

# RISK-ADJUSTED CAPITATION: RECENT EXPERIENCES IN THE NETHERLANDS

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**Prologue:** “Americans know too little about the implementation of market-reform strategies in other countries,” says Alain Enthoven, whose work on managed competition has formed the underpinnings of the most recent health system reforms in the Netherlands. In fact, he continues, “the Dutch are further down the road to managed competition than we [Americans] are.” In this paper four leading Dutch researchers bring the American policy audience up to date on how managed competition is being implemented in their country. What is critical to the success of reforms, both in the Netherlands and in the United States, are risk adjustment mechanisms to prevent cream skimming—that is, to prevent plans from selecting the best health risks and avoiding those predicted to cost more. In a health system based on upfront capitation, health plans see it in their interest to attract persons whose costs will not exceed the amount paid to the plan for their care. Wynand van de Ven is a professor of health insurance in the Department of Health Policy and Management at Erasmus University Rotterdam, in the Netherlands. He holds a doctoral degree from the University of Leiden and has served as a consultant to health system reform efforts in New Zealand, Sweden, Russia, Poland, and Israel. Rene van Vliet is associate professor of health economics in the same department; his doctoral degree also is from Erasmus. Erik van Barneveld is an assistant professor in the department, where he focuses on the use of mandatory community-rated high-risk pooling, which is another element of the risk-adjusted capitation examined in this paper. Leida Lamers is also an assistant professor in the department. With a background in psychology, Lamers focuses her research on the use of diagnostic information as a potential risk adjuster.

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**Abstract:** The market-oriented health care reforms taking place in the Netherlands show a clear resemblance to the proposals for managed competition in U.S. health care. In both countries good risk adjustment mechanisms that prevent cream skimming—that is, that prevent plans from selecting the best health risks—are critical to the success of the reforms. In this paper we present an overview of the Dutch reforms and of our research concerning risk-adjusted capitation payments. Although we are optimistic about the technical possibilities for solving the problem of cream skimming, the implementation of good risk-adjusted capitation is a long-term challenge.

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The Dutch government and parliament decided in 1988 to radically reform the health care system. Regulated competition among insurers as well as among providers is a crucial element of the reforms. The Dutch model could be considered the first attempt at nationwide implementation of Alain Enthoven's Consumer-Choice Health Plan.<sup>1</sup> There are close similarities between the proposed Dutch reforms and proposals for health care reform in, for example, the United States, Russia, Israel, and Germany. An important common element is that consumers may choose from among competing health insurance plans, which are largely financed through premium-replacing capitation payments.

A major technical problem is the development of risk-adjusted capitation payments, which competing health insurers would receive from a regulatory agency, such as a health alliance or a central fund, for each member. The payment amount varies depending on the risk group to which the insured person belongs. Risk-adjusted capitation payments either may constitute the entire revenue for insurers or may be supplemented by additional premiums. The payments are intended to provide competing insurers with an incentive for efficiency. However, if the risk groups involved are too heterogeneous, insurers may engage in cream skimming, or preferred risk selection. In so doing, insurers select so-called preferred risks, that is, insured persons whom the insurer expects to be profitable, given the system of capitation payments and given the regulations for setting additional premiums.<sup>2</sup>

Here we first give an overview of the proposed health care reforms in the Netherlands and describe how since 1993 risk-adjusted capitation payments have been implemented in the public health insurance system. Next we review recent results of Dutch research on risk-adjusted capitation payments and discuss whether cream skimming in a competitive health insurance market can ever be prevented. Finally, we discuss the relevance of our conclusions for other countries.

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## Health Care Reforms In The Netherlands

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**Compulsory health insurance and regulated competition.** The Dutch health care system is characterized by a high degree of detailed, direct

government regulation of volume, planning, and prices and by a mixture of several health insurance schemes. The failure of detailed government regulation has prompted attempts at reform. Furthermore, the present health insurance system has several problems, and incentives for efficiency are lacking. The proposed system can best be characterized as a compulsory health insurance system for the entire population based on regulated competition. Direct government control over prices and productive capacities will have to make way for regulated competition among insurers and among health care providers. Price cartels and regional cartels that have emerged from anticompetitive government regulation and self-regulation will be broken down.

**Central Fund.** The benefit package of the compulsory health insurance system will be broad, covering hospital care, physician services, drugs, physical therapy, and some dental care.<sup>3</sup> All persons will receive a subsidy toward their compulsory health insurance premiums through one of the competing insurers. The subsidy will come from a Central Fund, which is filled with mandatory, income-dependent contributions paid through taxation. From the Central Fund the subsidy will go directly to the qualified insurer chosen by the insured person. Qualified insurers must have an open enrollment period once every two years and must follow other procompetitive regulations. The subsidy per person is a risk-adjusted capitation payment that does not vary by insurer. The payment will be equal to the predicted per capita costs within the risk group to which the insured person belongs, minus a fixed amount. This fixed amount is the same for all persons and will be about 10 percent of the average predicted per capita costs of the compulsory health insurance. The deficit generated by this deduction is filled by a community-rated premium paid by the insured person directly to the insurer of choice. A community-rated premium implies that an insurer is obliged to quote the same premium to all insured persons who choose the same insurance option. Each insurer is free to set its own premium. This premium will reflect the difference between capitation payments and actual costs, thus creating an incentive for competing insurers to be efficient.

**Insurers as prudent buyers of care.** Insurers are expected to function as intermediaries between consumers and providers. To a great extent, insurers and providers will be free to negotiate the conditions of contracts. The benefit package of the compulsory health insurance system by law will be described not in terms of institutions such as hospitals or health centers, but rather in terms of types of care. Any supplier meeting certain quality standards may provide these services, thus greatly increasing opportunities for substitution of care. Insurers will be allowed to contract selectively with providers and to offer different insurance options (as do, for instance,

health maintenance organizations [HMOs], preferred provider organizations [PPOs], and traditional health insurers), provided that they cover all of the types of care specified in the law. Consumers will be free to choose from among different insurers. Premiums will reflect the efficiency and cost-generating behavior of the contracted health care providers.

**Past the point of no return.** According to the government's proposal, the reforms were slated to be implemented by the end of 1994. When we look at the two key elements of the proposed reforms—compulsory health insurance and regulated competition—we may conclude, however, that at the end of 1994 neither had been implemented. Nevertheless, in the early 1990s fundamental procompetitive changes in legislation have been achieved, giving us ground to expect that the point of no return toward regulated competition is past.<sup>4</sup>

One of these fundamental changes was the introduction in 1993 of risk-adjusted capitation payments in the Dutch public health insurance market. Simultaneously, this market was made potentially competitive by giving each consumer a biennial choice of health plan. During the past fifty years the sickness funds, which administer the public health insurance, were fully reimbursed for all of the health care expenditures of their members. In most regions there were only one or two sickness funds, so real consumer choice did not exist. Now all twenty-six sickness funds are working nationwide.<sup>5</sup> As of 1994 the funds had the option to selectively contract with providers and can offer different health plans to their members (for example, with or without a deductible). Within a short period, sickness funds were transformed from purely administrative bodies into risk-bearing enterprises, although their risk is still restricted.

For 1993 and 1994 the risk-adjusted capitation payments are based solely on age and sex. These risk adjusters, however, are much too crude. From an earlier study we conclude that, roughly speaking, in a given year the 10 percent of the population with the highest health expenditures (for hospital care, physician services, and prescription drugs) have expenditures in (at least) the next four years that are on average roughly double the per capita expenditures within their age and sex category.<sup>6</sup> Further, the healthier half of the population—that is, those without expenditures for hospital or specialist care or those without prescription drugs—have 25-40 percent lower per capita expenditures in (at least) the next four years than the average within their age and sex category. So, if the risk-adjusted capitation payments are based only on age and sex, each sickness fund can easily identify high- and low-risk persons simply by using its own claims records.

**Blended payments.** To reduce the disadvantages of risk groups that are too heterogeneous, the Dutch government introduced a partial capitation system. In 1993 and 1994 the sickness funds are responsible for only 2.5

percent of the difference between their actual expenses and predicted expenses based on age and sex. The remaining 97.5 percent is retrospectively reimbursed. In essence, this boils down to a blended payment system, as proposed by Joseph Newhouse, in which the weight on current expenditures is 0.975 and the weight on age/sex-predicted expenditures is 0.025.<sup>7</sup> To reduce the weight on current expenditures, thereby increasing insurers' financial incentive for efficiency, the risk adjustment formula needs to be improved.

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### **Empirical Research On Risk-Adjusted Capitation Payments**

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In one of our first studies on risk-adjusted capitation payments, we concluded that the most promising risk adjusters are diagnostic information related to prior utilization, disability, functional health status, and indicators of chronic medical conditions.<sup>8</sup> Here we review the main results of our empirical research on these and other risk adjusters.

**Diagnostic information related to prior hospitalizations.** Arlene Ash and colleagues have developed various variants of so-called diagnostic cost groups (DCGs) and have used them as risk adjusters.<sup>9</sup> The essence of DCGs lies in the allocation of people to a restricted number of groups according to diseases diagnosed during prior hospitalizations and incorporating this information in the risk-adjusted capitation payment model. Ash and colleagues tested the DCG adjusters on a database of U.S. Medicare-insured persons, a population composed mainly of persons age sixty-five and older.

We applied the DCG adjusters to a database of about 200,000 persons in the Netherlands, both aged and nonaged persons.<sup>10</sup> The results were comparable to those found in the Ash study. The addition of DCG adjusters to an age/sex-based risk-adjusted capitation payment model is a clear improvement. The percentage of the variance in the annual spending of individuals that was predicted for annual per capita spending more than doubled (from 3.2 percent to 6.6 percent).<sup>11</sup> The predictable future losses that an insurer will incur on the 5 percent of persons with the highest costs in a given year fell from 224 percent to 24 percent of the risk-adjusted predicted expenditures (Exhibit 1).<sup>12</sup>

Although the DCG adjusters on average substantially diminish predictable profits and losses, these are not reduced to zero. The average loss of 26 percent for persons who in the base year had expenditures between 1 and 2,500 guilders (U.S.\$1.80-\$4,545) is primarily caused by the high losses (74 percent) for persons with outpatient costs above 1,000 guilders (\$1,818). This group likely contains a relatively large proportion of chronically ill persons who have had no hospitalization in the base year. The average loss of 24 percent for persons who in the base year had expenditures

Exhibit 1  
Profits And Losses For Two Models Of Risk-Adjusted Capitation Payment

Costs of persons in base year (in guilders)	Percent insured	Percent of costs predicted in the next year <sup>a</sup>	
		Age/sex adjusted	Age/sex and DCG adjusted
Total costs			
0	62.6%	44%	30%
1-2,500	31.8	-13	-26
More than 2,500	5.6	-224	-24
Inpatient costs			
0	93.9	19	0 <sup>b</sup>
1-2,500	1.8	-121	41
More than 2,500	4.3	-235	-18
Outpatient costs			
0	63.3	40	28
1-1,000	30.7	-16	-8
More than 1,000	6.0	-172	-74

Source: R.C.J.A. van Vliet and W.P.M.M.van de Ven, "Capitation Payments Based on Prior Hospitalizations," *Health Economics* 2 (1993): 177-188, Table 4.

Notes: Profits and losses equal costs predicted on risk adjusters in the risk-adjusted capitation payment minus actual costs. "Costs" refers to expenditures for hospital and specialist care. DCG is diagnostic cost group.

<sup>a</sup> Profit and loss of the next year as a percentage of costs predicted.

<sup>b</sup> No statistically significant difference between actual and predicted mean costs (two-sided t-test,  $p > 0.05$ ).

above 2,500 guilders (\$4,545) is nearly completely caused by the large losses (about 250 percent of risk-adjusted capitation payments) on the 0.25 percent of the population that had expenditures above 25,000 guilders (\$45,455) in that year.<sup>13</sup>

**Recipients of disability benefits.** If risk-adjusted capitation payments are based only on age and sex, it is profitable for an insurer to have as few members who receive disability benefits as possible. We found that the future losses for these disabled persons (about 6 percent of the population) are 71 percent of the predicted expenditures based on age, sex, and region.<sup>14</sup> In another study we found similar results: an average predictable loss of 93 percent of the predicted expenditures based on age and sex for persons who are disabled and unable to work or are unemployed.<sup>15</sup> Results from studies in the United States also indicate that disabled and functionally impaired persons have roughly twice the health care expenditures of those who are unimpaired.<sup>16</sup> We agree with Newhouse that disability status seems like a nearly ideal risk adjuster.<sup>17</sup>

**Self-reported chronic conditions.** In an earlier study we analyzed risk-adjusted capitation payments in a database comprising some 20,000 respondents from the Dutch Health Interview Survey (DHIS).<sup>18</sup> In the basic risk-adjusted capitation payment model we included age, sex, insurance coverage, region, employment status, and family size as risk adjusters. This

model explained 3.2 percent of the variance in the imputed health care costs of individuals. The addition of self-reported chronic conditions raised this figure to 7.1 percent. Including number of physical impairments and self-rated general health status raised the figure to 10.9 percent. Although self-reported chronic conditions and perceived health status are powerful predictors of health expenditures, they might not be ideal risk adjusters, because they are vulnerable to manipulation.

**Region and ZIP code.** When considering region or ZIP code as a potential risk adjuster, the question arises for which risk factors the risk-adjusted capitation payment ideally should adjust: for differences in health status only, or also for other cost-determining factors such as the price and supply of health care? The adjusted average per capita cost (AAPCC) capitation payment that U.S. HMOs receive for Medicare patients is designed to represent the local per capita fee-for-service costs that would have been spent if the Medicare recipient had remained in the fee-for-service sector instead of enrolling in the HMO. Then an index of the regional health expenditure level is a good risk adjuster. However, according to the proposed Dutch health care reforms, risk-adjusted capitation payments should take into account health status only, and not the price and supply of health care in a region. These should be reflected in an insurer's community-rated premium. In that case, a regional cost index probably would do more harm than good.

We used DHIS data to construct a regional health index.<sup>19</sup> For a particular region, this is the ratio between expected costs in that region based on age, sex, and available health indicators (chronic conditions, physical impairments, and self-rated health status) on the one hand, and expected costs based on age and sex alone on the other. Subdividing the Netherlands into five regions by degree of urbanization yielded ratios ranging from 0.95 to 1.08. Adding such a regional health index to the risk adjusters of age and sex makes the risk-adjusted capitation payments more in accordance with the stated premises about such payments in the Netherlands. Although the regional health index stems from sample data of perceived health status and self-reported chronic conditions, its vulnerability to manipulation seems acceptably low, at least for the next few years.

**Consumer choice of a high- or low-option plan.** In the proposed Dutch reforms and also in U.S. proposals for managed competition, consumers may choose between high-option and low-option health insurance plans. In a low-option plan, the consumer has a higher deductible and pays a lower premium than in a high-option plan. However, this consumer choice may result in adverse selection; that is, high risks (those in poor health) may choose the high-option plan, and low risks may choose the low-option plan. Because of this, risk-adjusted capitation payments may

overcompensate insurers for consumers choosing the low-option plan and undercompensate for those choosing the high-option plan.

We estimated these effects on a panel database comprising both administrative and survey information for 14,000 privately insured persons.<sup>20</sup> The analysis was based on answers to the following question: "Would you like to have a health insurance plan with a deductible if you got an appropriate premium reduction?" All respondents had the same insurance coverage, because the insurance company did not yet offer policies with deductibles. In the year following the survey, average expenditures on hospital and specialist care for those respondents who did not want a deductible (the high-option group) were 57 percent higher than for those who preferred a deductible (the low-option group). Because all respondents had the same insurance coverage, moral hazard does not affect this difference.

An important question is the degree to which the adjusters used to calculate risk-adjusted capitation payments can explain the 57 percent difference. Exhibit 2 shows that the average over- and undercompensation as a result of adverse selection can be greatly reduced. When we use all available risk adjusters (that is, age, sex, supplementary insurance, region, five health indicators, and prior costs), the average over- and undercompensation is reduced by about 80 percent, compared with use of no adjusters at all. Recent research shows that refined systems of risk adjustment can do an even better job in predicting health care expenditures of individuals.<sup>21</sup> We therefore conclude that, given an appropriate set of

## Exhibit 2

### Over- And Undercompensation, Apart From Moral Hazard, For Consumers Preferring A High-Option Or A Low-Option Health Plan

Risk adjuster	Percent of predicted costs in the year after choice a	
	Low-option plan <sup>b</sup>	High-option plan <sup>c</sup>
No adjuster	24%	-20%
Age/sex	16	-11
Age/sex plus region and supplementary insurance	14	-10
Above, plus five health indicators <sup>d</sup>	8 <sup>e</sup>	-5 <sup>e</sup>
Above, plus last year's costs	5 <sup>e</sup>	-3 <sup>e</sup>

**Source:** W.P.M.M. van de Ven and R.C.J.A. van Vliet, "Consumer Information Surplus and Adverse Selection in Competitive Health Insurance Markets," *Journal of Health Economics* (forthcoming).

**Notes:** Over- and undercompensation equals predicted costs minus actual costs. "Costs" refers to expenditures for hospital and specialist care.

<sup>a</sup> Over- and undercompensation as a percentage of predicted costs in the year after consumers express their choice of health plans.

<sup>b</sup> 46 percent of respondents.

<sup>c</sup> 54 percent of respondents.

<sup>d</sup> Includes GP consultations, prescribed drugs, disability, days of illness, health change.

<sup>e</sup> Based on differences that are not statistically significant ( $p > 0.05$ ).



adjusters, there need not be any substantial over- or undercompensation as a result of adverse selection when consumers have a choice of whether to take a deductible (with a reduced premium) for a one-year health insurance contract with otherwise identical benefits. However, so long as the risk-adjusted capitation payment is based only on age, sex, and some other poor adjusters, one might consider incorporating the consumer's choice of a high- or low-option plan in the risk-adjusted capitation payment, to eliminate the under- and overcompensation that otherwise would take place.

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### Current Research On Risk-Adjusted Capitation

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From the results of the empirical research outlined above, we conclude that the following risk adjusters, alongside age and sex, can be considered promising: diagnostic cost groups (based on prior hospitalization), disability, regional health index, and, possibly, consumer choice of a high- or low-option plan. Our findings so far inspired the following research projects on which we are working now.

**Multiyear diagnostic cost groups.** We concluded from our analysis of DCG adjusters that a major weakness was the high losses for the small group of persons with the highest outpatient care expenditures in the base year. We hypothesized that this group contains a relatively large proportion of chronically ill persons who had no hospitalization in the base year. One way to capture this group is to look at diagnostic information related to other forms of prior utilization, for example, prescription drugs or outpatient care.<sup>22</sup> We are now exploring a different approach, namely, so-called multi-year DCG adjusters. That is, we assign to each DCG adjuster not only a weight for the next year, but also weights for a couple of years after that. The rationale for this is twofold. First, a serious hospitalization in a given year might induce predictably above average expenditures not only in the year directly following but, possibly to a diminishing degree, also in years after that (without necessarily resulting from a new hospitalization). Second, by giving higher risk-adjusted capitation payments for people who were hospitalized for certain diagnoses during one of the previous years (instead of only during the past year), we increase the probability that an insurer will receive an appropriate risk-adjusted capitation payment for chronically ill patients,

Preliminary results with respect to multiyear DCGs are promising.<sup>23</sup> We analyzed a data set of about 50,000 persons, which contained expenditures for hospital care, specialist care, dental care, physical therapy, and some ancillary services over the period 1988-1991. We first calculated the risk-adjusted capitation payment for each person for 1991 based on age, sex, and indicators for disability status, employment status, and urbanization. The

predictable losses (that is, predicted costs based on the risk-adjusted capitation payment adjusters minus actual costs) in 1991 for the 7 percent of persons with the highest outpatient costs in 1988 would then be equal to 98 percent of their predicted costs based on the risk-adjusted capitation payment adjusters. The addition of a one-year DCG adjuster to the risk-adjusted capitation payment formula reduced the predictable losses to 79 percent of the predicted costs. The addition of two-year and three-year DCG adjusters further reduced this to 38 percent.

**Mandatory community-rated high-risk pooling.** Another weakness of the DCG adjusters is the large loss that we found for the small group of persons who had expenditures above 25,000 guilders (\$45,455) in the base year. To solve this problem, we are analyzing a system of mandatory community-rated high-risk pooling. Under this scheme, each insurer would be obliged to pool all (or some) expenditures of a specified percentage of its insured persons (for example, 1 or 2 percent) and to pay to the pool a premium that depends only on the size of the insurer's portfolio. In advance of each year, the insurer informs the pool which of its insured persons will be pooled that year. The group of pooled members may change every year. This high-risk pooling may take several forms. For example, it could apply only to certain costs above a threshold, or to a certain percentage of those costs, or to a combination.

The purpose of mandatory community-rated high-risk pooling is not to reduce insurers' financial risk or their probability of going bankrupt. This might be done via voluntary risk-rated reinsurance or by solvency requirements from government. The purpose of mandatory community-rated high-risk pooling, rather, is to reduce insurers' incentive for cream skimming. Insurers will pool only those persons for whom they expect to be highly underpaid by the risk-adjusted capitation payments. If retrospectively it turns out that an insured person has had extremely high expenditures, but these high expenditures were unpredictable, cream skimming is not a problem. Insurers should be compensated as little as possible for unpredictably high outliers. It is the insurer's job to deal with these uncertainties. Because an insurer remains responsible for the costs of persons with unpredictably high expenditures and because the group of pooled members is relatively small, the latter may be "free riders" as far as the insurer's managed care activities are concerned.

There are clear analogies between mandatory community-rated high-risk pooling and the high-risk pools in the United States. Major differences, however, are that under mandatory community-rated high-risk pooling the pooled members pay the same premium as others, they have the same benefit package, and they are even unaware that their insurer has put them in the pool.

The results of preliminary empirical analyses with respect to mandatory community-rated high-risk pooling are promising.<sup>24</sup> We are now analyzing a data set of hospital spending for about 73,000 persons. For the 1 percent of persons with the highest costs in the base year, the actual expenditures next year are about 500 percent above the predicted costs based on age and sex. For the next 1 percent group (the ninety-ninth percentile) with highest costs in the base year, this percentage falls to about 200 percent above predicted costs. These figures illustrate how mandatory community-rated high-risk pooling for 1 percent of an insurer's portfolio might reduce predictable losses in the case of risk-adjusted capitation payments based on age and sex, if insurers select their pooled insured simply on the basis of the past year's costs. Insurers likely will have better predictors, so the above example underestimates the potential reduction of predictable losses due to mandatory community-rated high-risk pooling. In the above example, about 11 percent of next year's costs would be pooled.

An alternative to such risk pooling might be to retrospectively pool all expenditures for the 1 percent of insured persons with the highest costs. In that case, 42 percent of the costs would be pooled. However, the biggest part of these costs would be unpredictably high; thus, cream skimming would pose no problem, and pooling of these costs would be unnecessary.

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### Can Cream Skimming Be Prevented?

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A crucial question for policymakers who are attempting health care reform is whether a risk-adjusted capitation payment system, including its regulatory scheme, can be set up in such a way that cream skimming is prevented to a sufficient extent.

**Risk-adjusted capitation payment formula.** An effective way to prevent cream skimming is to refine the risk-adjusted capitation payment formula so that insurers cannot predict which insured persons will be profitable or unprofitable. The maximum predictable variance among individuals in annual, short-term health care expenditures is estimated to be around 15 percent and is unlikely to exceed 20 percent.<sup>25</sup> But can regulators ever achieve such a formula, and, if not, is predicting a lower percentage of the predictable variance good enough?

In a paper published previously in *Health Affairs*, Newhouse concluded that research so far shows that fully prospective risk adjustment formulae predict only around 20 to 30 percent of the predictable variance.<sup>26</sup> Further, Newhouse believes that further research can yield only modest improvement. He concluded that the amount of profit a plan can make by exploiting its proprietary information on risk (that is, information available to the insurer and not to the regulator) is a nonlinear function of the amount of

that information and, from the point of view of the regulator, that the nonlinearity is in exactly the wrong direction. In other words, although additional relevant adjusters in the risk-adjusted capitation payment formula will reduce an insurer's maximum attainable profit from cream skimming, the reduction of these profits increases with each additional percentage point of variance explained by the formula. In particular, the last percentage point of variance explained has a much larger effect on profit than the earlier changes have. Based on these arguments, Newhouse is pessimistic about whether a satisfactorily working, fully prospective risk adjustment formula is attainable. For the following reasons, however, we are more optimistic.

First, Newhouse considers only a fully prospective risk adjustment formula and so rules out measures of prior use as adjusters. However, besides being dependent on various health status characteristics, an acceptable (at least for now) risk-adjusted capitation payment also might depend on diagnostic information related to prior hospitalization, use of prescription drugs, or ambulatory care (ambulatory care groups, or ACG adjusters).<sup>27</sup> These adjusters might predict an additional 20 to 30 percent of the predictable variance.

Second, the conclusion that a plan's profit is a nonlinear function of its proprietary information on risk is based on a theoretical analysis under the assumption that the variance explained by the regulator's adjusters is negligibly small. However, in drawing conclusions Newhouse considers a variance explained by the regulator that approaches 100 percent of predictable variance. It can be shown that at such levels the underlying assumption results in an overestimation of the profit per enrollee of about 56 percent, which in turn implies an overestimation of the nonlinearity.<sup>28</sup> Whether the remaining (non)linearity is acceptable remains open for discussion.

Third, when the regulator improves its risk adjustment formula, not only will a health plan's potential profits from cream skimming decrease, but also the standard deviation of its profits will increase (up to a factor of three). As a result, the plan's uncertainty will increase about whether the selection of a certain number of enrollees the plan thinks to be overpriced will indeed yield a profit. Therefore, when the regulator improves the risk adjustment mechanism, an insurer has to increase the minimum number of selected enrollees to be quite sure that a selection strategy yields profits, not losses. This will increase the costs of the selection strategy, reduce its probability of success (because competitors may have the same strategy), and increase the probability that the regulator detects the cream-skimming strategy.

Fourth, one has to take into account an insurer's costs of cream skimming, which are clearly not zero. Information is not free, and a bad reputation resulting from cream-skimming strategies, such as keeping patients

from the highest-quality care, also is a cost to an insurer. Therefore, the regulator does not need to have a “perfect” risk adjustment formula. In theory, the risk-adjusted capitation payment formula should be refined to such an extent that insurers expect the cost of cream skimming to exceed its profits. By refining the risk-adjusted capitation payment formula, that is, by making the risk groups more homogeneous, the cost of cream skimming will increase—it becomes more difficult and therefore more costly to determine who are the preferred risks, and the process of cream skimming itself would have to be more sophisticated, making it more expensive—while on average the profits of cream skimming will fall, and the variation of expected profits will rise.<sup>29</sup> Therefore, refining the capitation formula, on balance, lowers cream skimming’s financial attractiveness to insurers. At what level of refinement cream skimming will become financially unattractive to insurers remains an open question.

Fifth, if the regulator’s adjusters predict a substantial amount of predictable variance, one may wonder whether small health plans with, say, 25,000 or fewer members, indeed could obtain accurate information on the (un)profitability of subgroups within the risk groups formed by the regulator’s adjusters. Large insurers, which have more accurate information on risk than small insurers have, might be reluctant to use this information for cream skimming because they are more vulnerable than small insurers to losing their reputation.

Sixth, given a fixed number of potential enrollees under the risk-adjusted capitation payment scheme, cream skimming is a zero-sum game. One insurer’s profits are another’s losses. Losers will have a strong financial incentive to advise the regulator about potential improvements in the risk-adjusted capitation payment formula. For example, the sickness fund in Amsterdam, which under the current risk-adjusted capitation payment formula incurs the largest losses per enrollee, is closely (and successfully!) cooperating with the regulator to improve the formula. So even if there exists an information asymmetry between regulator and insurers, losers will have a natural incentive to reduce this asymmetry.

Finally, Newhouse uses “explained variance” as an indicator of “information on risk.” Because explained variance is a quadratic function of predicted expenditures, whereas profit is a linear function of predicted expenditures in the profitable population, it is not directly clear how to interpret the nonlinear relation between a health plan’s “proprietary information on risks” and “profits.” For example, the relation between the square root of explained variance and profit appears to be linear. One may wonder whether in this context explained variance is the most appropriate indicator of “information on risk.”

**Procompetitive regulation.** Based on the arguments outlined above, we

do not share Newhouse's pessimism. Furthermore, to prevent cream skimming we do not need a "perfect" risk-adjusted capitation payment formula. The degree to which such a formula functions satisfactorily also depends on the regulatory regime. Besides open enrollment, standardized benefits, and all forms of mandatory community-rated high-risk pooling, the following measures also might prevent cream skimming: risk-rated (instead of community-rated) premiums, qualification of insurance contracts, no direct contact between an insurer's sales representative and applicants during the enrollment process, publication of results of consumer satisfaction surveys, and ethical codes for insurers.<sup>30</sup> The regulator should constantly monitor the behavior of insurers, and evaluate and periodically adjust and improve the risk-adjusted capitation payment formula. Because of this, insurers' uncertainty increases about which persons over time will be (un)profitable, thereby lessening the use of long-term cream-skimming strategies.

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## Conclusions And Discussion

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Market-oriented health care reform has emerged in the Netherlands over the past few years that shows a clear resemblance to proposals for managed competition in the U.S. health care system. As a result of the way risk-adjusted capitation payments have been implemented, sickness funds have hardly any financial incentive for efficiency. For this reason, government has not given up its old regulatory tools for cost containment. Consequently, government has not achieved one of the major goals of the health care reforms: to share the responsibility for cost containment and efficiency with other parties, especially insurers. Sickness funds, in turn, maintain that it is unfair to give them financial responsibility if they lack the tools for improving efficiency. This vicious circle can only be broken by the introduction of a sufficiently refined system of risk-adjusted capitation payments and an appropriate regulatory scheme. It is expected that in 1995 disability and a regional health index will be introduced as additional risk adjusters. The sickness funds are in favor of implementing a form of mandatory community-rated high-risk pooling.

**Reasons for optimism.** In this paper we have presented an overview of recent results of our research concerning risk-adjusted capitation payments. Based on these results and other findings in the literature, we think that it is technically possible to find a risk-adjusted capitation payment formula that, although not "perfect," can predict a substantial amount of predictable variance. A "perfect" formula is not necessary to prevent cream skimming. We have mentioned several forms of procompetitive regulation that can help to prevent cream skimming. In sum, we are optimistic about the technical possibilities to prevent cream skimming in a competitive health

insurance market.

**Monopsonistic insurance market?** Those who are not convinced of the effectiveness of the potential solutions to the cream-skimming problem may favor a combination of a monopsonistic market for health insurance and a competitive provider market. However, the prevention of cream skimming is also relevant for a competitive provider market, in which competing groups of providers receive an ex ante determined capitation payment to provide (or to purchase) a defined set of services to a defined population group, such as the system of fundholding for general practitioners (GPs) in the United Kingdom.<sup>31</sup> Whether cream skimming will be either a bigger or a smaller problem in a competitive provider market than in a regulated competitive insurance market remains to be seen. On the one hand, providers have more opportunities for cream skimming than insurers do because they probably have better information about the riskiness of their patients and because they can use more subtle tools (for example: “My colleague around the corner is specialized in treating your disease”). On the other hand, providers may be more reluctant to skim the cream because of more powerful ethical restraints.

**A long way from theory to practice.** Although we are optimistic about the technical possibilities to prevent cream skimming, the realization in practice will require considerable effort. Both the Dutch and the British governments have severely underestimated the problem of cream skimming and, consequently, the need to develop sufficiently refined risk-adjusted capitation payments. Insurers have always raised many critical questions about risk-adjusted capitation payments and see them as an instrument by which the government will get a stronger grip on the insurance business. Experience with the AAPCC in the United States shows that, although there is a large body of knowledge, the implementation of good risk-adjusted capitation payments is a long way from theory to practice. Nevertheless, cream skimming truly is the Achilles’ heel of a wide range of market-oriented strategies in health care that are being discussed and implemented these days in many countries. Therefore, efforts aimed at the prevention of cream skimming deserve a very high priority from both researchers and policymakers.

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## NOTES

1. A.C. Enthoven, "Consumer Choice Health Plan: A National Health Insurance Proposal Based on Regulated Competition in the Private Sector," *The New England Journal of Medicine* 298 (1978): 709-720
2. In this paper we assume some form of regulation with respect to the additional premium, for example, community rating or community rating by class. If the additional premiums are allowed to be risk-rated, cream skimming will not occur, because insurers will then adjust a person's additional premium to the person's expected costs minus his or her risk-adjusted capitation payment.
3. National health insurance for exceptional medical expenses has existed since 1968. The new government that came into office in August 1994 decided in contrast to the reform proposals of the previous government to create a separate regulatory scheme for these exceptional medical expenses (such as long-term care) apart from the competitive regulatory scheme for acute care. For a discussion of this aspect of the reform proposal, see W.P.M.M. van de Ven and F.T. Schut, "Should Catastrophic Risks Be Included in a Regulated Competitive Health Insurance Market? New Insights after Five Years of Health Care Reforms in the Netherlands," *Social Science and Medicine* 39 (1994): 1459-1472.
4. *Ibid.*
5. Because of mergers, the number of sickness funds dropped from fifty-three in 1985 to twenty-six in 1993. There is speculation that in the long run there will be only some ten health insurers in the Netherlands (for a population of fifteen million).
6. R.C.J.A. van Vliet and W.P.M.M. van de Ven, "Towards a Capitation Formula for Competing Health Insurers: An Empirical Analysis," *Social Science and Medicine* 34 (1992): 1035-1048.
7. When Newhouse advocated partial capitation, he was, of course, not contemplating a weight of only 2.5 percent on the capitation payment, as currently implemented in the Dutch scheme. J.P. Newhouse, "Patients at Risk: Health Reform and Risk Adjustment," *Health Affairs* (Spring I 1994): 132-146.
8. W.P.M.M. van de Ven and R.C.J.A. van Vliet, "How Can We Prevent Cream Skimming in a Competitive Health Insurance Market?" in *Health Economics Worldwide*, ed. P. Zweifel and H.E. Frech III (Dordrecht: Kluwer Academic Publishers, 1992), 23-46.
9. A. Ash et al., "Adjusting Medicare Capitation Payments using Prior Hospitalization Data," *Health Care Financing Review* (Summer 1989): 17-30.
10. R.C.J.A. van Vliet and W.P.M.M. van de Ven, "Capitation Payments Based on Prior Hospitalizations," *Health Economics* 2 (1993): 177-188.
11. *Ibid.*, Table 3.
12. In guilders the losses are reduced from 2,483 to 696, a reduction of 72 percent.
13. Van Vliet and van de Ven, "Capitation Payments Based on Prior Hospitalizations," Figure 2.
14. L.M. Lamers, "WAO'er ook ongeschikt als verzekerde," *Inzet* (October 1993): 17-18.
15. R.C.J.A. van Vliet, "Normuitkeringen in de gezondheidszorg," *Openbare Uitgaven* 22 (1990): 75-86.
16. J. Lubitz, J. Beebe, and G. Riley, "Improving the Medicare HMO Payment Formula to Deal with Biased Selection," in *Advances in Health Economics and Health Services Research*, vol. 6, ed. R.M. Scheffler and L.F. Rossiter (Greenwich, Conn.: JAI Press, 1985), 101-122; and L. Gruenberg, C. Tompkins, and F. Porell, "The Health Status and Utilization Patterns of the Elderly: Implications for Setting Medicare Payments to HMOs," in *Advances in Health Economics and Health Services Research*, vol. 10, ed. R.M. Scheffler and L.F. Rossiter (Greenwich, Conn.: JAI Press, 1989), 41-73.



17. J.P. Newhouse, "Rate Adjusters for Medicare under Capitation," *Health Care Financing Review* (1986 Annual Supplement): 45-55.
18. Van Vliet and van de Ven, "Towards a Capitation Formula."
19. R.C.J.A. van Vliet, "Vervolgonderzoek regionale gezondheidscomponent in normuitkeringen" (Unpublished report, Erasmus University, September 1994).
20. W.P.M.M. van de Ven and R.C.J.A. van Vliet, "Consumer Information Surplus and Adverse Selection in Competitive Health Insurance Markets: An Empirical Analysis," *Journal of Health Economics* (forthcoming).
21. J.P. Newhouse et al., "Adjusting Capitation Rates using Objective Health Measures and Prior Utilization," *Health Care Financing Review* (Spring 1989): 41-54; Newhouse, "Patients at Risk;" van de Ven and van Vliet, "How Can We Prevent Cream Skimming in a Competitive Health Insurance Market?" in *Health Economics Worldwide*; Ash et al., "Adjusting Medicare Capitation Payments using Prior Hospitalization Data;" Lubitz et al., "Improving the Medicare HMO Payment Formula to Deal with Biased Selection;" and Gruenberg et al., "The Health Status and Utilization Patterns of the Elderly," in *Advances in Health Economics and Health Services Research*, vol. 10.
22. M. Von Korff, E.H. Wagner, and K. Saunders, "A Chronic Disease Score from Automated Pharmacy Data," *Journal of Clinical Epidemiology* 2 (1992): 197-203; M.C. Hornbrook et al., "Assessing Health Plan Case-Mix in Employed Populations: Ambulatory Morbidity and Prescribed Drug Models," in *Advances in Health Economics and Health Services Research*, vol. 12, ed. R.M. Scheffler and L.F. Rossiter (Greenwich, Conn.: JAI Press, 1991), 197-232; and J.P. Weiner et al., "Development and Application of a Population-Oriented Measure of Ambulatory Care Case-Mix," *Medical Care* 5 (1991):452-472.
23. L.M. Lamers and R.C.J.A. van Vliet, "Multi-Year Diagnostic Information from Prior Hospitalizations as a Risk-Adjuster for Capitation Payments" (Draft report, Erasmus University, September 1994).
24. E.M. van Bameveld, R.C.J.A. van Vliet, and W.P.M.M. van de Ven, "Hogerisicoverevening en hoge-kostenverevening als aanvulling op de normuitkeringen voor curatieve zorg" (Draft report, Erasmus University, September 1994).
25. R.C.J.A. van Vliet, "Predictability of Individual Health Care Expenditures," *Journal of Risk and Insurance* 59 (1992): 443-460; and Newhouse et al., "Adjusting Capitation Rates using Objective Health Measures and Prior Utilization."
26. Newhouse, "Patients at Risk."
27. See von Korff et al., "A Chronic Disease Score from Automated Pharmacy Data;" and Weiner et al., "Development and Application of a Population-Oriented Measure of Ambulatory Care Case-Mix."
28. A technical appendix is available from Wynand P.M.M. van de Ven, Institute of Health Policy and Management, Erasmus University Rotterdam, Burgemeester Oudlaan 50, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands.
29. Although a refinement of the risk-adjusted capitation payment formula on average lowers the profits of cream skimming, for some persons it might increase the profits. Therefore, a more detailed exploration of the distribution of potential profits and losses per insured person might be necessary. See, for example, J.C. Beebe, J. Lubitz, and P. Eggers, "Using Prior Utilization to Determine Payments of Medicare Enrollees in Health Maintenance Organizations," *Health Care Financing Review* 6, no. 3 (1985): 27-38.
30. See Note 2; and van de Ven and van Vliet, "How Can We Prevent Cream Skimming in a Competitive Health Insurance Market?" in *Health Economics Worldwide*, section 6.
31. M. Matsaganis and H. Glennester, "The Threat of Cream Skimming in the Post-Reform NHS," *Journal of Health Economics* 13 (1994): 31-60.