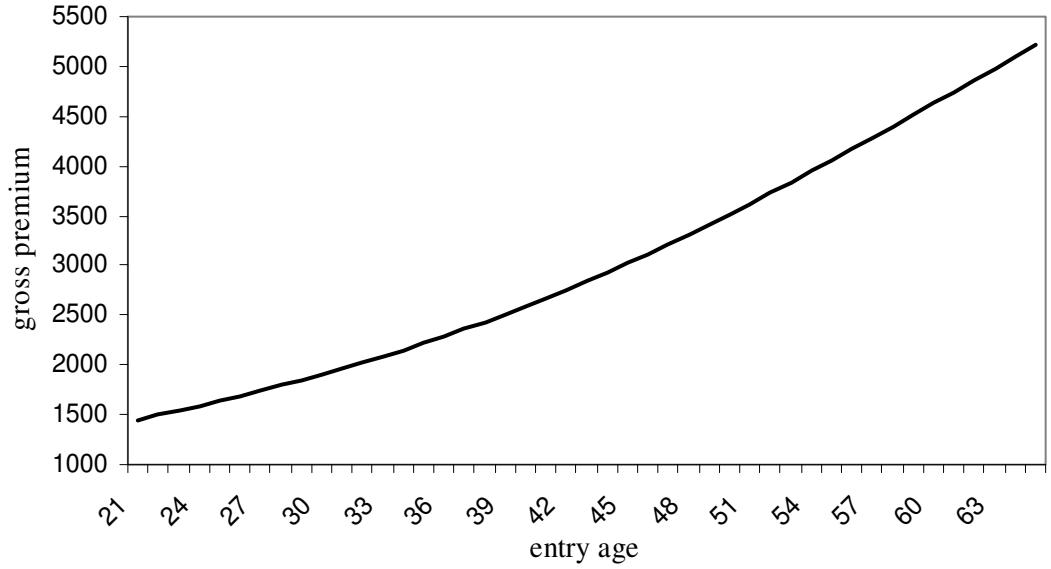
Private Health Insurance is the second way of gaining health insurance coverage in Germany and membership is voluntary (Schneider, 2002). All persons who are not covered by statutory health insurance can apply for private insurance. Everybody who is not a compulsory member of the statutory system can also choose to live without health insurance. The persons who are eligible to purchase private health insurance are self-employed individuals, civil servants and high income employees who choose to opt out of the statutory system. All other persons who are compulsory covered by the statutory system can also purchase some form of private health insurance, namely as a supplement to the statutory one. The different products of private health insurance (including supplementary insurance) are described in further detail in the following section.

The providers of private health insurance are commercial insurance companies or mutual companies (Schneider, 2002). Theses companies compete with each other and the statutory system for customers, because nobody is forced to leave the statutory system. This is a little bit different for private health insurances as supplemental coverage be-

cause everybody is a potential customer. Another aspect of the private system characterizes the competition among health insurance companies. It is not only difficult to return to the statutory system once one has a contract with a private health insurance provider, but it also difficult to change the insurer. The reason for that is that premiums are calculated based on the equivalence principle and level premiums are charged to the insured depending on the entry age. Therefore, premiums for elderly people who purchase private health insurance are higher than for younger people because health care costs increase with age. In addition, no non-forfeiture benefits are provided because already accumulated reserves are kept by the insurer. For this, private health insurers compete mostly for young persons and new customers (Schneider, 2002). Figure 1 shows a sample development of premiums depending on the entry age.

Contracts for private health insurance coverage are individually arranged, i.e. the insured can choose the desired coverage and the amount of co-payment. Deductibles are the most commonly offered type of co-payment. While deductibles are exceptional for statutory health coverage, they are very common for private plans. The statutory system rather makes use of benefit limits and co-insurance. Premiums are calculated for each insured individually based on the chosen coverage and the amount of co-payment. Once the contract is set up, benefits and premiums are defined for the duration of the policy. The individual character of private health insurance reveals the fact that it is based on the funding principle (Schneider, 2002).

Figure 1
Private Health Insurance Premiums Depending on Entry Age



Source: author's own calculation, depending on standard decrement table for private health insurance in Germany

The pricing of private health insurance accounts for increasing health care costs at increasing ages. This is reflected in premiums that are higher than necessary to pay current expenses in the early years. Redundant early year's premiums plus compound interest, therefore, are used to supplement the inadequate later years (Schneider, 2002). The calculations, however, do not account for a general inflation of health care costs. In this case premiums may be changed if claim costs differ from the actuarial assumption by more than 10% and a trustee approves adequate and correct calculation of premiums (confer Chapter V for further details).

Some additional facts about the private health insurance system:

1. The employer pays part of the premium in almost the same manner as in the statutory system. In this case, the employer also pays half of the premium, but the amount is limited to the maximum amount the employer would have to pay in the statutory system (Schneider, 2002).
2. Dependents are not covered: The insured has to enter into additional contracts to purchase health insurance coverage for the spouse and dependent children. Children might be covered under a spouse's statutory health insurance. In this case no additional coverage for the family members must be purchased.
3. Free choice of physician and hospital: The insured is typically reimbursed for all types of medical care services that are covered under the policy and are provided by any health care provider. There is neither an obligation to choose a primary care physician nor would any physician or hospital object to treat a privately insured.
4. Insureds are billed for medical services and apply for reimbursement of the insurance company. As long as the services are covered under the insured's policy, the insurer will reimburse the insured. Insurance companies do net settle any bills directly with the health care providers. Payments for services rendered to patients are also stated in fee schedules, but the eventually charged amount may be higher because the stated fees may be multiplied with a factor. The maximum allowed multiplier is 3.5 and depends on the complexity of the medical treatment.

As mentioned above, private health insurance is offered in two different ways. On the one hand, it can be purchased as primary health insurance if the insured is not compulsory covered by the statutory system. This form of private health insurance is also called substitutive health insurance (Schneider, 2002). On the other hand, every employee who is covered by the statutory system may purchase private health insurance as supplementary insurance to cover medical expenses that are not covered by the statutory system. The primary form is intended to be a substitute for statutory health insurance coverage. To be attractive it must provide similar feature as the statutory health insurance. The two main features are:

1. Life-long protection and
2. Premiums are independent of age

People who are covered under statutory health insurance can rely on a life-long insurance coverage. Therefore, this is expected by someone who has insurance with a private insurer. Especially the fact that it is almost impossible to return to the statutory systems reveals this aspect. Employees who chose to opt out may only return if they are not yet 55 years old and if their income falls below the contribution assessment ceiling. To avoid adverse selection, people older than 55 are not allowed to return at all. Self-employed individuals have no chance to return as well. It is essential for these people to be able to rely on a life-long insurance coverage. Combined with the above described fact that it is almost impossible to change the insurance company (because it might be very expensive), the decision for one private insurance company is a decision for the whole life (Schneider, 2002). This is another reason why private health insurance is based on the

funding principle, i.e. premiums are calculated using the equivalence principle. In fact, it is prescribed by regulation that private health insurance must be calculated similar to life insurance.

This leads to the second aspect of statutory health insurance that is crucial for the private system: Premiums do not increase with increasing age. Due to the fact that health care costs increase with increasing age, non-level premiums that are based on the insured's attained age would become unaffordable for elderly people. However, premiums for private health insurance are calculated based on the equivalence principle and depend on the entry age, but they do not depend on the current age thereafter. In fact, legislation prohibits premium increases unless there is a permanent inflation of health expenses of more than ten percent (Wolfsdorf, 1997). Actuarial calculations show such premium increases affect the elderly insureds more than younger ones. To prevent elderly insureds (who typically cannot return to the statutory system) from high premium payments, private insurance companies have to offer a so called standard plan. This plan provides the same benefits as the statutory health insurance and premiums are limited to the maximum contribution in the statutory system (Schneider, 2002). All private insurance companies offer the same standardized plan which is not based on the equivalence principle. To fund this plan, the premium has to be loaded by an extra amount which is proportional to the gross premium and determined by each insurer individually.

Contributions for statutory health insurance are based solely on the insured's wages, whereas premiums for private health plans depend on different factors. Besides the entry age, gender and state of health are the main factors that influence the amount

charged. Private Insurance companies have the right to refuse insurance coverage. However, they rather exclude individual pre-existing conditions from coverage with an exclusion rider or charge a higher premium to account for the increase in expected claims (Schneider, 2002).

Another characteristic of private health insurance is that the main provided benefits are similar to the benefits provided by the statutory system. Private plans normally provide even better and more benefits to be attractive for people who consider purchasing private health insurance. A broader coverage results in higher premiums and private plans, therefore, usually include some form of co-payment, typically deductibles, to lower the costs and consequently the premiums (Schneider, 2002)

3.3 Basic Forms of Private Health Insurance Coverage

Private health coverage can be individually compiled according to personal needs and the desired financial protection (PKV, 2002). Insurance companies offer different plans that are designed to cover different areas of potential financial loss due to sickness or an accident. Although most insurers have created their own plans, the general range of product is always the same and will be outlined in this section.

3.3.1 Substitutive Health Insurance

All persons that are not compulsory covered under the statutory system are eligible to purchase private health insurance as substitute for the statutory coverage. This is the primary form of health insurance for them. Three plans are generally offered:

1. Comprehensive Medical Expense Insurance
2. Hospital Indemnity Plan
3. Daily Sickness Benefits

Comprehensive medical expense insurance is the most important type of substitutive insurance. It provides benefits in case of accident, sickness and maternity. Full or partial reimbursement is provided for a wide range of health care expenses. This includes among others inpatient and outpatient medical treatment, surgery, preventive medical checkup, medicine, dental care and dental prosthesis (PKV, 2002). Statutory health insurance also provides benefits for most of these expenses, but private plan benefits typically exceed the basic benefits provided by the statutory systems. Benefits for dental prosthesis, for example, are mostly higher. Most private plans also pay for better hospital accommodation (single or double bedroom) and inpatient care by head physicians. Not covered by the statutory systems but often covered by private health insurance plans are treatments by a nonmedical practitioner, i.e. chiropractitioner (or lay medical practitioner). The insured is typically reimbursed for all expenses subject to some form of co-insurance. The most common form of co-insurance is a deductible and the insured can choose its amount (within a certain range) when the contract is concluded (Schneider, 2002).

Hospital indemnity policies are sold as supplementary coverage to comprehensive medical expense insurance. It provides an extra payment for expenses that arise in addition to costs for hospitalization that are not covered by comprehensive medical expense insurance. These additional expenses are, for example, the costs of a home help or commuting expenses for family members who visit the sick person at the hospital. Daily in-

demnities are paid for each day of hospitalization at a fixed amount, e.g. €30 or €50. No proof of additional expenses is required (PKV, 2002).

Daily sickness benefits are provided to compensate loss of income in case of disability due to an accident or sickness (PKV, 2002). The payment of benefits is typically subject to an elimination period of six weeks. The reason is that employees have to continue wage payment for six weeks following begin of disability. The elimination period is usually very short (e.g. three days) for policies of self-employed individuals, because they do not enjoy any continuation of income payments.

3.3.2 Supplementary Health Insurance

It is possible to purchase private health insurance as supplement to statutory health insurance coverage. The idea is to improve the provided benefits and therewith having a better financial protection. The statutory coverage is still the primary insurance in this case. Among the plans of benefits that are offered by private insurance companies are:

1. Supplementary Hospital Expense Insurance
2. Supplementary Benefits
3. Supplementary Long-Term Care Insurance

Supplementary hospital expense insurance covers expenses for inpatient care that are not covered by the statutory health insurance. Comfortable accommodation in a hospital's single or double bedroom and medical treatment by desired physicians, e.g. the head physician, are the most common benefits of this supplement in case of hospitalization (PKV,

2002). In addition, expenses for inpatient medical treatment in excess of a statutory policy limit are covered by this plan. The reason for this is that statutory health insurance typically provides benefits up to a certain limit and requires co-payments from the insured. The statutory system makes also frequent use of co-insurance.

A plan for supplementary benefits covers expenses for outpatient medical care in excess of statutory policy limits and for other costs that are not covered by a statutory health insurance. The offered benefits include payments for eyeglasses, hearing aids and dental prostheses. In addition, it covers the costs of nonmedical practitioners and reimburses co-payments for medicine that are required by the statutory system. Another part of this supplementary insurance is coverage for expenses of medical care on a trip abroad (PKV, 2002).

It was mentioned above that long-term care insurance is compulsory for all German citizens. This insurance coverage must be provided by any insurance provider to its insureds, i.e. employees who are covered by the statutory system purchase long-term care insurance from the organization that is providing their health coverage and private insurance companies offer this plans to their customers. Plans that are offered by private insurers are almost identical to the statutory coverage and provide legally obligated protection only. This is a very basic coverage and provided benefits are typically not sufficient to cover all incurring expenses. The need for long-term outpatient care at home or care at a nursing home is usually very expensive and an adequate coverage for these expenses is very important. Private insurers offer for this reason plans that supplement the basic cov-

erage and pay for all expenses in excess of policy limits. In addition, these plans include sometimes a fixed benefit in form of a daily allowance.

3.4 Fundamentals of Calculation

Private Health Insurance in Germany always has a long-term character due to the reasons described above and one requirement for the actually charged premium is to be independent of the insured's attained age. The last one is to protect the insureds against soaring premiums at increasing age, because this could be a serious problem for them as it is almost impossible to return to the statutory system. These features are not only reasonable to be able to compete with the statutory system, but they are also prescribed by law.

Lifelong protection and level premiums are characteristics of life insurance and, in fact, private health insurance companies are required by law to operate health insurance on a basis similar to life insurance (Schneider, 2002). As a result of these requirements it is essential for insurance companies to establish premiums using the equivalence principle and to set up contract reserves. That implies that private health insurance business is based on the funding principle, as opposed to the statutory system which is based on the pay-as-you-go principle (Schneider, 2002).

The individual premium calculation for a specific plan depends mainly on the insured's age at issue and gender. The word "individual" is of vital importance in this context because premiums have to be calculated individually. This implies that group health plans with pooled risk are not allowed in Germany (Schneider, 2002).

An introduction to ratemaking in the German private health insurance system is outlined in the following. The terminology is almost the same as the one that was used in Chapter II. Recall the following notation:

x = age

ω = age until termination of policy

l_x = expected number of policies at age x

q_x = death rate at age x

w_x = lapse (or withdrawal) rate at age x

S_x = average annual claims amount at age x

The persistency rate is defined in the common way as $p_x = 1 - q_x - w_x$ and $l_{x+1} = l_x \cdot (1 - q_x - w_x)$ is the formula for persisting policies.

The calculation of premiums and the contract reserves (this reserve is considered in Chapter IV) is influenced by the following actuarial bases (Wolfsdorf, 1997) that are prescribed by law:

1. Interest rate i with an upper limit of 3.5 percent
2. Decrement tables
3. Claims amount per risk per age (S_x)
4. Contingency margin
5. Expenses and additional charges

The decrement tables state values for the probabilities of decrement by death (q_x) and for the probabilities of decrement by lapsation (w_x). The contingency margin is a mandatory loading of at least five percent on the premium. I should be noted that equal actuarial bases are used to calculate premiums and to establish contract reserves. This is an important characteristic of health insurance valuation because different bases may be used for the valuation of life insurance premiums and reserves.

With this notation in mind, the net level premium (*NLP*) at issue age *x* is determined by the equivalence principle (Wolfsdorf, 1997). It is conservatively assumed that claim payments are made at the beginning of the year:

$$\sum_{k=0}^{\omega-x} S_{x+k} \cdot v^{k}{}_{k}p_{x} = \sum_{k=0}^{\omega-x} NLP \cdot v^{k}{}_{k}p_{x} ,$$

i.e. the Actuarial Present Value of Future Annual Claim Costs (APVFACC) is equal to the Actuarial Present Value of Future Premiums (APVFP). To simplify this equation, commutation functions are used and defined as follows (Wolfsdorf, 1997):

- $D_x = l_x \cdot v^x$ is the life commutation function including lapse rates.
- $N_x := \sum_{k=0}^{\omega-x} D_{x+k}$
- $O_x = S_x \cdot D_x$
- $U_x = \sum_{k=0}^{\omega-x} O_{x+k} = \sum_{k=0}^{\omega-x} S_{x+k} \cdot D_{x+k}$

Recall that the actuarial present value of an annuity due of 1 paid at the beginning of each year can be expressed using commutation functions:

$$\ddot{a}_x = \sum_{k=0}^{\omega-x} v^k{}_k p_x = \sum_{k=0}^{\omega-x} \frac{D_{x+k}}{D_x} = \frac{N_x}{D_x}$$

The equivalence equation can now be rewritten using these commutation functions. The right side of the equation can be simplified to

$$\sum_{k=0}^{\omega-x} NLP \cdot v^k{}_k p_x = NLP \cdot \sum_{k=0}^{\omega-x} v^k{}_k p_x = NLP \cdot \ddot{a}_x = NLP \cdot \frac{N_x}{D_x},$$

and the right side can be stated as

$$\sum_{k=0}^{\omega-x} S_{x+k} \cdot v^k{}_k p_x = \sum_{k=0}^{\omega-x} S_{x+k} \cdot \frac{D_{x+k}}{D_x} = \frac{U_x}{D_x} = A_x.$$

These simplified formulas can be used to obtain the net level premium:

The equivalence formula

$$\sum_{k=0}^{\omega-x} S_{x+k} \cdot v^k{}_k p_x = \sum_{k=0}^{\omega-x} NLP \cdot v^k{}_k p_x$$

can be rewritten as

$$\frac{U_x}{D_x} = NLP \cdot \frac{N_x}{D_x}.$$

Thus,

$$NLP = \frac{U_x}{N_x} = \frac{A_x}{\ddot{a}_x}.$$

The next step is to account for expenses in the calculation of premiums. The gross premium is still calculated as a level premium based on the equivalence principle. The calculation of gross premiums allows for the following calculative expenses and other loadings on the net premium (Wolfsdorf, 1997):

1. Sales commission which is proportional to the gross premium with factor α and paid at issue of policy to the agent,
2. Per policy expenses (γ) and
3. Expenses that are proportional to the premium with factor Δ.

The expenses that are expressed as percentage of the premium can by broken down into two parameters: the above mentioned contingency margin (σ) and the loading to fund the standard plan (Ω), i.e. $\Delta=\sigma+\Omega$. Contingency margin and loading for standard plan are the only expenses that are allowed to be a percentage of premiums. All other expenses have to be included as per policy expenses (confer Chapter V).

Typical values for the parameters are:

- α: 0.25-0.5 (that corresponds to approximately 3-6 monthly premiums)
- σ: 0.05-0.1 (the lower bound of 5 percent is prescribed by law)
- γ: ~ €150-200

Typical values for Ω are not available because the standard plan is rarely purchased.

With these parameters in mind, it is possible to derive the annual gross premium (G) for an insured who is x years old at issue of the policy, using the equivalence principle (Wolfsdorf, 1997):

$$G\ddot{a}_x = A_x + \alpha G + (\gamma + \Delta G)\ddot{a}_x ,$$

so that

$$G = \frac{A_x}{\ddot{a}_x} + \frac{\alpha}{\ddot{a}_x} G + (\gamma + \Delta G) = NLP + \gamma + \left(\frac{\alpha}{\ddot{a}_x} + \Delta \right) G .$$

This implies

$$G = \frac{NLP + \gamma}{1 - \Delta - \frac{\alpha}{\ddot{a}_x}}.$$

The sales commission αG is annualized and this amount is part of the annual gross premium. This method was invented by the mathematician August Zillmer (1831-1893). Using the method of Zillmer, the net level premium loaded by the annualized sales commission is called zillmerized premium (Wolfsdorf, 1997):

$$P^Z := NLP + \frac{\alpha G}{\ddot{a}_x}$$

However, there is an upper limit for the sales commission loading. According to German legislation (Calculations Directive), the use of Zillmer's method is limited such that:

1. The aggregate contract reserves for all issued policies of one year remains no longer than four years negative and
2. Each individual contract reserve is positive after 15 years or after half of the policy duration, whatever occurs first.

The high sales commission that is paid to an agent at issue of the policy is annualized and successively paid off by the insured. Negative reserves in the early policy years result and are a risk for insurance companies because they loose money if the insured chancels the policy. The above described regulation is designed to lower this risk.

It was mentioned above that premiums may be raised in case of a general inflation of health expenses. Schneider (2002) provides a calculation that shows that this premium

increase affects elderly insureds more than younger ones: Let P_x be the net level premium that an insured of age *x* at issue has to pay. Prescripts "old" and "new" refer to the actuarial bases of calculations before and after premium adjustment. It should be noted that German legislation requires using the same bases of calculations for old and new customers. Therefore the amount of contract reserves is always calculated with the same bases of calculations as for premiums of new policies (confer Chapter IV). If *q* is the rate of inflation of health expenses and the premium adjustment is made at policy duration *m*, then the amount of the contract reserve before premium adjustment at this time (${}_mV_x$) is

$$\begin{aligned} {}_mV_x &= {}^{old}A_{x+m} - {}^{old}P_x \cdot \ddot{a}_{x+m} \\ &= {}^{old}P_{x+m} \cdot \ddot{a}_{x+m} - {}^{old}P_x \cdot \ddot{a}_{x+m}. \end{aligned}$$

Similarly, the contract reserve after premium adjustment is calculated as

$$\begin{aligned} {}_mV_x &= {}^{new}A_{x+m} - {}^{new}P_x \cdot \ddot{a}_{x+m} \\ &= (1+q) \cdot {}^{old}A_{x+m} - {}^{new}P_x \cdot \ddot{a}_{x+m} \\ &= (1+q) \cdot {}^{old}P_{x+m} \cdot \ddot{a}_{x+m} - {}^{new}P_x \cdot \ddot{a}_{x+m} \\ &= {}^{old}P_{x+m} \cdot \ddot{a}_{x+m} + q \cdot {}^{old}P_{x+m} \cdot \ddot{a}_{x+m} - {}^{new}P_x \cdot \ddot{a}_{x+m}. \end{aligned}$$

By equating these to expressions for the contract reserve, the rise in premium amount at policy duration *m* for an insured who takes out insurance at age *x* is

$${}^{new}P_x - {}^{old}P_x = q \cdot {}^{old}P_{x+m}$$

This shows that the rate of inflation is applied to the amount of premiums for new insurance contracts and not to the current valid premium of the insured. Since premiums depend on the entry age and are always higher at later years, the raise of premiums is rela-

tively higher than the increase of health expenses. Thus, premium adjustments affect elderly insureds more than younger ones.

The German government enacted legislations to minimize the problem of higher-than-average increasing premiums of elderly insureds (Schneider, 2002). The corresponding legislation is described in Chapter V.

CHAPTER IV

BASICS OF RESERVING

Reserving is one of the most important topics for health insurance. This chapter describes the main categories of reserves in the United States and Germany and introduces some basic calculation methods.

4.1 Reserving in the U.S.

Minimum standards for health insurance reserves in the United States are generally prescribed by the NAIC Model Minimum Reserve Standards for Individual and Group Health Insurance Contracts which sets minimum standards for morbidity, interest and mortality. According to this model law health insurance reserves can be classified into three main categories:

1. Claim Reserves,
2. Unearned Premium Reserves and
3. Contract Reserves

These reserves are described and further classified in the following.

4.1.1 Claim Reserves

Claim reserves are the part of the reserves that reflect the obligations the insurer expects to pay for claims that already incurred prior to the statement date but are not yet (fully) paid. The term "reserves" in this case refers to both reserves for payments in the future that are not certain and to liabilities for unpaid obligations that are due or in settlement (Black and Skipper, 2000).

Expense liabilities for the settlement and administration of unpaid claims are also included in the claim reserves. The calculation of this part of the reserves is not highly sophisticated and is based on experiences from past periods. Liabilities for Expenses are usually calculated as a cost per claim or as percentage of the total claim liabilities. Other than claim expenses, the reserve for expenses may be accounted for in the unearned gross-premium reserve. An example for other than claim expenses is the case that the unpaid commissions or other expenses of the first year are higher than the loading in that year's premium (Black and Skipper, 2000).

The remaining part of the claim reserves can be further classified according to the status of claim settlement and payment. The four main categories are Due and Unpaid Liabilities, Liabilities for Claims in Course of Settlement, Incurred But Not Reported (IBNR) Claims and Reserves for Amounts Not Yet Due. Liabilities for claims due and unpaid are usually small and refer claims that are already approved but the payment is delayed. No special calculation methods are necessary to determine their value. Historical averages may be used or they may be calculated directly if very small in volume (Lloyd, 2000). Claims in course of settlement are reported to the insurance company but not yet

approved because not all required information is available. The insurer, for example, might need additional supporting material to determine the claim amount. The claims are filed but certainly not all of them will be approved. It is therefore the problem to determine the amount that the insurer will owe. Different approaches are used in this case. One way is to evaluate each claim individually and use experience data to determine the liability. Another way is to approximate the amount by totaling up the outstanding claims and multiplying this value with a factor that is determined from past experience (Black and Skipper, 2000). Claims that are incurred but not yet reported at the valuation date pose a challenge for the insurance companies. According to Lloyd (2000), the liabilities for these claims are usually a large portion of the total claim reserves and it is therefore important to develop proper estimation methods. However, this is difficult because the insurer has no knowledge about the number and types of the claims and experience data, therefore, must be used appropriately. These types of claims can be divided into two parts: accrued and unaccrued claims (Black and Skipper, 2000). The accrued liability refers to claims that already incurred and are due but unpaid because they are not yet reported. This part falls under the incurred but not reported liabilities. The unaccrued part refers to incurred and unreported claims which are not yet due, e.g. future disability income. The unaccrued liabilities are usually part of the last category of claim reserve, the reserve for amounts not yet due. This reserve is for all future unaccrued payments regardless of reported or unreported. Tabular methods are typically used to calculate these reserves (Lloyd, 2000).

Consider the following example to clarify the classification: A fabric worker is totally disabled on December 1st and his disability income plan provides a monthly replacement income of $1,500 subject to a 20 days elimination period. Assume December 31st is the valuation date, then the accrued payments at this day are $500 and $1,000 is unaccrued. In this case, $1,000 is the amount that is reserved for claims not yet due. If the claim is unreported as of the statement date then the liability for claims incurred but not reported is $500. On the other hand, if the worker already reported the claim, then the $500 is accounted as liability for claims in course of settlement or as liability for claims due and unpaid.

Claim reserves account for a large portion of the annual statement of health insurance companies. They are the largest position for group insurance contracts and substantial for individual health insurance contracts (Lloyd, 2000). Since individual health insurance policies have always a provision for renewability at the insureds decision and are calculated with a level premium, policy reserves represent probably their largest amount of the statement. Policy reserves are the amounts that are necessary to fulfill future contingent claims liabilities and are calculated similar to life insurance reserves using tabular methods. However, calculation of claim reserves is a lot more complex. Because of the large amounts in the annual statement they account for it is very important to establish them as precise as possible. Several methods are utilized to estimate claim reserves and basic approaches are now described. The paper by Lloyd (2000) outlines five basic approaches:

1. Direct Enumeration,

2. Projection Method,
3. Loss Ratio Method,
4. Tabular Method and
5. Development Method.

Direct Enumeration: This approach may be used if the number of claims is not exceedingly high, because the claim reserve is calculated for every claim individually. The direct way is to estimate the ultimate claim amount for every reported claim and deduct payments that have already been made. That demands a lot of experience because historical data and payments for similar claims must be applied to estimate the ultimate amount. Because of this, estimation is done by experienced claim examiners and the method is therefore referred to as examiner's method (Lloyd, 2000). Obviously, an almost complete inventory of settled claims is required. The majority of cases where this method is employed deal with very large catastrophic claims. Whatever claim reserves are estimated with this method, it is important that the present value of future contingent payments can easily be determined.

A second method for direct enumeration is the average claim method. Not every single reported claim is evaluated but the number of all reported claims is multiplied with an average claim amount paid in the past. Again, the amount already paid for the reported claims is deducted. This method is reasonable for open claims for which past claims provide a reliable experience (Lloyd, 2000).

Whatever method of the two mentioned above is used, it is important to pay additional attention to unreported claims because both described methods solitary take re-

ported claims into consideration. Reserves for unreported claims may be determined by loss ratio or per member per month (PMPM) cost estimates. This is reasonable if reported claims represent a major fraction of the claims reserve. Similar to the average claim method, the number of past IBNR claims could be multiplied with an average claim cost, subject to reliable experiences (Lloyd, 2000).

Projection Method: For situations in which the quantity of data or claims is very small this method is used to estimate the claim reserve. The idea is to determine an average claim cost per unit of exposure for claims incurred in the past. This rate is multiplied with the number of earned exposure units. As different health coverages may have different exposure bases this method needs to be applied several times. The amount for already paid claims is finally subtracted (Lloyd, 2000).

Loss Ratio Method: This method is similar to the above mentioned projection method. However, this approach does not rely on exposure units but on a projected loss ratio. The loss ration can either be estimated from historical data, i.e. the loss ratios of past incurred claims, or it may be an anticipated loss ratio from the pricing process. The loss ratio is thereafter multiplied with the earned premium and losses paid up-to-date are subtracted (Lloyd, 2000).

Tabular Method: Calculating reserves using the tabular method is similar to the process of estimating reserves in life insurance or policy reserves for long-term health insurance. The intention of the tabular method is to calculate the present value (i.e. including discounting) of future obligations for reported and adjudicated claims that are not yet due. This method is not applicable for unreported. The portion of the annual statement

for this part of the claims must be estimated using one of the other methods (Lloyd, 2000).

The tabular method makes use of continuance tables. These tables contain the probability of claim continuance according to the duration of benefit payments (Black and Skipper, 2000). For example, the probability of continuance of total disability may increase the longer the disability lasts. The probability of continuance must also consider the factors mortality and lapsation. Tabular method is typically applied to long-term claim payments characterized by a sequence of payments.

Bluhm (2003) describes a tabular method for the calculation of claim reserves for long-term benefits. This method is described in the following. Assume claim reserves for an open claim with monthly benefit payments shall be calculated. Open claims are claims for which benefits have already been paid and they will be paid no longer than the benefit period (BP). Then the claim reserve at policy duration *n* is

$$V_n = \sum_{t=n}^{BP} Benefit_t \cdot Continuance_t \cdot InterestDiscount_t$$

Observe that benefit payments are by no means constant, but may vary from month to month.

An example will illustrate the calculation. Assume an insurer wants to establish a claim reserve for a disability income claim with a monthly replacement income of $3,000. The policy has a two month elimination period and the benefits are paid for three month (this is rather the design of a short-term disability policy, but the assumption are sufficient for simplicity).

Let l_t be the number of individuals that are still disabled after a claim duration of *t* month and let $D_t = l_t \cdot v^{k/12}$ be the life commutation function on a monthly basis for an annual interest rate. Consider a sample continuance table calculated at an interest rate of 6 percent:

Table 3
Sample Continuance Table

Claim Duration (*t*)	l_t	D_t
0	1,000	1,000.00
1	900	904.38
2	820	828.00
3	760	771.15
4	720	734.12
5	700	717.20

Source: author's own calculation

This table can now be used to calculate the claim reserve at different durations, e.g. after two, three and four months.

$$V_2 = \sum_{t=3}^{5-1} 3{,}000 \cdot \frac{D_t + D_{t+1}}{2} \cdot \frac{1}{D_2} = 2{,}897.01 + 2{,}726.94 + 2{,}629.20 = 8{,}253.15$$

$$V_3 = \sum_{t=3}^{5-1} 3{,}000 \cdot \frac{D_t + D_{t+1}}{2} \cdot \frac{1}{D_3} = 2{,}927.97 + 2{,}823.03 = 5{,}751.00$$

$$V_4 = \sum_{t=4}^{5-1} 3{,}000 \cdot \frac{D_t + D_{t+1}}{2} \cdot \frac{1}{D_4} = 2{,}965.43$$

If a claim is reported and approved before the end of the elimination period which means that payments have not yet begun, one refers to this claim as a pending claim (Bluhm, 2003). A claim reserve can be calculated similar to a claim reserve for open claims. However, this calculation involves a factor that takes the probability that the claim will eventually receive a payment into account. The factor is determined by each company based on experience in past periods. This pending factor is multiplied with the reserve at the end of the elimination period. Assume a pending factor of 80 percent is used to determine the claim reserve during the elimination period for claims in the example from above. Then the pending reserve for a claim that is approved at the end of one month (i.e. during the elimination period) is

$$V_2 = 0.8 \cdot 8{,}253.15 = 6{,}602.52 \,.$$

Claims in course of settlement are also pending claims because payments have not yet begun. If a claim in course of settlement has already completed the elimination period at the valuation date then the claim reserve accounts for the accumulated value of past claim payments that have not yet been made because the claim is not yet approved. This

value is added to the present value of future claim payments before multiplying with the pending factor (Bluhm, 2003).

Development Method: Just as the tabular method the development method is designed to estimate claim reserves for incurred and reported but not fully paid claims. Other methods must be used to determine the portion for unreported claims (Lloyd, 2000).

The idea is to use known development patterns of claims to estimate the ultimate loss of a claim which is incurred but not completely paid. It is assumed that the historical data is predictive for future payments (Lloyd, 2000). The development pattern of claims can be described by development factors that are calculated as the ratio of payments in consecutive years or by completion factors which state the cumulative payment at a given date as percentage of ultimate losses. Either of the two patterns can be used to develop the ultimate claim loss. This method is also referred to as chain-ladder method (confer Brown, 2001) and shall be demonstrated with the following example.

To be able to estimate the ultimate loss it is important to know duration until claims are fully developed (Brown, 2001). Most health insurance plans have a specified benefit period, e.g. three years, and it can be assumed that all claims are fully developed after this time. For simplicity, in this example it is assumed that all claims are fully developed after six month. To study the development pattern of claims that incurred prior to the statement date the payments are summarized in a development triangle. Suppose claim payments in the six month prior to the statement date have been as follows:

Table 4
Claim Payments by Development Month

Month Incurred	Development Month					
	0	1	2	3	4	5
July	7,028	2,952	1,646	924	341	200
August	4,514	1,871	1,399	925	425	
September	3,232	1,879	972	376		
October	8,469	2,739	1,566			
November	8,412	2,350				
December	7,229					

Source: author's own calculation

To calculate the development and completion factors, cumulative claim payments are needed and arranged in the following Table 5.

Table 5
Cumulative Claim Payments by Development Month

Month Incurred	Development Month					
	0	1	2	3	4	5
July	7,028	9,980	11,626	12,550	12,891	13,091
August	4,514	6,385	7,784	8,709	9,134	
September	3,232	5,111	6,083	6,459		
October	8,469	11,208	12,774			
November	8,412	10,762				
December	7,229					

Source: author's own calculation

Claims that incurred in July are fully developed in December, i.e. after six month, by the assumption that all claims are fully developed after six month. That means that the ultimate loss for July claims is 13,091. The ultimate loss of claims that incurred after July is not yet known and, therefore, completion factors cannot be determined. By the assumption that July claims are fully developed, completion factors can be calculated and represent the ratio of cumulative claim payments to the ultimate loss (Brown, 2001), e.g. after three month $\frac{11{,}626}{13{,}091} = 88.81\%$ of the ultimate loss are developed.

Table 6
Completion Factors for July Claims

Month Incurred	Development Month					
	0	1	2	3	4	5
July	53.69%	76.24%	88.81%	95.87%	98.47%	100%

Source: author's own calculation

To determine the claim reserve an estimation of the ultimate losses is needed. Therefore, development factors for claim payments are calculated as the ratio of cumulative claim payments to cumulative claim payments in the previous period (Brown, 2001).

Table 7
Development Factors by Development Month

Month Incurred	Development Month				
	1/0	2/1	3/2	4/3	5/4
July	1.4200	1.1649	1.0795	1.0272	1.0155
August	1.4145	1.2191	1.1188	1.0488	
September	1.5814	1.1902	1.0618		
October	1.3234	1.1379			
November	1.2794				

Source: author's own calculation

The calculated development factors are the base for estimating future claim developments. However, the variety of development factors must be turned into a single month-to-month development factors. This is done by averaging the development factors for every month lag with a reasonable method (Brown, 2001). Many different methods are used, an arithmetic average being used in this example.

Table 8
Arithmetic Average of Development Factors

Month Incurred	Development Month				
	1/0	2/1	3/2	4/3	5/4
July	1.4037	1.1785	1.0867	1.0380	1.0155

Source: author's own calculation

Now, using the average development factors the development of claim payments for future months can be calculated to obtain estimated ultimate claim losses. This projected development is shown in Table 9.

Table 9
Estimated Future Claim Development

Month Incurred	Development Month					
	0	1	2	3	4	5
July	7,028	9,980	11,626	12,550	12,891	13,091
August	4,514	6,385	7,784	8,709	9,134	9,276
September	3,232	5,111	6,083	6,459	6,704	6,808
October	8,469	11,208	12,774	13,882	14,410	14,633
November	8,412	10,762	12,683	13,783	14,307	14,529
December	7,229	10,147	11,958	12,995	13,489	13,689

Source: author's own calculation

The last step is to determine the claim reserve by subtracting the amounts paid up-to-date from the estimated ultimate claim losses (Brown, 2001). The results are shown in Table 10.

Table 10
Estimated Claim Reserve per Month Incurred

Month Incurred	Estimated Ultimate Claim Loss	Amounts paid up-to-date	Claim Reserve
July	13,091	13,091	0
August	9,276	9,134	142
September	6,808	6,459	349
October	14,633	12,774	1,859
November	14,529	10,762	3,767
December	13,689	7,229	6,469

Source: author's own calculation

The total claim reserve is now calculated by summing up all single claim reserves for each month in which claims have been incurred:

$$\text{Total claim reserve at the end of December} = +142 + 1{,}859 + 2{,}767 + 6{,}469$$
$$= 11{,}237$$

4.1.2 Unearned Premium Reserves

Unearned premium reserve is a large position of the annual statement and is established to be able to pay a refund to a policyholder in case of cancellation prior to the end of the period for which premiums have been paid. It is the pro rata unearned modal premium that applies to the premium period beyond the valuation date (Black and Skipper, 2000).

The premium base is determined depending on the need for establishing a contract reserve (confer NAIC Model Law on Minimum Reserve Standards for Individual and Group Health Insurance Contracts, stated in Life & Health Valuation Law Manual, 1998, which is published by the American Academy of Actuaries). For a policy that requires establishing a contract reserve the premium reserve is based on the gross modal premium. The valuation net modal premium is the base in the other case. However, the gross modal unearned premium reserve is always a lower bound for the sum of the unearned premium reserve and the contract reserve.

The use of approximation methods to determine the unearned premium reserve is explicitly allowed by above mentioned regulation. One approach is to assume that premium due dates are distributed uniformly during the year. Then the unearned premium reserve is one half of the amount of the last premium collected.

4.1.3 Contract Reserves

A Contract reserve, also known as policy reserve or as active life reserve, is similar to a reserve established for life insurance products and is a fund where redundant early year's premiums are accrued to supplement the inadequate later year's premiums. This reserve is required for all individual and group contracts with level premiums and all other contracts that a renewable at the insured's decision (Black and Skipper, 2000). This includes disability income policies, long-term care policies and other long-term health insurance contracts, e.g. a guaranteed renewable medical reimbursement plans. All these types of policies have a long-term character in common because they typically provide

coverage to age 60 or 65 at a level premium determined at issue age. Premiums paid during the early years are higher than necessary to pay current claims but insufficient during the later years because of morbidity costs that increase with age. Because of this structure, a contract reserve could be compared with a reserve for a term life insurance to age 65.

The calculation of contract reserves must account for morbidity and lapsation rates in addition to mortality and interest rates on which the calculation of life insurance plans relies. Regulation prescribes minimum reserve standards concerning morbidity and mortality tables and a maximum interest rate. These standards are partially geared to life insurance regulation standards. The maximum permitted interest rate for contract reserves, for example, is the maximum interest rate that is permitted by law in the valuation of new life insurance and basis for mortality is a table permitted by law for the valuation of newly issued life insurance contracts (Black and Skipper, 2000).

Calculation of the contract reserve is performed using a prospective approach similar to life insurance, i.e. the reserve is the difference between the actuarial present value of future claim payments and the actuarial present value of future valuation net premiums. The minimum reserve is the reserve calculated on the two-year full preliminary term method. That means that insurers are allowed to use a one- or two-year full preliminary term method to establish the contract reserves (Black and Skipper, 2000). This modified reserving method does not require any reserve for the first one or two years of the policy period. This allows the insurer to use the first one or two premiums to pay for high acquisition expenses and any claims in these years. The offset to the net

level premium reserve at the end of the second or third year is amortized during the remaining term of the policy, i.e. the modified reserve is the net level premium reserve minus an unamortized expense allowance (Bowers, 1997).

4.1.4 Other Reserves

Especially for health insurance plans it is not unusual that claim costs increase with increasing policy duration. This upward trend is due to better medical technology and increasing costs for health care. Another example is disability replacement income that is based on current income levels. If income levels increase faster than calculated at issue the premium might be to low to cover the increased claim costs. A premium deficiency reserve may be established to account for this upward trend and for unusual occurrences. This reserve is calculated using a basic formula (Lloyd, 2000):

$$\begin{aligned}\text{Premium Deficiency Reserve} = {} & \text{Present value of future claim costs} \\ & + \text{Present value of future expenses} \\ & - \text{Present value of future premiums} \\ & - \text{Claim reserve} \\ & - \text{Unearned premium reserve} \\ & - \text{Contract reserve}\end{aligned}$$

A special reserve is established for group insurance plans. As mentioned in the chapter about the U.S. health insurance system, group insurance is often priced using experience rating. That means that the premium is adjusted at the end of a period depending on the claim experience in that period. The employer is held responsible for claim experience that is worse than expected and is given the financial benefit of a good claim experience in that specific period. An excess for good experience can be refunded or ac-

cumulated in a premium stabilization reserve. This reserve, for example, may be used to alleviate future bad experiences that would result in a rate increase. The premium stabilization reserve, also known as contingency reserve, is generally established by the following formula (Bluhm, 2003):

Premium Stabilization Reserve = Balance from prior period
+ Premiums earned during the past period
+ Investment earnings on money held
- Claims charged
- Expenses charged
- Risk Charge
- Premium Stabilization Reserve Addition
- Profit

An excess may be refunded only if the premium stabilization reserve maintains a certain minimum level.

4.2 Reserving in Germany

It is a characteristic of the German private health insurance system that contracts provide lifelong insurance coverage and are, therefore, operated on a long-term basis. Premiums are charged on a level basis although health care costs increase with age - even without consideration of a general inflation of health expenses. For that reason, insurance companies establish contract reserves to fund later expenses (Wolfsdorf, 1997). Claim reserves are also established but they play a minor role as described in the course of this section.

4.2.1 Contract Reserves

Due to level premiums, net premiums paid during the early policy years are higher than required to pay death claims at current age. Contract reserves are established by these redundant premiums to fund claim payments that exceed inadequate premiums in the later policy years.

Recall the equivalence equation that was used to determine the level gross premium:

$$G\ddot{a}_x = A_x + \alpha G + (\gamma + \Delta G)\ddot{a}_x ,$$

which is equivalent to

$$G = \frac{A_x}{\ddot{a}_x} + \frac{\alpha G}{\ddot{a}_x} + (\gamma + \Delta G) .$$

The term $\frac{\alpha G}{\ddot{a}_x}$ identifies the annualized sales commission and $\gamma + \Delta G$ is the amount of expenses paid at the beginning of each policy year. The annual expense amount is denoted by $C \coloneqq \gamma + \Delta G$. Then the contract reserve at policy duration m ($m \geq 0$) is defined as (Wolfsdorf, 1997):

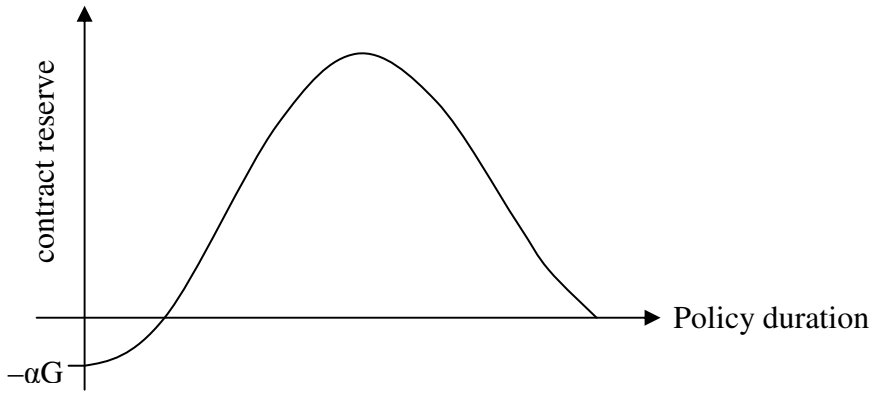
$${}_mV_x = \text{Actuarial Present Value of Future Claim Payments and Expenses} - \text{Actuarial Present Value of Future Premiums.}$$

Not only the gross premium is level, but it is also a common assumption (Wolfsdorf, 1997) that payments for annual expenses (excluding the first year sales commission) are level. Due to the equivalence principle, the contract reserve at issue ($m = 0$) is equal to 0:

$${}_0V_x = A_x + \alpha G + C\ddot{a}_x - G\ddot{a}_x = 0$$

Often a technical adjustment is made, assuming that sales commissions are paid before the first policy year. Then the contract reserve at issue is defined as ${}_0V_x = -\alpha G$. A hypothetical development of contract reserves is shown in Figure 2.

Figure 2
Hypothetical Development of Contract Reserves



The formula for contract reserves for $m > 0$ can be expressed in mathematical notation as:

$$\begin{aligned} {}_mV_x &= A_{x+m} + C\ddot{a}_{x+m} - G\ddot{a}_{x+m} \\ &= A_{x+m} - (G-C)\ddot{a}_{x+m} \end{aligned}$$

Recall, that the zillmerized premium is defined as the net level premium loaded by the annualized sales commission, in mathematical notation:

$$P^Z = \frac{A_x}{\ddot{a}_x} + \frac{\alpha G}{\ddot{a}_x} = G - C$$

Thus, the contract reserve can be expressed as

$${}_mV_x = A_{x+m} - P^Z\ddot{a}_{x+m}$$

and is therefore sometimes denoted as zillmerized contract reserve (Wolfsdorf, 1997).

The high sales commission that is paid to an agent at issue of the policy is annualized and successively paid off by the insured. This effect causes negative contract reserves in the early policy years and is a risk for the insurer. To limit this risk, regulation provides rules that prohibit negative reserves in the long run (BaFin, 2005a):

1. ${}_mV_x \geq 0$ for $m \geq \min\{15, \text{duration of contract}\}$
2. The aggregate contract reserve for all policies that are issued in one year has to be positive no later than four years after issue.

In case contract reserves are negative, they do not appear as a liability, but they are booked as a payment request on the asset side of the financial statement (Wolfsdorf, 1997).

Contract reserves are usually calculated for the end of a policy year. It is obvious that the financial statement is not always prepared at the policy anniversary. The amount that is stated in the statement has therefore to be estimated in some way. Two different approaches can be used (Wolfsdorf, 1997):

1. Contract reserves are determined for each policy individually. In this case, the contract reserve is determined at both the policy anniversary before and after the statement date. Then the stated amount is estimated by liner interpolation between these two amounts.
2. The contract reserve is determined at an aggregate level. It is assumed that policy issue dates are uniformly distributed over the year and thus on average issued at mid-year. Thus, the contract reserve is calculated as $\frac{1}{2} \cdot \left({}_mV_x + {}_{m+1}V_x \right)$.

4.2.2 Claim Reserves

According to Lloyd (2000, p. 14) "claim reserves are created when an event has occurred to create a claim obligation but complete payment has not been made as of the valuation date". However, in Germany the event that creates a claim obligation does not refer to begin of an illness, but to medical treatment. This is because claim payments are assigned to the date of treatment, not the beginning of an illness or the occurrence of an accident (Schneider, 2002).

Hence, insurance companies do provide reimbursement for expenses of medical treatment within the policy period, but not for the costs of any medical services received after termination of a contract, even if the illness occurred before the termination (Schneider, 2002). Consider the hypothetical situation that in insured is seriously injured and needs medical treatment for one year. If the insured cancels the policy for some reasons after six months, then the insurer does not pay for any treatments that the injured receives after six months.

In consideration of this provision, premiums for a year are assigned to the medical services received in that year, not to injuries or sicknesses occurring during that occur in that year. Consequently, claim reserves are established for outstanding payments that refer to medical treatments received in the accounting year before the valuation date, but that are not yet reimbursed (Schneider, 2002). By law, the claim reserve has to be estimated using a statistical approximation procedure that accounts for payments made in the first months after the valuation date (Bundesministerium der Justiz, 2005). According to the DAV (2005), the claim reserve is estimated by the following steps:

1. Look at outstanding payments in the first month after the end of the fiscal year (FY)
2. Calculate for the past three fiscal years the ratio of all payments made after the valuation date to the outstanding payments made in the first months after the valuation date:

$$\frac{\text{FY - payments made in the following years}}{\text{FY - payments made in the first months after the valuation date}}$$

3. Calculate the arithmetic average of the past three year's ratios.
4. Increase the actual payments made after the valuation date by the average value, i.e. according to the experiences of the three preceding years.

Assume an insurance company paid €10,000 for outstanding claim payments in the first months after the end of the accounting period. If the ratio of all payments made after the valuation date to the outstanding payments made in the first months after the valuation date is 1.45, 1.1 and 1.35 for the three fiscal years preceding the accounting period under consideration, respectively, then the arithmetic average of these ratios is

$$1/3 \cdot (1.45 + 1.1 + 1.35) = 1.3.$$

Hence the claim reserve that is stated in the balance sheet is

$$1.3 \cdot €10{,}000 = €13{,}000.$$

CHAPTER V

OVERVIEW OF LEGAL AND REGULATORY ENVIRONMENT

Activities in insurance markets are not performed in a theoretical environment, but require some forms of regulation to ensure financial solvency of insurance companies and to protect customers against misleading policies and against unexpected loss of coverage. This chapter gives a short introduction to some regulations that control the health insurance market in the U.S. and Germany.

5.1 Regulation in the U.S.

Insurance companies in the United States are regulated by both the federal and the state governments. Although the states have the primary responsibility for insurance regulation, the federal government supervises matters which are of national character (Black and Skipper, 2000).

5.1.1 State Regulation

The states of the U.S. control the insurance market in a variety of aspects of the insurance business. In an attempt to unify the regulation in different states, the National Association of Insurance Commissioners (NAIC) is a voluntary association of the state commissioners that drafts model legislations which are usually adopted by most states.

The coordinated regulation is especially important for multistate insurers doing business in several states (Black and Skipper, 2000).

Model regulations drafted by the NAIC are usually adopted by the states but not always. Some states do not adopt them and others adjust or rewrite them depending on their ideas. The model laws themselves have no authority (Black and Skipper, 2000). Model laws that are described in the following are therefore not representative for all states but they give some idea of the prescriptions. The greatest concern of insurance commissioners is to assure financial solvency of insurance companies. Therefore, insurers are required to establish adequate reserves and minimum standards were developed by the NAIC. The NAIC Model Minimum Reserve Standards for Individual and Group Health Insurance Contracts are intended to ensure this. This model law requires the insurance companies to establish reserves, and it is left to the insurer to determine adequacy of them (Bluhm, 2003). It states that "when an insurer determines that adequacy of its health insurance reserves requires reserves in excess of the minimum standards […], such increased reserves shall be held and shall be considered the minimum reserve for that insurer" (confer American Academy of Actuaries: Life & Health Valuation Law Manual, 1998). The model law specifies three categories of health insurance reserves, which are claim reserves, premium reserves and contract reserves. These reserves are described in further detail in the preceding chapter.

For all reserves, morbidity, interest and mortality bases are specified. For both individual and group contract health insurance benefits the model specifies different tables with morbidity data that are the minimum standards to calculate the reserves. For exam-

ple, the basis for contract reserves for hospital benefits, surgical benefits and maternity benefits are the 1974 Medical Expense Tables for contracts issued in or after 1982. The maximum interest rate is the maximum interest rate permitted by law for the valuation of life insurance. Except for long-term care, the base for mortality data is the mortality table permitted by law for the valuation of whole life insurance. For long-term care policies issued in or after 1997, the 1983 Group Annuity Mortality Table is to be used.

The model law also specifies reserve methods for the different categories of reserves. While the model states only general guidelines for claim and premium reserves, it specifies that contract reserves are to be calculated on the two year full preliminary term method. For long-term policies issued in or after 1992, reserves are calculated on the one year preliminary term method.

Another model is the NAIC Uniform Individual Accident and Sickness Policy Provision Law which is discussed in the book by Dearborn (1994). This model law states twelve required provisions that a policy must contain and ten other provisions which are optional. The twelve required provisions are as follows:

1. Entire Contract: This provision ensures that no changes can be made to the policy and any endorsements after the inception date.
2. Time Limit on Certain Defenses: This provision states that the policy is incontestable after three years. This does not apply for fraudulent misstatements unless the policy is guaranteed renewable. It is also stated that benefits for preexisting conditions may not be reduced or denied after the contestable period expires unless this conditions are not explicitly excluded from coverage.

3. Grace Period: Under this provision, a premium payment delay is accepted for a specified number of days. The minimum grace period depends on the mode of premium payments. For policies with weekly and monthly premium payments it is seven and ten days respectively and 31 days for other policies. The insured is still covered during the grace period and benefits for a claim must be paid, but may be reduced by delayed premiums.
4. Reinstatement: A policy that is lapsed because premiums are not paid until expiration of the grace period may be reinstated under certain conditions. First, the policyholder is required to pay the due premium and the policy is reinstated automatically if it is accepted by the insurance company. However, the insurer may require another application and provide evidence of insurability.
5. Notice of claim: The insured must file a claim within 20 days of occurrence, or as soon thereafter as is reasonable possible.
6. Claim Forms: The insurer has to provide the insured with a claim form for filing proof of loss. If the insurer fails to do so within 15 days, the claimant may file written proof in any form covering the occurrence, the character and the extent of the loss for which claim is made.
7. Proofs of Loss: The insured must provide the insurer with written proofs of loss within 90 days of loss occurrence, or as soon thereafter as is reasonable possible.

8. Time of Payment of Claims: This provision states that an indemnity will be paid immediately after the insurer receives proof of loss. Periodic payments must be paid at least monthly.
9. Payment of Claims: This provision specifies how and to whom benefit payments are to be made.
10. Physical Examination and Autopsy: The insurer has the right to examine the insured person at reasonable intervals and to make an autopsy in case of death at its own expenses.
11. Legal Actions: The insurer cannot take legal action against the insurer within 60 days following the supply of proof of loss. Legal actions are to be taken within three years thereafter.
12. Change of Beneficiary: The insured has the right to change designation of beneficiary at any time.

Among the ten optional model provisions is the Misstatement of Age provision. This provision allows the insurer to adjust benefits if the insured's age is found to be misstated. Under the misstatement of age provision, the benefit payable is the benefit that the premium would have purchased at the correct age (Dearborn, 1994).

Most of the above stated provisions also apply to group health insurance plans. Since group plans normally do not require the insured to provide evidence of insurability, group policies must include a provision that indicates under which circumstances evidence of insurability is required (Bluhm, 2003).

The last model law that will be mentioned here is the NAIC Group Coordination of Benefits Model. Group plans typically cover both the insured individual and dependent family members. To handle duplicate coverage situations, e.g. an individual is covered under two or more plans, the coordination of benefits (COB) rules were established. These rules coordinate which plan is primary in such situations. This plan covers all costs and the other plan(s) reimburse for expenses that are not covered or exceed the limits of the primary plan (Bluhm, 2003).

5.1.2 Federal Regulation

As mentioned earlier, the states have the primary responsibility for the regulation of the insurance business. Therefore, the federal government does not regulate the insurance companies directly but is does establish rules and regulations that are concerned with the insured's rights and protection with an emphasis on group insurance plans (Black and Skipper, 2000). Two important acts will be outlined in this section. Further information about the two federal laws can be found on the website of the Centers for Medicare & Medicaid Services (CMS) (http://www.cms.hhs.gov/hipaa).

Employees and dependents that are covered under a group health plan may loose their coverage for different reasons. In this case they are protected by the Consolidated Omnibus Budget Reconciliation Act (COBRA) that gives the right to temporarily continue the coverage that was provided through the group plan (Black and Skipper, 2000). However, COBRA does not apply to all employers and does therefore not protect all employees and their dependents. In fact, COBRA requires employers with 20 or more em-

ployees to comply with the act. Only certain circumstances and eligible persons qualify for continued coverage. Usually employees, spouses and dependent children who are covered under a group plan are eligible for COBRA coverage. The qualifying events and the length of COBRA coverage are outlined by Dearborn (1994):

1. The employee's employment is terminated for reasons other than gross misconduct: COBRA covers the employee, spouse and dependent children for 18 months.
2. The employee's working hours are reduced which results in termination from the plan: COBRA covers the employee, spouse and dependent children for 18 months.
3. Divorce or legal separation: COBRA covers the former spouse and dependent children for 36 months.
4. The employee dies: COBRA covers the spouse and dependent children for 36 months.
5. The employee become eligible for Medicare: COBRA covers the spouse and dependent children for 36 months.
6. A child is not longer dependent according to the plan definition: COBRA covers the child for 36 months.

Continued coverage makes sense, for example, in case of a job loss. The employee may have access to a new group health plan or obtain individual coverage, but the new coverage is often subject to new exclusions of preexisting conditions or new waiting periods. COBRA, in this case, can fill the gap of coverage. The coverage, however, is not pro-

vided automatically but the beneficiary must elect within 60 days to take COBRA coverage. The advantage for eligible persons is that they do not have to provide evidence of insurability if they want to continue coverage and the schedule of benefits is the same as if the qualifying event had not occurred. However, the premiums for COBRA coverage are usually not paid by the employee. The individual who continues coverage may be required to pay the whole premium for the coverage. This premium is the same as the total cost for the coverage before the qualifying event occurred and may be increased by two percent for administrative costs (Dearborn, 1994).

The recent Health Insurance Portability and Accountability Act (HIPAA) is also concerned with the problem of continued protection for insureds. Information about this Act can also be found on the website of the CMS (http://www.cms.hhs.gov/hipaa). For persons covered under a employer's group plan this act lowers the probability of losing existing coverage, supports an insured to change coverage and states that employees must be offered new coverage if they lose their existing coverage (Bluhm, 2003). The act also includes important rights for individual coverage. The overall focus of the act is to improve the insured's rights regarding portability, availability and renewability of health insurance coverage. HIPAA protects insureds who meet certain eligibility conditions. Some of the most important features of HIPAA are:

1. Pre-Existing exclusions are limited for group plans and not allowed for individual coverage.
2. Premiums may not be increased on individual basis due to bad health experience. Higher premiums may only be charged to a certain class of insureds.

3. Special enrollment opportunities are required for employees who change or lose their job. They must be accepted into a group plan or offered an individual policy.
4. Every small employer, i.e. 2-50 employees, must be able to purchase group insurance.
5. Group health plans must be renewed at the employer's decision. Only certain situations allow the termination of coverage, e.g. nonpayment of premiums or fraud.
6. Individuals that meet eligibility conditions must be able to purchase individual health insurance.
7. Individual health plans must be guaranteed renewable.

Altogether, HIPAA provides substantial improvements of the insured's rights and protection. However, it should be noted that HIPAA does not provide protection if an insured wants to change individual coverage.

5.2 Regulation in Germany

Insurance providers in Germany are regulated by federal law and supervised either by federal government or federal states (Länder). The providers of statutory health insurance, non-profit organizations under public law, are supervised by federal states and private insurance companies are supervised by federal government represented by the "Bundesanstalt für Finanzdienstleistungsaufsicht" (BaFin) which is the Federal Financial

Supervisory Authority (BaFin, 2005b). This section focuses on regulations concerning commercial insurance companies who offer private health insurance.

This pattern of supervision is in force since 1995 which was the year of insurance deregulation in Germany. Before 1995 private insurance companies were regulated and supervised by the federal government which, for example, prescribed insurance plans by model plans. The most important responsibilities of BaFin are stated by BaFin (2005b):

1. EU-Companies are supervised by their home country supervisory authority, i.e. BaFin supervises all private insurance companies that have their registered office in Germany.
2. Insurance plans must be presented to the BaFin, but need not to be approved. Some of the objectives of insurance supervision are to ensure that insurers charge appropriate premiums to be able to pay for promised benefits and that they establish adequate reserves. The requirement to submit new plans is part of this supervision.
3. BaFin is responsible to ensure financial solvency of insurance companies.

BaFin, furthermore, is responsible for the authorization process of companies that want to engage in insurance business and it ensures that insurance companies comply with statutory and regulatory requirements (BaFin, 2005b).

The main statutory regulations are found in the Insurance Supervision Act (Versicherungsaufsichtsgesetz – VAG; BaFin, 2005c), the Insurance Contracts Act (Versicherungsvertragsgesetz – VVG; BaFin, 2005e)) and the Commercial Code (Handelsgesetzbuch – HGB; Bundesministerium der Justiz, 2005). Further specifications are made

by the Calculations Directive (Kalkulationsverordnung – KalV; BaFin, 2005a) and the Accounting Directive (Versicherungsunternehmens-Rechnungslegungsverordnung – RechVersV; BaFin, 2005d).

The Insurance Supervision Act states the most important requirements for health insurance companies. Some of them are the following:

1. Substitutive health insurance must be operated similar to life insurance. That refers to the requirement of decrement tables, adequate use of experience data for morbidity assumptions and the use of lapse. These assumptions must be used to calculate premiums and reserves similar to life insurance. There is an upper limit of 3.5 percent for the interest rate.
2. Insurance companies cannot cancel the contract. This is to ensure lifelong protection because it is almost impossible to return to the statutory system. However, the insurer reserves the right to change premiums under certain conditions.
3. Premiums may be changed in the case of a change of health expenses. Real claim payments must differ from the actuarial assumption by more than 10%. Of course, this usually applies to an increase of health expenses and a raise in premiums. However, an independent trustee has to approve adequate and correct calculation of premiums and to agree to the premium changes (Schneider, 2002).
4. An insured has the right to switch to a similar plan and having the contract reserve credited for the new premium. That makes it possible for the insureds to

change to newly introduced plans if they are similar and charge lower premiums. Elderly insureds have no chance to pay lower premiums otherwise. The fact that premiums for new contracts are, among other things, based on the entry age prevents elderly insureds from receiving coverage at a similar rate to the current premium. However, the new plan must be similar to the current one; otherwise the insured will lose the accrued contract reserves (Schneider, 2002).

5. The same actuarial bases of calculations must be used for old and new customers. In particular, premiums for new contracts may not be lowers as they would be for existing coeval customers without taking their contract reserves into account (Schneider, 2002).
6. Insureds have to pay a loading of ten percent on their premium. This loading is charged at the ages of 21 through 60. This extra charge has to be used to increase reserves and to lower premiums after the age of 65.
7. The insureds must be credited for at least 90 percent of the interest surplus exceeding the actuarial assumptions. These dividends are used to mitigate premium rises or even to lower premiums.

The Insurance Contracts Act specifies certain requirements for contracts. Among many others, the following specifications are made:

1. The insurer has the obligation to pay for promised benefits.
2. The waiting time for medical expense insurance may not exceed three months and it may not exceed three years for long-term care insurance.

Special requirements for the determination of contract and claim reserves are stated by the Commercial Code and specified by the Accounting Directive. The Commercial Code defines the explicit obligation to establish claim and contract reserves. The Accounting Directive, for example, explains the method of determining claim reserves that is described in the preceding chapter.

An important part of the regulation is the Calculations Directive which defines the methods and parameters for the determination of premiums and contract reserves. Important specifications are:

1. The types of actuarial bases of calculations are specified. These bases are mentioned in Chapter III in connection with the calculation of premiums. It is furthermore prescribed that all bases of calculation must be determined conservatively. The upper limit for the interest rate is 3.5 percent
2. It is specified that the same bases of calculations must be used for the determination of premiums and reserves (Schneider, 2002).
3. The gross premium must include a contingency loading of at least five percent.
4. Sales commissions may be included using the method of Zillmer, i.e. the costs are annualized and successively paid off by the insured. Limits for the use of this method are defined and explained in Chapter IV.
5. Calculations must assume expenses as unit costs independent of age. Only an additional charge to finance the standard plan (confer Chapter III) may be included as percentage of premium.

Some of the above mentioned regulatory requirements deal with two problems of the private health insurance market (Schneider, 2002):

1. The fact that it is unfavorable to change the insurer with increasing duration of the policy and
2. The problem of increasing health expenses and therefore increasing premiums.

The first problem is approached by the requirement of the same actuarial bases of calculations for old and new customers. This is to prevent old customers from being at a disadvantage if low premiums are offered to new customers. Insurers compete almost solely for new customers who do not have private health coverage yet. This fact provides an incentive for the insurance companies to offer very favorable premiums to new and young customers (Schneider, 2002).

Another way to deal with this problem is the requirement to offer the right of plan switch. If there is an insurance plan which is similar to the one of the insured, than the insured can switch to this plan and accrued reserves are taken into account. This ensures that old customers can switch to new plans with lower rates. Both approaches intend to put old insureds on par with new ones (Schneider, 2002).

The second problem of increasing premiums is approached by several of the above mentioned regulations. Schneider (2002) identifies five regulations to achieve a premium discharge:

1. The ten percent loading on the premium is solely used to increase reserves and lower premiums as from the age of 65.

2. Interest profits must be used to finance premium increases and, if possible, to lower premiums for the elderly insureds.
3. The assumption of unit costs ensures that elderly insureds do not have to bear higher-than-average expenses.
4. Insurance companies must offer a standard plan. This plan provides benefits that are similar to the statutory insurance and premiums are equal to the average maximum contributions of the statutory system (Schneider, 2002). All insureds that are older than 65 have the right to switch to this plan.
5. According to Schneider (2002), insurance companies have the obligation to inform elderly insureds about plans with benefits that are equal to the insured's benefits and lower premiums.

CHAPTER VI

ESSENTIAL DIFFERENCES AND SIMILARITIES OF THE TWO SYSTEMS

Both, the United States and Germany have a system of health insurance which covers most parts of the population, but they differ in the way how this coverage is provided. Germany has a long tradition of statutory health insurance which is compulsory for all employees and provides comprehensive coverage with a broad range of benefits. This compulsory coverage does not include high income employees who may choose to opt out of the statutory system, civil servants and self-employed individuals. Not only the employees but also their dependent spouse and children as well as unemployed people are covered by the statutory system. This explains that more than 90 percent of the population in Germany is covered by statutory health insurance (confer Colombo and Tapay, 2004). The remaining part of the population is almost completely covered by private health insurance on a voluntary basis. Only a very small number of individuals have no health insurance at all.

On the other hand, compulsory health insurance coverage is virtually not existent in the United States. The only compulsory contributions are made by employees to finance the Medicare program which provides basic health coverage for people aged 65 and above. The most important source of health coverage in the United States is an employment based plan. More than 60 percent of the population is covered by such form of

health coverage (DeNavas-Walt, 2004). Statutory health insurance is provided only for elderly people (Medicare) and the needy (Medicaid). Therefore, just slightly more than 26 percent of the population has access to some form of governmental coverage, whereas almost 70 percent has some form of private insurance. More than 15 percent are not covered by health insurance (DeNavas-Walt, 2004).

The high percentage of people who have private health insurance in the U.S. can be explained with the presence of employment based health insurance (confer OECD, 2004). This is a cheap form of gaining health insurance for employed people because 26.6 percent of the employees did not contribute to the employers plan in 2002. Moreover, among all covered employees only 17.7 percent of the single premium was contributed by them (Crimmel et al., 2004). Though this values are unfavorably changing, they are still pretty nice compared to Germany because all employees who are covered by the statutory system have to make contributions and the percentage of the total premium they contribute is 50 percent. Moreover, private health insurance may not be sold on a group basis (Schneider, 2002), but is rated on an individual basis. The employer contributes at most 50 percent of premiums for private health coverage.

In the United States, the majority of population is covered by a private health plan, but the expenditures on public health exceed expenditures on private health insurance. 44 percent of total health expenditures are spend for public health; whereas some 35 percent are spend for private health insurance. The situation is different in Germany: statutory insurance covers 90 percent of the population but only 75 percent of total health expenditures are spend for public care (OECD, 2004). This is a result of high health care

costs for private plans because better benefits are provided and fees for medical treatment are higher.

Private health insurance is a source of primary coverage in the United States and Germany. However, in the U.S. it is a form of principal coverage, whereas private coverage in Germany is a substitute to the statutory coverage (confer Colombo and Tapay, 2004). Private health insurance can also be purchased as a supplement to basic coverage. In the U.S., for example, Medicare is designed to provide basic coverage with relatively high out-of-pocket expenses. Private health insurance companies offer plans to fill gaps of Medicare. If private health insurance is purchased as supplement in Germany, it is designed to enhance the benefits of the statutory insurance (e.g. better accommodation). The percentage of people who have private health insurance as a supplement is almost equal to the percentage of people who have it as substitutive coverage, namely about 9 percent (confer Colombo and Tapay, 2004).

A special feature distinguishes the U.S. private health insurance market from the German one: the existence of health service providers. Service providers are health insurance providers that provide prepaid benefits on a service-type basis, i.e. the insured is not reimbursed for medical expenses, but benefits are provided in the form of medical services. This is also the characteristic of the statutory system in Germany, but no private health coverage provider offers this system. Privately insured people in Germany are always reimbursed for their incurred expenses. Some Health Maintenance Organizations (HMO) are special type of service provider because they are a closed network of health care providers. These organizations employ their own doctors and health care facilities

and control the health care of the insureds. The insureds are a member of the HMO and pay relatively low premiums. The HMO, in return, stresses preventive care and forces the insured to visit a primary care physician at first with any health problem. They, furthermore, try to lower expenses by providing health services from one source and transferring risk to the health care providers. Such forms of health care are unknown in Germany. The only sources of private health insurance are private insurance companies.

In Germany, the statutory and the private health insurance system exist side by side. Private insurance companies offer substitutive health insurance coverage for all individuals who are not covered by the statutory system. In contrast to this, providers of private health insurance in the U.S. offer protection up to age 65 and people are covered primarily by Medicare – which is a statutory program – thereafter. Consequently, there is no problem of switching between the statutory and the private system. This is a basic problem of the German system: individuals who have private health insurance can hardly return to the statutory system. As a result of this, private insurance has to provide basic features that are typical for the statutory system: lifelong protection with premiums that are independent of the insured's current age. This is different in the U.S. system: individual policies typically provide coverage up to age 65 because they are guaranteed renewable, but there is no protection thereafter. The situation is a little bit different for people who are covered by a group plan. These plans are renewed annually and the insured can lose coverage if the contract is not renewed or – if it is an employment based plan – in case of job loss. Continuation and portability of the coverage is ensured by the Health

Insurance Portability and Accountability Act (confer Chapter V) under these circumstances.

Both individual health insurance in the U.S. and Germany are rated similar. In both cases, level premiums are determined individually based on the principle of equivalence. Another similarity is that premium calculation accounts for the probability of decrement by lapsation because no non-forfeiture benefits are provided. Level premiums account for increased health care costs at later ages. Therefore, contract reserves are established to fund insufficient later premiums. However, both systems do not account for a general inflation of health expenses. Premium adjustments in the U.S. are possible annually at the policy's anniversary. The insurance company has the right to raise premiums for a whole class of insureds, but not on an individual basis because of bad claim experience. Premium adjustments in Germany are also possible but a little bit more difficult because the claim experience must differ from the actuarial assumptions by more than ten percent and a trustee must approve changes of the premium.

The importance of claim reserves is significant in the United States because claim payments are assigned to the beginning of illness, not to the date of treatment which is done in Germany. Contract reserves are larger for individual contracts than for group plans, but claim reserves are still very important. Therefore, claim reserves are the most important reserves for the private health insurance sector in the U.S., whereas contract reserves are most important in Germany.

The majority of the U.S. population is covered by an employment based group plan which is typically rated by experience rating. This reveals a basic fact: premiums

may vary a lot and insureds cannot rely on a certain level of premiums. This is somehow also true for individual private health insurance because insurers may change premiums each year if they do this for a whole class of policies.

In Germany, private health insurance is operated similar to life insurance because of the lifelong coverage character. This is also true for the calculation of premiums and reserves of individual private health insurance contracts in the U.S. because they are also determined by the equivalence principle. In contrast to this, group insurance in the U.S. is re-rated each policy anniversary. Hence, the character of group insurance rating is similar to property & casualty insurance.

To conclude, the U.S. and German health insurance systems have many differences and some similarities – in particular individual private health insurance is operated similar. Germany has a large system of statutory insurance which covers the majority of the population and provides comprehensive benefits, whereas the statutory system in the U.S. is restricted to the elderly and needy people. Especially Medicare provides basic coverage only. Supplementary coverage must be purchased from private insurance companies. Nowadays, the government offers plans that fill the gaps of Medicare. The majority of the U.S. population is covered by private employment based group insurance plans. This form of private health insurance, in turn, is not allowed and consequently not existent in Germany. Private health insurance is solely offered on an individual basis. The existence of service providers in the U.S. market is also a major difference.

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