

Morbidity-based risk adjustment in the Netherlands

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The author Rudy Douven works as a health economist at CPB Netherlands Bureau for Economic Policy Analysis. The Dutch Health Insurance Board (CVZ) is gratefully acknowledged for providing data for this study. The author has written the paper as a private citizen and remains responsible for the contents of this study.

Abstract/Summary

In the Dutch social health insurance system, health insurers operate in a managed competition framework. Essential features of this framework are open enrolment, community rating and risk adjustment. The objective of this paper is to show the progress of the Dutch risk-adjustment system and how it affected health insurers' annual profits and losses. Major steps forward in the Dutch ex-ante risk adjustment occurred in 2002 and 2004 with the introduction of two morbidity-based risk adjusters: pharmacy-based cost groups (PCGs) and diagnostic cost groups (DGCs), respectively. PCGs measure outpatient morbidity based on prior use of prescribed drugs, and DGCs measure inpatient expenditures based on hospital diagnoses. After the inclusion of both risk adjusters, the Dutch ex-ante risk adjustment can explain more than 20% of the overall variation in annual spending among individuals. The improvements in the ex-ante risk-adjustment scheme went along with a policy of lower ex-post payments, thereby increasing health insurers' financial risks. The empirical analysis shows that, during the years 2002-2004, ex-ante risk adjustment reduced the profits and losses of health insurers by about 60%. This implies that, even on average, predictable healthy and unhealthy people were unevenly distributed among health insurers. The ex-post payment schemes have reduced the possible profits and losses of health insurers further. Ultimately, the application of ex-ante and ex-post payment schemes reduced the possible profits and losses of health insurers by more than 80% almost every year during 1993-2004, compared to situations without any risk adjustment.

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1 Introduction

For many years, Dutch health insurance for basic cure services consisted of a two-pillar system. One pillar consisted of the social health insurance system for people in the lower income brackets, and the other pillar was the voluntary private health insurance system for people with higher incomes. In 2006, the Dutch government implemented radical market reforms and the two pillars became one: one mandatory national health insurance system.

The key idea of the market reforms is to increase efficiency by promoting more competition among health insurers as well as health care providers. The new Health Insurance Act creates many more opportunities for health insurers to improve efficiency. Firstly, the new Health Insurance Act falls under the Third Insurance Directive of the European Commission's competition law. Former social health insurers now have to compete with for-profit insurers, and new (international) insurers may enter the market. Secondly, the new system creates many more opportunities to health insurers to offer preferred provider arrangements and to manage care. Also, on the supply side, major reforms are taking place. Hospitals are no longer budgeted for providing health care services and will have to negotiate more and more with health insurers about volume, price and quality of care. The Dutch Competition Authority is also becoming more active, for example in judging intended mergers or preventing provider and insurer cartels.

Introducing more competition into the health care market is not without risks, as it may threaten solidarity. To preserve solidarity for the basic benefit package, health insurers are obliged to charge a community-rated premium, and to accept all eligible applicants during annual open enrolment periods. These restrictions on the premium may create predictable losses for health insurers on enrollees with predictably high medical expenditures. Therefore, the Dutch government implemented a system of risk-adjusted premium subsidies that compensate health insurers for enrollees with predictably high medical expenditures. The objectives of the Dutch risk-adjustment system are twofold. The first objective is to create a level playing field for insurers, and the second objective is to reduce incentives for risk selection. The functioning of the Dutch risk-adjustment system will be the main subject of this paper.

The Dutch government gained much experience with risk adjustment in the Dutch social health insurance system when it introduced the first rudimentary risk-adjustment system in 1991. Much progress has been made over the past sixteen years, and the risk-adjustment system has been further expanded and refined. In this paper, I report on the evolution of the risk-adjustment system. I will pay special attention to the two morbidity-based risk adjusters, Pharmaceutical Cost Groups (PCGs) and Diagnostic Cost Groups (DCGs), which the Dutch government introduced in 2002 and 2004, respectively.

The paper is organized as follows. In section two, I discuss some key elements of the financing system in the Dutch social health insurance system, which also resembles to a large extent the financing system of the new health insurance system after the health care reforms in 2006. In section three, I explain the inclusion of the various risk adjusters and show that the Dutch risk adjustment has been continuously improved. In section four, I explain the ex-post payments, or risk-sharing arrangements, and I show that improvements in the

ex-ante risk-adjustment system were attended by an increase in insurers' financial risk. In section five, I present some practical aspects of the risk-adjustment system, and in section six, I show how risk adjustment affected the market position of health insurers. Finally, I discuss the future of the Dutch system and draw some lessons in section 8 from the Dutch experience, which may be useful when considering the situation in Germany.

2 The Dutch social health insurance system

2.1 Introduction

The Dutch system for health insurance is divided into three “compartments”.

The first compartment is a compulsory national health insurance scheme, the so-called AWBZ or Exceptional Medical Expenses act. This scheme provides coverage to the whole population against catastrophic risks such as hospital care exceeding one year, long-term nursing home care, long-term institutional care for mentally and physically handicapped people, as well as daily home care, mostly for elderly people. The AWBZ is tax-financed with some co-payments. In 2003, health care expenditures in the first compartment came to about 20 billion euros, or 45% of total health care expenditures.

The second compartment consisted for a long time of a two-pillar system: the Dutch social health insurance, also known as sickness fund insurance, was mandatory for people in the lower income brackets (about two-thirds of the population). This social insurance system operated alongside a voluntary private health insurance system for people with a higher income (about one-third of the population). The second compartment covers care by general practitioners, short-term care in hospitals, pharmaceuticals and various types of ambulatory care. Although there are many differences in the social and private health insurance schemes, in general all people received the same quality of health care services. In 2003, health care costs of the second compartment amounted to about 23 billion euros, or 53% of total health care expenditure. As of 2006, the new health insurance system is called ZVW (VWS, 2006).

The third compartment consists of other types of health care, such as luxury care, various types of dental care and physiotherapy. For these health services, people may buy supplementary insurance. In the social health insurance, more than 90% of the population had some form of supplementary insurance. Before 2006, only private health insurers were allowed to offer supplementary insurance. The money spent on the third compartment in 2003 was about 1 billion euros, or 3% of total health care expenditure.

In the remainder of this section, I will briefly discuss the major players in the Dutch social health insurance system, the suppliers of health care, the social health insurers or sickness funds and the health care financing system.

2.2 The suppliers of cure services

In the Netherlands, general practitioners function as gatekeepers for all cure services. A referral from a general practitioner is a necessary requirement for obtaining medical services from a specialist. For a long time, general practitioners received a uniform annual fee for each enrollee in the social health insurance system and a fee per visit for enrollees in the private health insurance system. Together with the introduction of the new health care system in 2006, the financing system changed as well and most general practitioners receive a mixed payments system: a uniform fee for each person combined with a fee per visit.

The law still prohibits for-profit hospitals in the Netherlands, and private non-profit foundations own most hospitals. The government reimburses hospitals for their fixed (capital) costs and hospitals negotiate with insurers about their variable costs. For a long time, hospitals operated under a global budget but this produced growing waiting lists. In 2001, the global budget was suspended and hospitals were reimbursed for most services. This change boosted hospital production and volume growth increased by about 5% per annum until 2004 (Douven et al., 2006). Recently, the government introduced a new administration system based on costs per treatment (known as the DBC-system). Since 2005, hospitals and insurers negotiate on volume, price and quality of about 10% of the hospital services. The other 90% of hospital services is still regulated by the government, but the Minister of Health intends to liberalize hospital services further and, in the future, hospitals and insurers should negotiate on 70% of hospital services (Tweede Kamer, 2006a). The government lessened regulation for the construction of new hospitals and other types of hospital investments. More reforms to promote competition are on the way. There is discussion about the introduction of a new hospital payment system (CTG/ZAIO, 2006) and, in the near future, the government may allow for-profit hospitals to enter the market.

2.3 Social health insurers

Under the social health insurance system, insurers or sickness funds provided 'in kind' insurance. This means that enrolees were entitled to receive care while the payments went directly from the social health insurers to the health care providers. The coverage of care, the so-called 'basic benefit package', is determined each year by the government. While in the past the basic benefit package was clearly defined, in recent years health insurers have acquired more and more flexibility to determine the entitlements of their enrolees (Van de Ven et al. 2004).

All social health insurers were non-profit insurers. A non-profit insurer can generate profits to improve the organization, to build up reserve capital or to lower premiums. However, non-profit insurers may not distribute profits to shareholders, as is the case of for-profit insurers. The government regulated the amount of financial reserves insurers were allowed to hold. Health insurers' financial reserves had to meet a certain minimum solvency margin and, since 2001, the law has additionally required a maximum margin to a social health insurers' financial reserve.

During the 1990s, the social health insurance scheme was profoundly reformed by the introduction of more competition. After 1996, health insurers were allowed to set different out-of-pocket or nominal premiums, but the nominal premium had to be equal for enrolees affiliated with the same insurer (community rating). During the period 1996-2004, competition among social health insurers was limited and the most important drivers for premium setting were the legally specified minimum and maximum levels of the financial reserves (Douven and Schut, 2006). Research also showed that competition is likely to be weak in the social health insurance system because of the low price sensitivity of consumers (Schut and Hassink, 2006; Van Dijk et. al. 2006). This latter observation is in sharp contrast to the observed consumer mobility in 2006. After the introduction of the new health care system, about 20% of the total population changed health insurers (Vektis, 2006).

The basic idea of competition is to promote efficiency and service. Whether efficiency and service in the social health insurance system have improved since introducing more competition is difficult to say. The problem with efficiency is that it is extremely hard to measure, and some signs even point in the wrong direction. For example, although health plans received some room for selective contracting and managing care, health insurers hardly used these opportunities (CTZ, 2004, CTZ 2005). On the other hand, there is also no evidence that competition provoked serious risk-selection activities by social health insurers (CPB, 2003).

Some basic features of the Dutch social insurance market are presented in table 2.1. Over the period 1993-2005, the number of health insurers decreased, particularly during the first years of the new millennium. Almost all insurers leaving during the sample period merged with other insurers, while new insurers entering always started with a relatively small number of enrollees. The data show a clear trend of health plans becoming larger and the market becoming more concentrated. This is confirmed in the last row by the concentration measure HHI (Herfindahl-Hirschmann index), which shows an upward trend.

Table 2.1 Number and size of Dutch social health insurers during 1993-2005

Years	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Population size (millions)	9.4	9.6	9.7	9.8	9.9	9.9	9.9	10.3	10.3	10.2	10.1	10.2	10.1
Total number of insurers	25	25	26	27	29	29	29	26	24	21	21	21	21
Number of health insurers leaving	2	0	1	0	0	2	0	3	2	4	0	0	0
Number of health insurers entering	2	0	2	1	2	2	0	0	0	1	0	0	0
Insurers with enrollees > 100,000	22	21	21	21	21	19	19	19	18	15	15	15	15
HHI*	572	566	625	622	622	663	663	707	711	893	886	878	870

* The HHI is equal to the sum of the squared market shares of all health plans

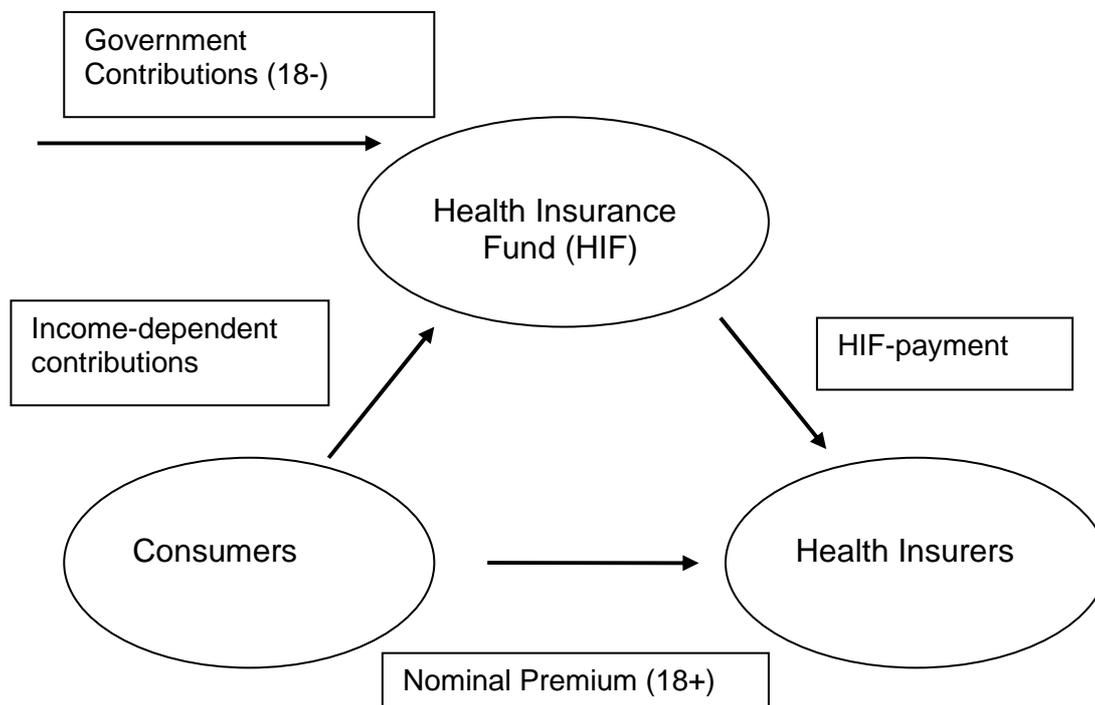
2.4 The health care financing system

Figure 2.1 illustrates the scheme for the Dutch health care financing system. The government administers the health insurance fund (HIF). The HIF collects money from the consumers and from the government (for example for expenditure on children under eighteen, or additional governmental contributions to the HIF).

In the left part of the figure, all consumers must pay an income-dependent contribution levied by the tax collector. These contributions reflect the income-solidarity contributions of the consumer, and it enables the government to control the income solidarity of the system.

In order to stimulate insurers to become more efficient, the Dutch government introduced elements of regulated competition into the system. This is visible in the lower part of figure 2.1. All enrollees pay a nominal (community-rated) premium directly to the health insurers. Health insurers are not allowed to differentiate their nominal premium across different risk categories. Thus, all

Figure 2.1 The Dutch health care financing system



enrolees under contract with the same insurer (except children under eighteen, for whom health care is free) pay identical nominal premiums. Since 1996, nominal premiums may vary among insurers. This enables insurers to compete on nominal premiums. This element of regulated competition is expected to increase the efficiency efforts of insurers. Less efficient insurers will arguably have higher expenditures and will therefore have to set higher community-rated premiums than more efficient insurers.

Broadly speaking, the total expenditures of supplying health care should equal total income-dependent contributions plus total nominal premiums. Since the government controls the size of the income-dependent contributions, it controls to a large extent the size of nominal premiums as well. Among the political parties and health care economists as well, there still exist different views about the optimal size of the nominal premium (and the optimal size of the income-dependent contributions).

Table 2.2 shows that before 1991 there were only income-dependent contributions. After the introduction of regulated competition in the social health insurance system in the 1990s, the government increased, especially recently, the size of nominal premiums that consumers had to pay (and thereby decreased income-dependent contributions). Under the new health care system, the law requires (of health care suppliers and health insurers) that 50% of all expenditures must be paid by income-dependent contributions and 50% by nominal premiums.

The HIF collects the income-dependent contributions and reimburses them to the health insurers. This is visible in the right-hand side of figure 2.1. The government distinguishes between two types of HIF payments: risk-adjusted ex-ante (prospective) payments and ex-post (retrospective) payments. The ex-ante risk-adjusted payments are capitation payments, which are based on the risk factors of an enrollee.

Table 2.2 The share of total nominal premiums in total expenditures and annual mean nominal premiums*

Year	1990	1991	1995	1996	1998	2001	2003	2005	2006
Share (%)	0%	11%	8%	10%	5%	8%	13%	17%	50%
Annual mean (euros)	–	103	90	153	108	346	344	386	1,030

*Numbers are approximate. Up to 2005, the numbers refer to the Dutch social health insurance system.

2.4.1 How does the government calculate the risk-adjusted payments?

Each year before the first of October, the Dutch government has to determine the ex-ante risk-adjusted payments to the health insurers for the following year. This process contains several steps:

Step 1

A prediction of total expected health care expenditure for the following year (the so-called ‘macro budget’, or ‘acceptable costs’ (Van de Ven and Ellis, 2000). The government bases its predictions of the macro budget on forecasts of CPB, an independent governmental research bureau for economic policy analysis.

Step 2

The government determines the income-related contributions for the following year. This yields the so-called ‘administrative premium’. If all health plans charge the administrative premium as their nominal premium, then total income-dependent contributions plus total nominal premiums would equal the macro budget.

Step 3

The government determines its risk-adjusted capitation payment for each person in the population, such that the sum of payments for all people equals the macro budget. The risk-adjusted capitation payments should reflect all risk factors the government desires for solidarity.

Step 4

The government predicts the number of enrollees for each health insurer (and corresponding attributes for performing risk adjustment). Next, a health insurer receives its risk-adjusted capitation payments for each person (see step 3), minus the administrative premium (see step 2). The sum of all these payments is the health insurers’ risk-adjusted budget for the following year. For health insurers, these ex-ante risk-adjusted budgets form the starting point for setting their nominal premiums (around November).

Step 5

Since people may change health insurers, the government recalculates the health insurers’ risk-adjusted budget according to the correct number of

enrolees of an insurer. These recalculations occur after the annual open enrolment period. At a later point in time, if actual health care expenditures become known, then the settlement of the ex-post payments takes place. In 2006, the Dutch government decided for the first time to also recalculate health insurers' budgets according to actual total health care expenditures (in case actual total health care expenditure deviates from the macro budget or predicted total expenditure in step 1). In general ex-post recalculation of the macro budget leads to a better distribution of the risk-adjusted payments among health insurers (Douven, 2004).

3 Risk adjusters in the Dutch risk-adjustment system

In the section, I explain which risk adjusters the government uses to calculate the ex-ante risk-adjusted capitation payments. The Dutch government has also introduced retrospective payment schemes to reduce possible risk-selection activities by health insurers. This will be the subject of section 4.

3.1 The evolution of risk adjusters in the Netherlands

Table 3.1 presents an overview of risk adjusters used over the years. The first two years, 1991 and 1992, were trial years. In 1991, there was only one risk adjuster: 'historical expenditures' or prior yearly expenditures of a health insurer. The prior yearly expenditures were not determined at the capitation level but at the insurer level. In 1992, the Dutch government introduced for the first time the two normative risk adjusters 'age' and 'gender'. Both risk adjusters were only used for 20% of the macro budget and 80% was still explained by 'historical expenditures'. 'Historical expenditures' were abandoned and, from 1993-1994, the risk-adjusted capitation payments were determined only by 'age' and 'gender'. Further refinements took place gradually. First of all, health care expenditures were split up into different categories (see also section 4). For example, in 1998, the macro budget consisted of four types of different budgets: fixed and variable hospital outlays, specialist medical care and other medical outlays. The risk-adjusted capitation payments were determined for each budget separately. For each budget, the same risk adjusters were used, but with different weights. The number of risk adjusters increased over the years as well. During 1995-1998, two additional risk adjusters were introduced in addition to 'age' and 'gender'. The risk adjuster 'urbanization' relates individual health care expenditures to the degree of urbanization of a region in which an individual is living, and the risk adjuster 'income' relates individual expenditures to the type of income an individual is receiving. During 2000-2001, 'historical expenditures' were re-introduced, but abolished again in 2003. Substantial improvements occurred after 2001. In 2002, the government introduced the first morbidity-based risk adjuster: pharmaceutical cost groups (PCGs), which improved the

Table 3.1 Risk adjusters in the Dutch risk-adjustment system

Year	Risk adjusters
1991	Historical expenditures
1992	Historical expenditures, age, gender
1993-1994	Age, gender
1995-1998	Age, gender, urbanization, income/disability status
1999	Age, gender, urbanization, income
2000-2001	Age, gender, urbanization, income, historical expenditures
2002	Age, gender, urbanization, income, historical expenditures, pharmaceutical cost groups
2003	Age, gender, urbanization, income, pharmaceutical cost groups
2004-2006	Age, gender, urbanization, income, pharmaceutical cost groups, diagnostic cost groups

predictions, especially for the chronically ill. In 2004, the second morbidity-based risk adjuster, diagnosis expenditure groups (DCGs), was added. In the following sections, I discuss each risk adjuster in succession.

3.2 Age and gender

The most common risk adjusters are age and gender. In all countries that apply risk adjustment, both risk adjusters are always included. However, countries may differ in their use of the number of age subgroups. For example, Belgium and Israel use ten age subgroups while in Germany each age reflects an age subgroup (Van de Ven et al., 2002). The Dutch risk adjustment distinguishes nineteen different age subgroups (0-4, 5-9 all the way up to 85-89, and 90+). The risk adjusters age and gender have some obvious advantages. The data are directly obtainable from health insurers and invulnerable to manipulation. Furthermore, they provide for insurers or health care suppliers no perverse incentives for inefficiency or for providing a low quality of care. The main problem with both risk adjusters is that they are bad predictors of future individual health care expenditures. For example, they do not adjust for large differences in individual health status within each age/gender subgroup. Demographic variables like age and gender explain only around 1-3% (depending on the population) of the overall variation in annual spending across individuals, while estimates of the maximum possible explanatory power of a risk-adjustment system are probably around 50%, depending on the type of health care services (Van de Ven and Ellis, 2000).

3.3 Historical expenditures

In 1991-1992 and in 2000-2002, historical, or prior yearly, expenditures at the insurer level were used as risk adjusters to determine insurers' risk-adjusted budgets. The data are easy to obtain since they are routinely available in the administrative departments of health insurers. Since 2000, 'historical expenditures' were introduced only as a risk adjuster for the sub-budget 'other medical outlays'. Only 30% of this budget was determined by the average expenditures of 'other medical outlays' over the previous three years. However, the Dutch government decided to abolish this risk adjuster in 2003 since it added little explanatory power to the risk-adjustment system (CVZ, 2003). In general, risk-adjustment models that include age, gender and prior year individual expenditures as risk adjusters can explain around 6-10% of the overall variation in annual spending across individuals. While this is a substantial improvement over demographic risk-adjustment models, the inclusion of prior year expenditures also has several disadvantages. Firstly, it may compensate insurers for possible inefficient behaviour in the previous year, and thus does not stimulate them to undertake health-improving activities (McClure, 1984). Even less desirable, it may encourage over-utilization. Secondly, differences in prior year expenditures among individuals could reflect differences in physician practice patterns, market power or product prices. The latter factors represent expenditures which the government may not want to risk-adjust.

3.4 Urbanization

The urbanization criterion divides about 4000 Dutch postal codes into ten different groups, and this allocates every Dutch person uniquely to one of the ten groups. The health insurers receive different risk-adjusted capitation payments for people falling into different groups. In 2005, the difference in capitation payments between a person in the cheapest urbanization group and someone in the most expensive group was about 150 euros.

The main problem of the urbanization criterion is how to allocate each postal code to one of the ten groups. The process followed here is not straightforward and contains a rather complex econometric two-step procedure. In the first step, a regression model is designed which explains individual expenditures using all available risk-adjusters except urbanization. This regression yields an error term for each individual, which represents actual expenditures minus estimated expenditures. In step 2 the individual error terms are regressed on various postal code characteristics, such as the percentage of non-Western foreigners, the percentage of low-income people, the number of nursing home beds, distance to the nearest hospital and the degree of urbanization of a postal code. This second regression yields for each postal code a mean individual expenditure level. Next, a clustering procedure clusters the postal codes into ten different groups. For example, the highest cost group contains the most postal codes with the highest number of non-Western foreigners. In big cities, such as Amsterdam or The Hague, all ten urbanization groups exist (Goudriaan, 2001; Goudriaan et al. 2005).

There is discussion in the Netherlands about how many urbanization groups the government should use, and which explanatory variables to include in the second step of the two-step procedure. On the one hand, one can argue that the explanatory variables are adequate risk adjusters, since they allow for differences in urban health status and are difficult to manipulate by health insurers. On the other hand, variables such as the number of nursing home beds and the distance to the nearest hospital measure individual health expenditures only indirectly, and one may question why a region's risk-adjustment payments should alter if, for example, a new hospital or nursing home is established in that region.

3.5 Income/disability status

The risk adjuster 'income' has changed frequently over time. In 1995-1998, the risk adjuster 'income' only explained the disability status of a person. In 1999, the Dutch government updated the risk factor and added more criteria, such as employment and social security status. In 2005, the income criterion groups people into twenty-five different groups on the basis of six employment criteria such as disability status, social security status and type of income (unemployed, self-employed, paid employment and old age pension) and four age criteria (15-34, 35-44, 45-54, and 55-64 years of age). In 2005, the risk-adjusted capitation payments for a disabled individual aged 55-64 were about a thousand euros more than for a self-employed person in the same age group. In 2006, the health care reforms, as well as the reforms in social security, changed the availability of certain administrative data, and new ways of achieving administrative data about people's type of income took effect. The

predictive power of a risk-adjustment model with the risk adjusters age, gender, urbanization and income is still rather small. For example, Van Vliet and Lamers (2001) find that a model with these four risk adjusters can explain 6.4% of the overall variation in annual spending across individuals. Lamers, Van Vliet and Van de Ven (2006) perform a similar exercise with a more recent Dutch dataset and find a predictive power of 6.5% for outpatient and inpatient health care expenditures (excluding fixed hospital costs).

3.6 Pharmacy-based cost groups (PCGs)

After extensive research on morbidity-based risk adjusters (mainly carried out by the Erasmus University, Rotterdam, under the leadership of Professor Van de Ven), the Dutch government decided to extend the set of risk adjusters in 2002 with pharmacy-based cost groups (PCGs). The main idea of morbidity-based risk adjusters is to identify individuals that show indications of chronic health conditions. PCGs are an outpatient morbidity measure based on prior use of prescribed drugs. In the Netherlands, pharmacy claims contain a code from the Anatomical Therapeutic Chemical Classification Index (ATC code). Now only those drugs are selected that are indicative of certain chronic conditions. These selected drugs can be used to assign people to chronic conditions which are subsequently used to predict future spending of these people. In 2002, twelve PCGs were included and, in 2006, five new PCGs were added. Table 3.2 shows the seventeen PCGs and the annual payment a health insurer receives in 2006 for a person falling into a particular PCG. The

Table 3.2 Pharmacy-based cost groups and annual payments for individuals classified in a PCG (Van Vliet, 2005)

Number	Year of introduction	Type of disease	Annual payment in 2006 (euros)
0	2002	Reference group	0
1	2002	Chronic obstructive pulmonary disease (COPD)	1,232
2	2002	Epilepsy	1,738
3	2002	Crohn's disease and ulcerative colitis	1,967
4	2002	Cardiac diseases, ASCVD and CHF	2,262
5	2002	Rheumatism	3,182
6	2002	Parkinson's	3,537
7	2002	Diabetes type I	3,667
8	2002	Organ transplants	5,680
9	2002	Cystic fibrosis / pancreas	8,394
10	2002	Neuromuscular diseases	10,270
11	2002	HIV/Aids	13,234
12	2002	Severe kidney problems (including ESRD)	15,156
13	2006	Glaucoma	332
14	2006	Thyroid disorders	396
15	2006	High cholesterol	678
16	2006	Diabetes type IIb	864
17	2006	Diabetes type IIa	1,664

payments shown in the table refer to the ex-ante payments (thus without taking the high-risk equalization scheme for high risks into account, see section 4). The payments vary from about 330 euros for individuals with glaucoma to about 15 000 euros for individuals with severe kidney problems.

3.6.1 Incentive problems with PCGs

The main problem with morbidity-based risk adjusters is the possibility of manipulation, because knowledge of the impact on capitation payments may lead health care providers or insurers to alter prescription behaviour to maximize payments. For example, if the rule for falling under a certain PCG is the amount of prescriptions a person receives, then it may be profitable to give a patient a prescription for one week four times instead of one prescription per month. Another example is that health care providers or insurers stimulate the prescription of drugs that fall into the PCG-system. This problem increases if a payment for a PCG-classified person is two or three times higher than the costs of the prescribed drugs that form the basis for PCG assignment (Lamers et al., 1999). The implementation of PCGs may also lead to 'upcoding', for example by classifying a person receiving treatment for diabetes type II, which was not classified in the Dutch PCG-system in 2002, as receiving treatment for diabetes type I. PCGs may also hinder the adoption of efficient prescribing habits if less efficient prescribing becomes more profitable for doctors. In the Netherlands, independent general practitioners prescribe drugs, and thus inappropriate prescription behaviour may (still) be less of a problem than, for example, in the United States, where health insurers and health care providers may be vertically integrated.

3.6.2 Rules for assigning a person to a PCG

To overcome these incentive problems, the Dutch government decided to implement some rules (see also Lamers and Van Vliet, 2003, and Van de Ven et al., 2004). The first rule is that one should not use the number of prescriptions for a drug as a basis for calculation, but the prescribed daily doses. A second rule is that the drug use should be related to a specific chronic condition and that classification for a PCG is only for people that received drugs on prescription in the previous year for at least 181 days. This rule identifies the chronically ill people and prevents health insurers receiving payments for incidental drug users. A third rule is that there should be a clear consensus concerning the drug's use. This rules out diseases for which we observe a lot of practice variation and variations in the drugs used, for example hypertension and depression. A fourth rule is that people are assigned to one PCG only, which removes the incentive for prescribing additional drugs for people who are already PCG-classified. To improve the predictive accuracy of the risk-adjustment system, however, the Dutch government is planning to abandon this last rule to allow for co-morbidity.

The above rules exclude most people in the population with at least one outpatient prescription per year (about 80% of the population). During the first few years after the introduction of PCGs, about 7% of the population was assigned to one of the twelve PCGs. The highest prevalence occurred for asthma/COPD (about 2.7% of the population), and for cardiac diseases, ASCVD and CHF (about 2.4% of the population) (Prinsze and Van Vliet, 2005).

Table 3.3 Percentage of Dutch population assigned to a PCG group or DCG group in 2006 (Van Vliet et. al, 2005)

Age	PCG GROUP		DCG GROUP	
	Male (%)	Female (%)	Male (%)	Female (%)
0-4	0.8	0.5	0.2	0.1
5-9	1.4	1.0	0.1	0.1
10-14	1.5	1.2	0.1	0.1
15-19	1.5	1.6	0.2	0.2
20-24	1.8	2.3	0.3	0.4
25-29	2.4	3.3	0.4	0.4
30-34	3.3	4.2	0.5	0.5
35-39	4.5	5.5	0.6	0.6
40-44	6.6	7.3	0.9	1.0
45-49	9.8	10.0	1.5	1.5
50-54	14.5	13.8	2.4	2.3
55-59	20.9	19.0	3.7	2.9
60-64	27.4	24.7	5.4	4.1
65-69	33.3	31.2	7.5	5.6
70-74	42.7	38.2	10.2	7.5
75-79	49.6	43.7	12.8	9.4
80-84	49.9	44.5	13.0	9.7
85-89	49.0	44.9	11.9	9.0
90+	47.9	44.9	9.0	6.5
Total	11.6	12.5	2.3	2.2

In 2006, the government enlarged the number of PCGs from twelve to seventeen, which increases the proportion of people classified in a PCG to about 12% of the total population.

Table 3.3 shows that assignment to a PCG for both males and females increases constantly with age. The table shows also that after the age of 70 more than 40% of the population are assigned to a PCG. In most age groups, males are more often assigned to a PCG group than females, except for the age groups 15-40. Overall, 11.6% of males and 12.5% of females in the Dutch population are assigned to a PCG.

3.6.3 Predicted accuracy

The value of adding more risk adjusters is to improve the overall accuracy and goodness-of-fit of the annual per capita expense prediction models. The fact that morbidity-based risk adjusters measure health more directly should also be reflected in the predictive accuracy of the Dutch risk-adjustment model. Indeed, research showed that the predictive accuracy increases substantially after adding PCGs. Lamers and Van Vliet (2003, 2004) show that a risk-adjustment model with twenty-two PCGs and without other risk adjusters can explain about 9-10% of the overall variation in annual spending across individuals. Lamers, Van Vliet and Van de Ven (2003) estimate a risk-adjustment model that relates to the Dutch situation during 2002-2003, with the risk adjusters age, gender, urbanization, income and PCGs. Their model can explain about 11.8% of the overall variation. This figure changed only slightly to 11.5% in a similar exercise with more recent data (Prinsze and Van Vliet, 2005).

3.7 Diagnostic Cost Groups (DCGs)

Since PCGs are based on drugs prescribed in outpatient settings, people treated in an inpatient setting are not assigned to PCGs. The predictable high health care expenditures of patients in hospitals are thus not included. The Dutch government, therefore, added Diagnostic Cost Groups (DCGs) to the risk-adjustment model in 2004. The idea behind DCGs is that a person with a serious hospitalization in the previous year(s) might induce predictably above-average expenditures not only in the year directly following, but also – to a diminishing degree – in the years thereafter. A DCG is a cluster of diagnosis groups with comparable future expenditure. Diagnosis groups are based on ICD-9 codes of hospital admissions obtained from the Dutch National Medical Registry (LMR). The government links this information to the administrative data of insurers to estimate the risk-adjusted payments and the number of DCG-prevalences for each insurer. Until 2006, the government based the ex-ante risk-adjusted payments for the current year t on DCG information of year $t-3$, while the government based the ex-post payments (see section 4) on DCG information of year $t-2$. It would be ideal to base the risk-adjusted payments on DCG information of year $t-1$, since the idea is to predict future expenditures given hospital admission in the previous year. The problem is that information from the LMR is not yet readily available. The Dutch government is currently working hard to speed up the processing of information on hospital admissions.

Currently, the Dutch risk-adjustment model contains thirteen DCGs. Table 3.4 shows the types of diseases within one PCG and the annual payment a health insurer receives for a person classified to a particular PCG. The payments vary from about 1,293 euros to about 47,167 euros for individuals on haemodialysis. Table 3.3, above, shows that the DCG prevalence in the Dutch population is about 2.2%, which is much lower than the PCG prevalence of about 12%. After the age of 50, men are more often assigned to a DCG than women are. Table 3.3 also shows that slightly more than 14% of the Dutch population is assigned to either a PCG or DCG.

Table 3.4 Diagnostic Cost Groups and annual capitation payments per DCG*

DCG	Type of disease	Annual payment in 2006 (euros)
0	Reference group	0
1	Osteoarthritis, atrial arrhythmia, heart rhythm and conduction disorders, internal injuries/traumatic amputations/ diabetes with acute complications/hypoglycaemia	1,293
2	Post-myocardial infarction, coronary atherosclerosis, angina pectoris, asthma, peptic ulcer, brain injury, cancer of the uterus/cervix/female genital organs	2,288
3	Unstable angina, thrombosis, vascular disease, epilepsy and other seizure disorders, diabetes with no or unspecified complications, breast cancer, diverticula of the intestine, diseases of the oesophagus, cardio-respiratory failure/shock	2,832
4	Radiation therapy, stroke, major congenital disorders, colon cancer, aortic and other arterial aneurysms, cancer of the prostate/testis/male genital organs, inflammatory bowel disease, bone/joint infections/necrosis, precerebral arterial occlusion, hypertension	3,350
5	Congestive heart failure, stomach disorders, valvular and rheumatic heart disease, pancreatic disorders, cerebral haemorrhage, benign tumours and neoplasm of the brain/nervous system	4,075
6	Peripheral vascular disease, cancer of the bladder/kidney/urinary organs, atherosclerosis of major blood vessels, artificial opening of gastrointestinal tract status, coma and encephalopathy	4,935
7	Chemotherapy, rheumatoid arthritis and connective tissue disease, paralytic and other neurological disorders, degenerative neurological disorders, rectal cancer, cirrhosis, other liver disorders, other cancers, cancer of the placenta/ovary/uterine adnexa, paroxysmal ventricular tachycardia	6,138
8	Chronic obstructive pulmonary disease, stomach, small bowel, other digestive cancer, HIV/Aids	7,917
9	Blood/immune disorders, mouth/pharynx/larynx/other respiratory cancer, decubitus and chronic skin ulcers	8,848
10	Lung cancer, diabetes with chronic complications	10,563
11	Metastatic cancer, liver/pancreas/oesophagus cancer, brain/nervous system cancer, end-stage liver disorders	13,615
12	Blood and lymphatic cancers/neoplasms (115), renal failure/nephritis (111), pulmonary fibrosis and bronchiectasis (176) (at home), artificial respiration (special medical procedure) (144), spinal cord injury (163), major organ transplant status	15,477
13	Haemodialysis (special medical procedure)	47,167

* Prinsze et al. (2005) and Van Vliet et al. (2005)

3.7.1 Incentive problems and rules for assigning a person to a DCG

As with PCGs, DCGs may create perverse incentives for health care providers or insurers. For example, providers may have an incentive to hospitalize more (even relatively healthy) people to obtain higher payments in the future.

Furthermore, it may create incentives to substitute outpatient or day surgery care for inpatient care or it may induce providers to screen more aggressively in order to detect more diseases. To discourage this type of manipulation the government implemented some rules, as with PCGs. The first rule is that the government assigns to a DCG only people that stayed three days or more in a hospital in the previous year. This rule excludes diagnoses that are minor or transitory and includes only people that have a serious illness or are

chronically ill. The second rule is that the number of people assigned to a DCG should be substantial (more than 1,000). A large sample size increases the accuracy of the estimated risk-adjusted payment for a DCG. A third rule is that DCGs must be easily identifiable and are clinically coherent. This rule prevents providers setting vague diagnoses and overcomes possible discussions over whether a certain diagnosis should be, or should not be, included in a DCG. A fourth rule is that risk-adjusted payments should be based on variable hospital costs. This rule not only lowers payments to insurers but also reflects the fact that, in the Netherlands, insurers incur almost no risks for fixed hospital costs (see section 4).

3.7.2 Predicted accuracy

Prinsze and Van Vliet (2005) show that adding DCGs to the risk-adjustment model almost doubles the predictive accuracy of total expenditures and can explain 22.8% of the overall variation in annual spending across individuals. As expected, the predictive accuracy of inpatient expenditures increased particularly substantially from 4.3% (without DCGs) to 15.6% (with DCGs).

To conclude, the overall accuracy and goodness-of-fit of the Dutch risk-adjustment system has increased substantially over time. Another possible approach to show this improvement over time is to look at the average predicted losses in year t for the 10% of people with the highest expenditures in year $t-1$ (Van de Ven et. al. 2004). In the dataset of the researchers, the average expenditures for the top ten percent group in year $t-1$ were 3,433 euros in year t . The row 'no-risk adjusters' in table 3.5 indicates that, if there were no risk adjustment, then health insurers would only receive 875 euros for each person belonging to this group and health insurers would have an average loss of 2,558 euros. Adding risk adjusters to the model decreases the average loss. In the last row, the risk-adjustment model predicts average risk-adjusted payments of 2,418 euros for people in the top 10 percent group, and this lowers the average losses to 1,015 euros. This example shows that risk adjustment has improved over the years, although it is still not perfect.

Table 3.5 Predictive accuracy of the Dutch risk-adjustment system

Risk adjusters	Average predicted expenditures	Average losses	Average predicted expenditures as a percentage of average actual expenditures
No risk adjusters	875	2,558	75%
Age and gender	1,350	2,083	61%
Age, gender, urbanization, income	1,443	1,990	58%
Age, gender, urbanization, income, PCGs	1,967	1,466	43%
Age, gender, urbanization, income, DCGs	2,046	1,387	40%
Age, gender, urbanization, income, PCGs, DCGs	2,418	1,015	30%

* Source: Van de Ven et al. 2004. Numbers refer to ex-ante risk adjustment

4 The ex-post payment system

In the previous two sections, I showed how the government determines the ex-ante risk-adjusted payments. The Dutch government calculates risk-adjusted payments for several sub-budgets. At the end of the year, health plans may have higher or lower health care expenditures than their ex-ante risk-adjusted (sub-)budgets. Health plans do not bear the full financial risk on the difference between actual expenditures and the ex-ante risk-adjusted budget. This is due to the ex-post payments.

4.1 Ex-post payment schemes

If ex-ante risk adjustment were the only form of risk adjustment, then health insurers would be fully financially responsible for their health care expenditures. However, for a long time, social health insurers ran no risk at all over their health care expenditures. After the introduction of the risk-adjustment schemes in 1991, the Government decided to gradually increase health insurers' risk. The main aim was to introduce more competition into the social health care market. The idea was, however, to do this slowly since it could take a great deal of time before an adequate risk-adjustment system were designed. A slow, gradual increase of insurers' risks would also prevent perverse activities by health insurers, such as risk selection. The existence of a skew distribution between healthy and unhealthy people across health insurers may also lead to unfair risk-adjusted capitation payments. If risk adjustment does not adequately adjust for this skewness, then some insurers may obtain huge profits while other insurers (even very efficient ones) may go bankrupt, solely through the failure of the risk-adjustment system (CPB, 2003). Retrospective payments seem less sensible if differences in expenditures are due to differences in efficiency, since this penalizes health insurers for their efficient behaviour. In terms of incentives, a greater role for retrospective compensation means stronger disincentives for both efficiency and risk-selection strategies. This marks the trade-off between efficiency and risk selection (Newhouse, 1996).

The Dutch government has introduced various ex-post or retrospective payment schemes during 1991-2005:

- *Retrospective equalisation*
The idea of retrospective equalisation is that health insurers transfer a percentage of the difference between their risk-adjusted capitation payments and actual individual expenditures to a pool. All insurers equally share the money in this pool retrospectively. The scheme is budget-neutral and therefore involves no extra government subsidies, since it compensates losses made by some insurers using the profits of others.
- *High-risk equalisation*
This is a special form of retrospective equalisation. In high-risk equalisation, health insurers transfer a percentage of all individual expenditures above a certain threshold to a pool. All insurers equally share the money in this pool retrospectively.

- *Retrospective compensation*

Each health insurer receives from or pays to the government a fixed percentage of some of their losses or profits. Losses and profits are defined as the difference between the risk-adjusted capitation expenditures minus actual individual expenditures. Retrospective compensation is a form of risk sharing that leads to additional losses or profits for the government.

From 1991-1995, the Dutch government applied retrospective compensation (100% during 1991-1992 and 90% during 1993-1995) and retrospective equalization (75% during 1993-1995). However, due to the gradual improvement of the risk-adjustment system, the government decided in 1996 not only to increase insurers' financial risk but also to allow health insurers to set different out-of-pocket premiums. Simultaneously, the Government divided the macro budget into several sub-budgets. The idea behind the introduction of the sub-budgets is to differentiate insurers' financial risk according to the type of expenditure. For example, if a health insurer cannot influence fixed hospital outlays, then why keep a health insurer responsible for these types of expenditures?

Table 4.1 Ex-post compensation percentages in the Dutch social health insurance system

Sub-budgets and ex-post schemes	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Fixed hospital outlays										
Retrospective equalization	-	-	-	-	-	-	-	-	-	-
Retrospective compensation	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Variable hospital outlays										
Retrospective equalization	60%	30%	30%	30%	-	-	30%	30%	30%	30%
Retrospective compensation	50%	25%	25%	25%	25%	25%	35%	35%	35%	35%
Other medical outlays										
Retrospective equalization	60%	30%	30%	30%	-	-	-	-	-	-
Retrospective compensation	50%	25%	15%	-	-	-	-	-	-	-
Specialist medical care										
Retrospective equalization	-	-	-	-	-	50%	30%	30%	30%	30%
Retrospective compensation	-	-	95%	95%	95%	40%	35%	35%	35%	35%
High-risk equalisation										
Individual threshold (euros)	-	2040	2040	3400	4545	4540	7500	7500	12500	12500
Equalisation percentage	-	90%	90%	90%	90%	90%	90%	90%	90%	90%

Table 4.1 shows the different sub-budgets and the retrospective payment schemes. The sub-budgets have changed over time. For example, the sub-budget 'specialist medical care' belonged, until 1997, to the sub-budget 'other medical outlays', and by 2002 the sub-budget was linked up with the sub-budget 'variable hospital outlays'. In 2005, the budget 'variable hospital outlays' covered about 45% of total health care expenditures (about 18 billion euros), respectively the sub-budget 'fixed hospital outlays', 21%, and the sub-budget 'other medical outlays', 34%.

The table shows that health insurers do not bear full financial responsibility for most sub-budgets. The ex-post payments for the sub-budget 'other medical outlays', which includes expenditures on pharmaceuticals, general practitioners, physiotherapists etc., have declined to zero which implies that health insurers are fully financially responsible for these types of expenditures. The ex-post payments for the sub-budget 'variable hospital outlays' (including the sub-budget 'specialist medical care') have declined as well, albeit to a lesser extent. Since health insurers cannot influence fixed hospital expenditures, the ex-post retrospective compensation for the sub-budget 'fixed hospital outlays' has not been changed over the years and is still 95%. Table 4.1 also shows that an improvement of the risk-adjustment system runs parallel to an increase of the individual threshold of the high-risk equalization scheme. In 2005, all individuals with health care expenditures above 12,500 euros now fall under this scheme.

The fewer health care expenditures the government retrospectively reimburses, the more risk is borne by health insurers. By combining the different ex-post payment scheme of Table 4.1, one can calculate an overall percentage of insurers' financial risk for each year separately. For example, in 1993, 75% of the expenditures were retrospectively equalised, which reduced the overall insurers' financial risk to 25%. Next, 90% of these expenditures were retrospectively compensated, which reduced insurers' risk to 2.5%. Table 4.2 shows that insurers' financial risk rose substantially. While health insurers' risk borne in 1991 and 1992 was zero, it increased to 53% in 2005.

Table 4.2 Increase in health insurers' financial risk (in %) in the Dutch social health insurance system*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0%	0%	2.5%	2.5%	2.5%	13%	27%	28%	35%	36%	38%	41%	52%	53%	53%

*Van de Ven et al. (2004).

5 Risk adjustment and its practical implementations

In the Netherlands, the Dutch government is responsible for the annual review of the risk-adjustment model. The development of the model is a dynamic process of continuously improving and updating the system. Each year, the Dutch government has to decide which new risk adjusters to include and which of the existing risk adjusters to update or to exclude. The inclusion of new risk adjusters may be necessary because new diseases may appear or expenditure patterns of certain treatments may change. The exclusion of risk adjusters may be necessary as well. For example in 2004, the Dutch government excluded one pharmaceutical cost group related to stomach diseases from the risk-adjustment system. It turned out that it became impossible to identify chronically ill people from their use of prescription drugs, since too many drugs for stomach diseases were prescribed off-label. Annual changes in the system are partly based on research, as well as on political arguments and on pressure of health insurers and, in 2006, of consumer organizations as well. For a smooth functioning of the system, the government created a technical working group, called WOR, for continuous research on the risk-adjustment system. The WOR is a relatively large working group, which consists of the Ministry of Health, the Health Care Insurance Board (CVZ), the Dutch insurers' association (ZN), individual health insurers and independent (commercial) research groups. The WOR meets regularly, discusses ongoing research projects and gives technical advice on further steps in the risk-adjustment process. The WOR also serves as a forum for complaints of health insurers about the functioning of the risk-adjustment system. Health insurers can clarify their problems in the WOR, preferably with the help of objective arguments and relevant data, and the WOR may decide to undertake closer research. For example, there is still discussion on whether people living in big cities, such as The Hague and Amsterdam, receive adequate compensation (see also Goudriaan and Thio, 2004).

In August/September/October of each year, the government decides on changes to the risk-adjustment system. What will be the size of the macro budget, what new risk adjusters will enter the risk-adjustment system, and what are the ex-post payments for next year? These important decisions are not taken by the WOR, but by the Minister of Health after consulting the Dutch insurers' association. The decision-making process on the size of the macro budget and the choice of risk adjusters is reasonably transparent, but the decision-making process about the annual determination of the ex-post payment system probably needs more explanation. The general rule followed here is that improvements in the ex-ante risk-adjustment system lead to lower ex-post payments. However, the main question is how to fulfil this rule quantitatively.

The Health Care Insurance Board (CVZ) manages the health insurance fund (HIF) and controls the money and data flows from and to the health insurers. The CVZ has to gather all the necessary data from health insurers, such as all individual health care expenditures, the exact number of enrolees falling in a DCG or PCG group, etc. This takes time and, in practice, it takes several years before the CVZ can make up the final settlement. The consequences are that it also takes several years before health insurers can calculate their final annual

balance sheets and close their books for that year. The complexity of the processing of data and money flows came to light in 2006 after the introduction of the new health insurance system. The CVZ made mistakes in the calculations of the ex-ante risk-adjusted capitation payments, which costs the government a total amount of 247 million euros. In the beginning of 2006, it appeared that a mistake had occurred in distributing the macro budget among health insurers. Some health insurers received too much money ex-ante, while other health insurers received too little. Since health insurers base their calculation of the nominal premiums on the ex-ante risk-adjusted capitation payments, an error in these payments has direct consequences for the nominal premium level. Health insurers that received too much money from the HIF claimed that they could not return the extra money to the HIF, since this information was not known to them at the time they had to announce their nominal premium for 2006. These insurers claim that they would otherwise have set a higher nominal premium in 2006. Health insurers that received too little money from the HIF, of course, have the right to obtain the correct amount of risk-adjusted payments from the HIF. Mistakes in ex-ante payments may disturb the level playing field between health insurers, and therefore the Minister of Health decided in 2006 that all health insurers should receive extra money, which amounted to 247 million euros in total (Tweede Kamer, 2006b).

After the health care reforms in 2006, the social health insurance system was replaced by a private health insurance system. Private health insurance falls within the scope of the Third Non-Life Insurance Directive of the European Commission's competition law. There is still discussion about whether a system of risk adjustment in combination with open enrolment and community rating is in conformity with this competition law (Paolucci et. al. 2006). Although the Dutch Minister of Health received conditional approval from the European Commission to continue with the new health care system (Tweede Kamer, 2005), the Dutch health insurer AZIVO went to the European Court in May 2006. The claim is that imperfect risk adjustment is incompatible with the EC competition law. The decision of the European Court of Justice may take a year or two, but the final judgment may be important for the future of the Dutch health insurance system. Recently, the Dutch Minister of Health responded to the House of Representatives that he regretted this course of action. He admitted that risk adjustment does not adequately compensate for health expenditures of people living in some big cities, but that it was very difficult to find objective causes for explaining these differences.

Not only is there a growing interest among politicians on the functioning of the risk-adjustment system – patient groups also became aware of the system. The Federation of Patients and Consumer Organizations in the Netherlands (NPCF) launched new research when they discovered that the morbidity-based risk adjusters, DCGs and PCGs, do not compensate all chronically ill people. The research, carried out by the Erasmus University Rotterdam, concluded that the Dutch risk-adjustment system is still imperfect and that more research should be carried out to find new risk adjusters (Prinsze et al. 2005). Some examples are '*multi-year DCGs*' (people that are assigned to certain DCG should receive risk-adjusted payments for more than one year) or '*co-morbidity*' (assigning people to more than one DCG or PCG), or '*functional limitations*' (risk adjusters could be based on resources for handicapped people). The Dutch Minister of Health informed the House of Representatives

that he would intensify research on compensating chronically ill people. In practice, this implies that the risk adjustment will be further refined and that more morbidity-based risk adjusters will be added to the system. The problem became clearer in 2006 when some chronically ill people (who are compensated by the risk adjustment) could obtain group contracts from health insurers while others (those chronically ill people that are not adequately compensated) could not.

The annual costs of carrying out risk adjustment are estimated at less than one euro per person. These costs include staff at the Ministry of Health, the insurers' interest organization (ZN), Health Care Insurance Board (CVZ), and contracting out research and staff at the individual health insurers. The general impression is that these costs outweigh the possible consequences created by extensive risk selection (CPB, 2003).

6 How does risk adjustment affect the market position of health insurers?

In practice, we observe that the risk-adjusted payments change over time. For example, if new risk adjusters become available, then the redistributive payments to health insurer alter. In addition, annual changes in the ex-post payment scheme may alter the size of profits or losses that health insurers incur. In this section, I will show how changes in the ex-ante and ex-post risk-adjustment scheme affect the profits and losses of Dutch health insurers. The data I use in this section are obtained from the Dutch Health Care Insurance Board (CVZ). These data are not publicly available.

6.1 Ex-ante risk-adjusted payments at the health insurer level

Risk adjustment affects the market position of health insurers. Health insurers with relatively unhealthy enrolees will receive more money from the health insurance fund than health insurers with healthy enrolees. In the previous section, we showed that – at the individual level – there exist large differences in risk-adjusted capitation payments. These differences at the individual level may, however, average out at the insurer level due to the effects of pooling. Whether this is the case or not depends on how healthy and unhealthy enrolees are distributed over health insurers and how well risk adjustment corrects for these differences. Table 6.1 shows the minimum and maximum annual mean risk-adjusted capitation payment of a health plan. In the table, all figures are in

Table 6.1 Mean ex-ante risk-adjusted capitation payments to health insurers in the Dutch social health insurance system (euros, 2005 prices, numbers rounded off)*

Year	All health insurers			Health insurers with enrolees > 100,000	
	Maximum capitation payment	Minimum capitation payment	Population mean	Maximum capitation payment	Minimum capitation payment
1993	1,895	1,342	1,804	1,895	1,725
1994	3,153	1,610	1,804	1,962	1,704
1995	3,049	1,538	1,804	2,239	1,653
1996	2,332	1,545	1,804	2,332	1,705
1997	2,689	1,236	1,804	2,617	1,683
1998	2,294	1,243	1,804	2,189	1,697
1999	2,654	1,196	1,804	2,110	1,709
2000	2,126	1,185	1,804	2,126	1,694
2001	2,049	1,244	1,804	2,049	1,690
2002	2,032	1,025	1,804	2,032	1,626
2003	2,041	1,095	1,804	2,041	1,632
2004	2,051	1,090	1,804	2,051	1,602
2005	2,065	1,106	1,804	2,065	1,565

*The numbers are approximate and rounded off. The numbers in the table are adjusted such that for each year total ex-ante risk-adjusted payments are equal to actual total health care expenditures.

2005 prices, and therefore the mean (over the total population) risk-adjusted capitation payments equal 1,804 euros for each year (column 4). For example, the table shows for the year 1995 that the health insurer with the predicted unhealthiest enrolees (using the risk adjusters age, gender, urbanization and income, see table 3.1) received on average 3,049 euros per capita. This is $3,049 - 1,804 = 1,245$ euros more than the population mean. The insurer with the predicted healthiest enrolees received on average 1,538 euro per person. Hence, the difference in mean risk-adjusted capitation payments between the predicted healthiest and unhealthiest health insurer was $3,049 - 1,538 = 1,511$ euros.

Small insurers will generally exhibit higher levels of variation than large insurers. Indeed, if we consider only those insurers with a number of enrolees greater than 100,000, then the difference between the minimum and maximum declines, sometimes substantially. For example, the last two columns in table 6.1 show that, in the year 1995, the difference between the predicted healthiest and unhealthiest insurer diminishes to $2,239 - 1,653 = 586$ euros. If one compares the numbers in columns two and three with the numbers in columns five and six, then one observes that, after the year 2000, the maximum numbers in columns two and five do not change, while all the minimum numbers in column six rise substantially in comparison with column three. This suggests that small Dutch health insurers hold relatively healthier enrolees. A rather stable and less volatile pattern seems to have arisen after the introduction of the two morbidity-based risk adjusters in 2002 and 2004.

The figures in table 6.1 are much higher than the nominal premium raised by the health insurers (see table 2.1). Hence, all health insurers receive money from the Health Insurance Fund (HIF) and do not have to pay money into the HIF. In the new health care system, 50% of total (health care and health insurers' administrative) expenditures have to be collected by the nominal premium. Even in this case, health insurers do not have to pay money into the HIF. As long as the minimum number in table 6.1 is higher than about 900 euros (half of the population mean in column 4), this situation does not occur.

6.2 The effect of ex-ante risk adjustment on insurers' market positions

In general, health insurers with relatively predictable unhealthy enrolees will have more health care expenditures than insurers with relatively predictable healthy enrolees. The main idea behind risk adjustment is to compensate insurers for these predictable differences. This section analyzes the effect on insurers' health care expenditures after ex-ante risk adjustment by comparing two indicators for each year (see also Rosenkranz and Luft, 1997).

Indicator IND1: This indicator is constructed under the assumption that no risk adjustment occurs; or equivalently each health insurer receives a similar payment of 1,804 euros (2005 prices) for each enrolee. The indicator IND1 is calculated by subtracting the mean per capita health care expenditure of each health insurer from 1,804 euros. The indicator $IND1(i,k)$ is constructed for each year i and for each health insurer k operating in year i .

Table 6.2 The effect of risk adjustment on insurers' total expenditures in the Dutch social health insurance system (euros, 2005 prices, numbers based on health insurers with enrollees > 100,000)*

Year	IND1 (assuming no risk adjustment)			IND2 (with ex-ante risk adjustment)			$1 - \frac{\text{MAR2}}{\text{MAR1}}$
	Maximum profits	Minimum profits	MAR1	Maximum Profits	Minimum profits	MAR2	
1993	397	-145	109	377	-191	105	0.04
1994	308	-225	100	322	-190	88	0.12
1995	369	-195	102	165	-184	67	0.34
1996	586	-129	109	214	-50	40	0.63
1997	685	-150	107	60	-128	33	0.69
1998	414	-116	113	166	-94	44	0.61
1999	350	-158	104	117	-106	33	0.68
2000	521	-230	108	200	-135	55	0.49
2001	286	-193	89	151	-79	42	0.52
2002	265	-219	92	75	-80	36	0.61
2003	250	-252	89	57	-79	34	0.62
2004	345	-301	105	144	-100	43	0.59

*The numbers are approximate and rounded off. The numbers in the table are adjusted such that for each year total ex-ante risk-adjusted payments are equal to actual total health care expenditures.

Indicator IND2: The second indicator is constructed in a similar way as IND1, but the 1,804 euros are now replaced by the ex-ante risk-adjusted capitation payments that each health insurer receives (see subsection 6.1, above).

For both indicators, we can calculate the annual Mean Absolute Result (MAR). This statistic is the annual mean (over all health insurers) of the absolute values of IND1 and IND2. Both statistics, MAR1 (for IND1) and MAR2 (for IND2), are indicators for variation, where MAR1 measures the annual total variation over health insurers without any risk adjustment and MAR2 the annual variation left after ex-ante risk adjustment.

Table 6.2 shows several indicators. First let us compare the maximum profits in column two under IND1 with the maximum profits in column five under IND2. The table shows that the maximum profits are smaller for almost all years under IND2 than under IND1. This implies that ex-ante risk adjustment reduces the variation in profits and losses of health care insurers. For example, if we consider the year 2004, then the most profitable insurer would have received profits of 345 euros per capita without risk adjustment. However, due to the existence of the risk-adjusted payments, the maximum possible profits for an insurer declined to 144 euros. The same holds for the maximum possible losses (or minimum profits) in the 'Minimum profits' column. Without risk adjustment, the annual maximum loss for a health insurer was 301 euros per capita in the year 2004. With risk-adjustment, the maximum loss diminished to 100 euros per capita in column six. Next, compare the MAR1 and MAR2 statistics in columns four and seven of the table. The fact that MAR2 is substantially smaller than MAR1 indicates a reduction of the variation in profits and losses of health insurers. For the early years, 1993-1995, MAR2 and MAR1 are roughly of the same size, because in those years risk adjustment

was still in its early stages. After 1996, however, the risk-adjustment system improved and the difference between MAR2 and MAR1 increases.

The last column in the table presents a statistic for risk-adjustment performance. The statistic shows that, after 1996, possible losses or profits of health insurers declined by about 60% through ex-ante risk adjustment. Note that this is a rather high figure. An important question is how to explain the variation left in the data. I consider there to be five possibilities (Douven, 2004).

1. *Unexpected events*

Even perfect risk adjustment cannot predict luck or unexpected events. If unexpected events follow a skew distribution across health insurers, then both MAR1 and MAR2 increase. According to the law of large numbers, however, unexpected events are likely to cancel out at the insurer level.

2. *Efficiency differences*

The main idea of ex-ante risk adjustment is that efficiency differences are left in the data. The ideal situation would be that the remaining differences fully reflect the efficiency differences across health insurers. In general, large efficiency differences will lead to a higher MAR1 and MAR2. As I explained in section 2.3, efficiency differences between insurers were probably small during the sample period.

3. *Mobility issues*

Over time, switchers, for example due to risk selection, may influence expenditure differentials between insurers. The magnitude of this effect is probably low since mobility was rather low in the Dutch social health insurance system (Douven and Sahin, 2003). Moreover, recent research showed that switchers in 2000-2001 had expenditures that were around 40% below average in 1994-2002, confirming that movers are 'good' risks in absolute terms. However, after taking into account that these people are younger and healthier, the risk-adjusted payments for them nearly equalled actual expenditures (Van Vliet, 2006).

4. *Changing market and policy characteristics*

Changes in the insurance market, such as mergers and new entrants, may influence our statistics. In addition, policy characteristics such as changes in the income threshold, changes in the basic benefit package, changes in the hospital payment system etc. may affect insurers' health care expenditures.

5. *Risk adjustment*

The main idea of the two statistics MAR1 and MAR2 is that any differences between the two statistics can be fully attributed to the effect of risk adjustment. The fact that the two statistics differ implies that healthy and unhealthy people were unevenly distributed across health insurers. One could argue that the larger the difference between the two statistics, the larger the need for applying ex-ante risk adjustment. However, perfect risk adjustment may also yield similar MAR1 and MAR2 statistics. This is the case if healthy and unhealthy people are evenly distributed across health insurers. For example, in the table we observe no clear improvements of risk-adjustment performance in the last column after the implementation of the two morbidity-based indicators during 2002-2004. At first sight, it may appear that chronically

ill people are evenly distributed over health insurers. I will study this aspect further in the next subsection.

6.3 The effect of PCGs on insurers' market position

Until now, we have considered only total health care expenditures. Total health care expenditures consist of several sub-budgets (see section 4). Since pharmaceutical cost groups (PCGs) measure outpatient morbidity, adding PCGs to the risk-adjustment system will mainly affect outpatient expenditures, which are part of the sub-budget 'other medical outlays'. Hence, if we want to study the effect of PCGs on the market position of insurers, it seems better to focus on this sub-budget only. The sub-budget 'other medical outlays' was introduced in 1996 and covered about 34% of total health care expenditures in 2005. Note also that since the year 2000 health insurers have borne full financial risk on this sub-budget (see table 4.1, except for possible high-risk equalization payments).

Table 6.3 The effect of risk adjustment on insurers' expenditures of the sub-budget 'other medical outlays' (euros, 2005 prices, numbers based on health insurers with enrollees > 100,000)*

Year	IND1 (assuming no risk adjustment)			IND2 (with ex-ante risk adjustment)			$1 - \frac{MAR2}{MAR1}$
	Maximum profits	Minimum profits	MAR1	Maximum profits	Minimum profits	MAR2	
1996	170	-37	27	39	-50	18	0.31
1997	198	-53	31	37	-36	20	0.37
1998	85	-33	20	44	-24	15	0.25
1999	114	-59	27	37	-45	18	0.34
2000	154	-64	25	76	-37	15	0.40
2001	37	-46	16	25	-26	10	0.36
2002	59	-34	21	24	-21	10	0.53
2003	55	-61	21	7	-13	5	0.75
2004	67	-77	25	15	-22	7	0.74

*The numbers are approximate and rounded off. The numbers in the table are adjusted such that for each year total ex-ante risk-adjusted payments are equal to actual total health care expenditures.

In Table 6.3, I calculated the same statistics as in Table 6.2 in the previous subsection, but now only for the sub-budget 'other medical outlays'. The table shows some interesting results. During the years 1996-2001 before the introduction of PCGs, we observe rather low numbers in the last column, while the numbers increase substantially after 2001. This suggests that adding PCGs to the risk-adjustment model lowered the variation of possible profits and losses of health insurers. Indeed, health insurers' maximum profits and losses (for the sub-budget 'other medical outlays') declined in 2004 after risk adjustment to 15 euros and 22 euros respectively per capita, while health insurers' profits and losses were much higher in each year before 2002. This result suggests that, before 2002, some health insurers may have made a lot of profits or losses because risk adjustment did not adequately correct for predictable differences in outpatient expenditures. This analysis shows also the idea behind ex-post payments. As long as risk adjustment is imperfect, ex-post

compensation payment schemes may prevent health insurers from obtaining high profits or losses arising from a skew distribution of predictable unhealthy people across health insurers.

6.4 The effect of ex-post risk adjustment on insurers' market position

The maximum possible profits and losses shown in the previous subsections are not profits and losses that actually occurred in the Dutch social health insurance system. The actual profits or losses of health insurers follow from the final settlement after accounting the ex-post payment schemes. In this section, I calculated the same indicator IND3 as in section 6.2, above, but now after health insurers had received their (ex-ante and) ex-post payments. The results of IND3 reflect reasonably well the actual profits and losses that health insurers incurred in the Dutch social health insurance system.

Indicator IND3: This indicator presents the final profits or losses for each health insurer in each year, after the final settlement of the ex-ante and ex-post payment schemes (2005 prices).

In columns two, three and four of table 6.4, the results are presented for IND3. Columns two and three show the maximum possible profits and losses of health insurers (with a population larger than 100,000), and MAR3 in column four measures the variation of profits and losses among health insurers. The maximum profits for health insurers turn out to be 5 euros per capita in the year 1993, rising to 35 euros per capita in 2004. The maximum losses (or minimum profits) show a similar trend, from 9 euros in 1993 to 44 euros in 2004. If we compare these numbers with the same numbers in table 6.2, then we observe

Table 6.4 The effect of ex-ante risk-adjusted and ex-post payments on insurers' total expenditures (euros, 2005 prices, numbers based on health insurers with enrollees > 100,000)*

Year	IND3 (with ex-post risk adjustment)		With ex-ante risk adjustment		With no risk adjustment		
	Maximum Profits	Minimum Profits	MAR3	MAR2 (Table 6.2)	MAR1 (Table 6.2)	$1 - \frac{\text{MAR3}}{\text{MAR1}}$	$1 - \frac{\text{MAR3}}{\text{MAR2}}$
1993	5	-9	3	105	109	0.98	0.98
1994	5	-8	2	88	100	0.98	0.98
1995	5	-4	2	67	102	0.98	0.97
1996	14	-20	6	40	109	0.95	0.86
1997	26	-33	14	33	107	0.87	0.56
1998	28	-20	10	44	113	0.91	0.77
1999	45	-36	16	33	104	0.85	0.52
2000	48	-98	24	55	108	0.78	0.57
2001	22	-45	13	42	89	0.85	0.68
2002	30	-22	11	36	92	0.88	0.69
2003	25	-16	8	34	89	0.91	0.75
2004	35	-44	15	43	105	0.86	0.66

*The numbers are approximate and rounded off. The numbers in the table are adjusted such that for each year total ex-ante risk-adjusted payments are equal to actual total health care expenditures.

that, due to the ex-ante and ex-post payments, the variation in possible profits and losses of health insurers has decreased substantially.

In column 7, we compare the variation after ex-ante and ex-post risk adjustment (MAR3) with a situation without risk adjustment (MAR1). It turns out that the variation has decreased in almost all years by more than 80%. Hence, possible profits and losses of health insurers have also decreased by more than 80%. This is the result of a combination of two opposing factors: an improvement in the ex-ante risk adjustment and a decrease in the ex-post payments. For example, in the year 1996, ex-ante risk adjustment decreased the variation of total health care expenditures without risk adjustment by about 31% (last column in table 6.2), the next ex-post payments decreased the remaining variation by another 86% (last column in table 6.4) to about 95% (column 7 in table 6.4). In the last year listed, 2004, the result is obtained in a different way. Due to an improvement in the risk-adjustment system, the variation in insurers' health care expenditures without risk adjustment decreased more than in 1996, to 74% (last column in table 6.2). Next, the ex-post payments have declined over the years (see table 4.2) which has decreased the variation less than in 1996, but still by another 66% (last column in table 6.4). Ultimately, this resulted in a decrease of total initial variation in insurers' health care expenditures by about 86% (column 7 in table 6.4).

7 The future of Dutch risk adjustment

7.1 Improving the data

Although a lot of progress has been made in improving the Dutch risk-adjustment system, there is still a lot of work to be done. In the short term, the main problem is gathering adequate data. The recent health insurance reforms imply many changes, not only for the consumers, health insurers and health care providers, but also for the risk-adjustment system. While before 2006 only two-thirds of the population (in the social health insurance system) fell under the risk-adjustment scheme, this scheme now covers the whole Dutch population, including those who were previously privately insured. For the latter population, many data are lacking. In the private insurance sector, no systematic gathering of the data ever occurred and some data are simply not available. For example, because of the high deductible schemes in the private health insurance sector, many consumers did not send in their bills to the health insurer. Another problem is the change in the hospital administration system. Through the introduction of the new administration system, individual expenditure patterns may change. For example, compared to the previous administration system, hospital costs of older people decreased while those of younger people increased (Van Barneveld et al. 2005). Of course, the Dutch government fully distinguishes these data problems and is continuously exerting efforts to improve the data.

7.2 Improving ex-ante risk adjustment

The main direction for the Dutch ex-ante risk-adjustment system is to improve the system further by adding new risk adjusters. Only recently, the Minister of Health informed the House of Representatives that the risk-adjustment system needed further development and that new PCG and DCG groups should be added to the system (Tweede Kamer, 2006c). Since it is likely that health insurers or researchers will always identify new groups of people that are not adequately risk-adjusted, the question remains: when do we stop adding new risk adjusters to the system? Hence, there is need for designing objective criteria for determining the optimal level of risk adjusters.

One of the main reasons for implementing a risk-adjustment system was to prevent risk selection. While before 2006 risk selection was prominent in the Dutch private health insurance system, it seemed absent in the Dutch social health insurance system (CPB, 2003). It is too early to say whether we will observe much risk selection in the new health insurance system. Compared to the Dutch social insurance system, health insurers' tools for applying risk selection have been increased. For example, insurers obtain more flexibility in specifying concrete entitlements in the basic benefit package. This may be a tool to exclude certain treatments or providers with a good reputation, thereby pushing expensive enrollees to other health insurers. The allowance of preferred provider arrangements also provides insurers with more tools to influence treatment decisions and may thereby create selection problems. Other new tools form the group contracts. As already stated in section 5, in 2006 some groups of chronically ill people could not receive a group contract,

presumably because their illness was not adequately compensated by the risk-adjustment system. Another difference with the social health insurance scheme is that, in the new system, for-profit health insurers enter the scene. A for-profit health insurer is expected to offer a return on investment to its shareholders and this may magnify the incentive for risk selection. Interviews with health insurers yielded that supplementary insurance seems to be the most prominent tool for applying risk selection. The reason is that many consumers obtain their basic and supplementary insurance from the same health insurers. Since consumers often have to fill in a health-based questionnaire before obtaining supplementary insurance, health insurers can use this information to (indirectly) refuse consumers basic health insurance (Erken, 2003). Recently, the House of Representatives asked the Dutch Minister of Health whether health insurers misused the risk-adjustment system. The question arose because one health insurer claimed at a conference that it was administratively relatively easy to assign bills from many patients to one patient in such a way that the final bill exceeds the 12,500 euro threshold of the ex-post high-risk equalization scheme (see section 4). The Minister of Health responded that he assessed the chances that insurers manipulate bills as low and that there were large fines for fraud (Tweede Kamer, 2005a).

Promoting competition may also provoke market developments that may worsen the quality of the risk-adjustment system in the longer term (Douven, 2004). Currently, health insurers and health care providers negotiate over the volume, quality and price of (individual) health care services. These negotiations deliver real product prices, which the competition authority uses to study market behaviour and which the government needs to perform risk adjustment. If, in the near future, competitive health care markets arise with more preferred provider arrangements, then health insurers and health care providers may eventually integrate vertically. Vertically integrated organizations will be mainly interested in their total production costs, instead of the cost structures of individual health services, since, on the market, the nominal premium is the only price that really matters. This may create data problems. For example, vertically integrated organizations may not set real prices, but may manipulate prices to maximize their ex-ante or ex-post payments from the health insurance fund. A story from the United States may be illustrative here (Hadley et al., 2002). In Medicare, Health Maintenance Organizations (HMOs) receive ex-ante risk-adjusted subsidies, but their (internal) prices of health care services are excluded from the calculations of the ex-ante risk-adjusted payments. These data about prices were unknown or unreliable. Risk selection by HMOs lead to populations that were healthier than average on the market and, since HMO data were excluded from the calculation process of the ex-ante risk-adjusted payments, the annual growth rate of the risk-adjusted payments grew faster than necessary.

Other future market developments may be specialisation of health insurers or health care providers in certain health care services, such as diabetics, for example. In itself, this development is favourable since it may increase efficiency. Problems may arise if one health care provider treats all (or most) diabetics. The main idea of risk adjustment is that acceptable risk-adjusted capitation payments can be determined by averaging out expenditures on all diabetic patients over all health insurers. However, if one insurer or provider holds all diabetics, then it will be much more difficult to determine optimal

capitation payments. A similar problem may occur if health insurers concentrate regionally. In risk adjustment, it is difficult to compensate health insurers adequately for differences in regional production structures. An inexpensive regional health insurer may claim to allocate these differences not according to lower regional wages or capital costs, but according to differences in providing health care services. In general, market developments are difficult to predict, but the first signs point to a more concentrated health insurer market in the future. In the first half of 2006, the health insurance market announced two new mergers. If the Dutch Competition Authority accepts these mergers, then the total market share of the six largest Dutch health insurer concerns will comprise more than 90% of the total market.

The (initial) success of the new health insurance system lead to new ideas in the political arena. There are now far advanced plans to expand the basic benefit package and to transfer forms of long-term care from the first compartment (AWBZ, see section 2.1) to the basic benefit package in the new health care system (ZVW). The main idea is that introducing more competition may increase efficiency in long-term care as well (Pomp et al., 2006). An important question here is whether these types of care, such as nursing home care and care for mentally handicapped people, can be adequately included in the risk-adjustment system. Recent research showed that designing a risk-adjustment system for long-term care is more complicated than for basic cure services (Van de Ven, 2005).

7.3 Abolishing ex-post payments

The other direction that the Dutch government is taking is to abolish the ex-post payment system, thereby increasing health insurers' financial risk. According to the Health Insurance Act, the retrospective equalization scheme should disappear by 2011. The decision is to abolish the ex-post retrospective compensation schemes as well, although the Health Insurance Act does not specify a concrete timeline. It only concludes that the timeline depends partly on the launching of the new hospital financing system (ZVW, 2005).

After some years, the only ex-post payment system left will be the high-risk equalization scheme. A remaining question here is how to determine the individual threshold and the corresponding equalization percentage (see section 4). A well-known aspect of this outlier scheme is that it not only picks up structural variation, but also random variation. An interesting alternative to the outlier scheme might be the ceding, ex-ante, of expected high-cost patients to a common pool (Van Barneveld, 2000). This outlier scheme targets people that the health insurer expects ex-ante to incur the highest losses, thereby excluding possible payments to health insurers due to random variation.

8 Conclusions

The objective of the new health insurance system in the Netherlands in 2006 is to increase efficiency by promoting more competition among health insurers. In the new Dutch health insurance system, health insurers obtain many more opportunities to offer preferred provider arrangements and to manage care. To preserve risk solidarity for the legally standardized basic benefit package, Dutch health insurers are obliged to charge a community-rated premium. These changes went along with a system of risk adjustment to compensate health insurers for enrollees with predictably high medical expenses. A system of risk adjustment in itself will not create more incentives for efficiency on the health care market, but adequate risk adjustment is a precondition for introducing more competition into the health care market.

An adequate system of risk adjustment cannot be built in a day, nor will there be a foreseeable end. It took the Dutch government more than ten years to introduce the first morbidity-based risk adjuster and, even after fifteen years, the development of the Dutch risk-adjustment system is still a dynamic process of continuously improving and updating the system. New risk adjusters may enter the system, or existing risk adjusters may be excluded from the system. This dynamic process is necessary for the government to anticipate the changing environment in health care and insurance markets, and to prevent health insurers profiting from the deficiencies of the existing risk-adjustment system. This implies that, in the future as well, the Dutch government or any other government that builds a risk-adjustment system will always have to exert new efforts to improve its risk-adjustment system.

The inclusion of morbidity-based risk adjusters into the risk-adjustment system can have a very large impact on the financial flows of health insurers. The empirical analysis shows that, during the years 2002-2004, ex-ante risk adjustment reduced the profits and losses of health insurers by about 60%. This implies that, even on average, predictable healthy and unhealthy people were unevenly distributed across Dutch health insurers. In the Dutch health insurance system, however, these changes in profits and losses did not actually occur, due to the existence of ex-post payment schemes in the Netherlands.

This analysis may have some important implications for Germany. If in Germany, as in the Netherlands, healthy and unhealthy people are unevenly distributed across health insurers, then the inclusion of morbidity-based risk adjusters into the risk-adjustment system may have a very large impact on insurers' financial flows. In Germany, the impact will be much larger than in the Netherlands since, in Germany, ex-post payment schemes are almost non-existent.

References

Barneveld, E.M. van, 2000, Risk sharing as supplement to imperfect capitation in health insurance: a trade-off between selection and efficiency, PhD thesis, Erasmus University Rotterdam, The Netherlands.

Barneveld, E.M. van, M. Ludwig, and J.S. Visser, 2005, Schadelastverschuivingen bij verzekeraars, Economische Statistische Berichten, 8 april 2005, pp. 162-165 (in Dutch).

CPB, 2003, Zorg voor concurrentie, Een analyse van het nieuwe zorgstelsel, CPB Document 28, The Hague, The Netherlands (in Dutch).

CTG/ZAIO, 2006, De Zichtbare Hand, uitvoeringstoets ziekenhuisbesteding, College Tarieven Gezondheidszorg en Zorgautoriteit in oprichting, Utrecht (in Dutch).

CTZ, 2004, Prestaties zorgverzekeraars bij inkoop ziekenhuiszorg, Publicatienummer 23, Health Care Insurance Board (CTZ), Diemen (in Dutch).

CTZ, 2005, Prestaties zorgverzekeraars bij inkoop kraamzorg, Publicatienummer 24, Health Care Insurance Board (CTZ), Diemen (in Dutch).

CVZ, 2003, Evaluatie verstrekkingenbudgettering ZFW 2002, Health Care Insurance Board (CVZ), Report 23074550, The Netherlands (in Dutch).

Dijk, van M., M. Pomp, R. Douven, T. Laske-Aldershof, F.T. Schut, W. de Boer and A. de Boo, 2006, Consumer price sensitivity in health insurance, CPB Discussion Paper 56, CPB, The Hague.

Douven, R. and H. Sahin, 2003, Deliberate consumer choice in health insurance, CPB Report 2003/1, pp 48-51, CPB, The Hague.

Douven, R. 2004, Risk adjustment in the Netherlands An analysis of insurers' health care expenditures, CPB-Discussion Paper 39, CPB, The Hague

Douven, R., 2005, Kwaliteit risicoverevening hangt af van marktontwikkelingen, Economische Statistische Berichten, pp. 290-292 (in Dutch).

Douven, R. and E. Schut, 2006, Health plan pricing behaviour and managed competition, CPB-Discussion Paper 61, CPB, The Hague.

Douven, R., M. Ligthart, H. Mannaerts and I. Woittiez, 2006, Een scenario voor de zorguitgaven 2008-2011, CPB-Document 121, CPB, The Hague (in Dutch).

Erken, O., 2004, Verzekerde Selectie?, CPB Memorandum 84, CPB, The Hague (in Dutch).

Goudriaan, R, 2001, Objectieve onderbouwing van een regiocriterium in het ZFW-verdeelmodel, APE-report 214, Research for the Dutch Ministry of Health, The Hague (in Dutch).

Goudriaan, R. and V. Thio, 2004, Grotestedenproblematiek en het regiocriterium, APE-report 246, Research for the Dutch Ministry of Health, The Hague (in Dutch).

Goudriaan, R., V. Thio, R.S. Halbersma and S.H. Meulenbelt, 2005, Regio in detail: analyses op buurt- en postcodeniveau, APE-report 246, Research for the Dutch Ministry of Health, The Hague (in Dutch).

Hadley, J., S. Maxwell, M. Moon and S. Zuckerman, 2002, The direct payment method for Medicare managed care plans: a concept paper, Washington DC, Health Policy Center, The Urban Institute.

Lamers, L.M. and R.C.J.A. Van Vliet, 2003, Health-based risk adjustment, improving the pharmacy-based cost group model to reduce gaming possibilities, *European Journal of Health Economics* 4, pp. 107-114.

Lamers, L.M. and R.C.J.A. van Vliet, 2004, The pharmacy-based cost group model: validating and adjusting the classification of medications for chronic conditions to the Dutch situation, *Health Policy* 68, pp. 113-121.

Lamers, L.M., R.C.J.A. Van Vliet, and W.P.M.M. van de Ven, 1999, Farmacie Kosten Groepen, een verdeelkenmerk voor normuitkeringen gebaseerd op medicijngebruik in het verleden, Institute of Health Policy and Management, Erasmus Medical Centre Rotterdam (in Dutch).

Lamers, L.M., R.C.J.A. Van Vliet, and W.P.M.M. van de Ven, 2003, Risk-adjusted capitation payment systems for health insurance plans in a competitive market, *Expert Review Pharmacoeconomics Outcomes Res.* 3(5), pp. 541-549.

Lamers, L.M., R.C.J.A. Van Vliet, and W.P.M.M. van de Ven, 2003a, Risk adjusted premium subsidies and risk sharing: key elements of the competitive sickness fund market in the Netherlands, *Health Policy* 65, pp. 49-62.

McClure, W. 1984, On the research of risk adjusted capitation rates, *Inquiry* 21, pp. 205-213.

Newhouse, J.P., 1996, Reimbursing health plans and health providers: efficiency in production versus selection, *Journal of Economic Literature* 34, pp. 1236-1263

Paolucci, F., A. den Exter and W.P.M.M. Van de Ven, 2006, Solidarity in competitive health insurance markets: analysing the relevant EC legal framework, *Health, Economics, Policy and Law* 1(2), pp. 107-126.

Pomp, M., E.S. Mot and R. Douven, 2006, Handle with care! Sturingsmodellen voor een doelmatige ouderenzorg, CPB-Document 122, CPB, The Hague (in Dutch).

Prinsze, F.J., W.P.M.M. van de Ven, D. de Bruijn and F.T. Schut, 2005, Verbetering risicoverevening in de zorgverzekering, Onderzoek uitgevoerd in

opdracht van de Nederlandse Patienten Consumenten Federatie (NPCF), Institute of Health Policy and Management, Erasmus Medical Centre Rotterdam (in Dutch).

Prinsze F.J., and R.C.J.A. van Vliet, 2005, Health based risk adjustment: improving the pharmacy based cost group model by addition of diagnostic cost groups, Working Paper presented at iHEA conference at Barcelona 2005, Institute of Health Policy and Management, Erasmus Medical Centre Rotterdam.

Rosenkranz, S.L. and H.S. Luft, 1997, Expenditure models for prospective risk adjustment: Choosing the measure appropriate for the problem. *Medical Care and Research Review* 54, pp. 123-143.

Schut, F.T. and W.H.J. Hassink, 2002, Managed competition and consumer price sensitivity in social health insurance, *Journal of Health Economics* 21, pp 1009-1029.

Tweede Kamer, 2005, Antwoorden van minister Hoogervorst op de vragen van het Kamerlid Kant (SP) over de uitspraken van Euro-commissaris mevrouw Kroes (2050601680), 11 november 2005, The Hague (in Dutch).

Tweede Kamer, 2005a, Antwoorden van minister Hoogervorst op kamervragen van het Kamerlid Omtzigt (CDA) over misbruik van het vereveningsfonds (2050604820), 12 december 2005, The Hague (in Dutch).

Tweede Kamer, 2006a, Ruimte voor betere zorg, Kamerstuk CZ/IZ-2695262 van Minister Hoogervorst, 6 september 2006, The Hague (in Dutch).

Tweede Kamer, 2006b, Antwoorden van minister Hoogervorst op de vragen van het Kamerlid Schippers (VVD) over mogelijke rekenfouten bij het College voor zorgverzekeringen (2050618010), 11 september 2006, The Hague (in Dutch).

Tweede Kamer, 2006c, Antwoorden van de minister op kamervragen van het Kamerlid Omtzigt over het weren van patiëntencategorieën door zorgverzekeraars (2050614250), 20 juni 2006, The Hague (in Dutch).

Van de Ven, W.P.M.M, 2005, Second Opinion 'Risicoverevening AWBZ', Erasmus Universiteit Rotterdam, Research in opdracht van het secretariaat van de IBO-Werkgroep 'Romp-AWBZ', 20 December 2005 (in Dutch).

Van de Ven, W.P.M.M. and R.P. Ellis, 2000, Risk adjustment in competitive health plan markets. In Culyer A.J. and J.P. Newhouse (eds.) *Handbook of Health Economics*, Vol 1A, Amsterdam, Elsevier, pp. 755-845.

Van de Ven, W.P.M.M., R.C.J.A. van Vliet and L.M. Lamers, 2005, Health adjusted premium subsidies in the Netherlands, *Health Affairs* 23 (3), pp. 45-55.

Van Vliet, R.C.J.A., 2006, Free choice of health plan combined with risk-adjusted capitation payments: are switchers and new enrollees good risks?, *Health Economics* 15, pp. 763-774.

Van Vliet, R.C.J.A., R. Goudriaan, S.H. Meulenbelt, V. Thio, 2005, Berekening normbedragen risicovereveningsmodel 2006, Research for the Dutch Ministry of Health, APE Report, WOR116b, The Hague (in Dutch).

Van Vliet, R.C.J.A. and L.M. Lamers, 2001, Morbiditeitsindicatoren voor het ZFW-verdeelmodel, Research for the Dutch Ministry of Health, Erasmus University Rotterdam (in Dutch).

Vektis, 2006, Verekerdenmobiliteit en keuzegedrag, May 2006, Zeist, The Netherlands (in Dutch).

VWS, 2006, Health Insurance in the Netherlands: The new health insurance system from 2006, The Ministry of Health Welfare and Sport, The Hague, the Netherlands.

ZVW, 2005, Besluit Zorgverzekeringswet, The Ministry of Health Welfare and Sport, 22 April 2005, kenmerk Z/VV-2577868, The Hague (in Dutch).

ZVW, 2006, Wijziging Regeling Zorgverzekering en Regeling beschikbare middelen verstrekking en vergoedingen Zfw 2005, The Ministry of Health Welfare and Sport, 25 September 2006, kenmerk Z/F-2717267, The Hague (in Dutch).