Access to coverage for high-risks in a competitive individual health insurance market: via premium rate restrictions or risk-adjusted premium subsidies?

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Received 13 October 1997; received in revised form 26 July 1999; accepted 27 August 1999

Abstract

A competitive market for individual health insurance tends to risk-adjusted premiums. Premium rate restrictions are often considered a tool to increase access to coverage for high-risk individuals in such a market. However, such regulation induces selection which may have several adverse effects. As an alternative approach we consider risk-adjusted premium subsidies. Empirical results of simulated premium models and subsidy formulae are presented. It is shown that sufficiently adjusted subsidies eliminate the need for premium rate restrictions and consequently avoid their adverse effects. Therefore, the subsidy approach is the preferred strategy to increase access to coverage for high-risk individuals. © 2000 Elsevier Science B.V. All rights reserved.

JEL classification: I10; I11; I18; G22

Keywords: Access; Health insurance; Regulation; Selection; Subsidies; Risk-adjustment

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1. Introduction

A major problem of an unregulated competitive market for individual health insurance is the seeming incompatibility of the equivalence principle and the solidarity (or fairness) principle. The *equivalence* principle of a competitive insurance market implies that an insurer has to break even on each insurance contract. The *solidarity* principle, as the Europeans term it, implies that the high-risk individuals receive a subsidy from the low-risk individuals to increase their access to health insurance coverage.\(^1\) This situation would occur if each insurer would accept predictable losses on the contracts of the high-risk individuals and compensate these losses by predictable profits on the contracts of the low-risk individuals. However, in a competitive market such a system of cross-subsidies cannot be sustained because competition minimizes the predictable profits per contract. Consequently, an insurer has to break even on each contract either by adjusting the premium to the consumer’s risk (premium differentiation) or by adjusting the accepted risks to the premium (selective underwriting). So, in an unregulated competitive market the premium for an insured consumer who develops AIDS, cancer or a heart disease has to be raised in the next contract period (usually a year) to the expected cost level or, alternatively, the insurer may decide to exclude from coverage the costs related to medical conditions which pre-exist before the new contract period, or not to renew the contract at all. For automobile, burglary and fire insurance these consequences of the equivalence principle appear to be socially acceptable. For health insurance this is not the case. In most countries a sponsor (e.g., government or employers) takes actions to increase access to health insurance coverage for the high-risk individuals. Often these actions result in a reduction of the level of competition in the individual health insurance market, e.g., a monopolistic national health insurance or an employer offering to its employees options from only one risk-bearing insurer. Since a restriction of competition may reduce efficiency, an increasing number of countries are looking for ways to combine competition and universal access. Therefore, this article addresses the question: *how can a sponsor make the solidarity principle compatible with the equivalence principle in a competitive individual health insurance market?*

A straightforward way is that the sponsor imposes restrictions on the variation of the premium rates for a specified health insurance coverage, possibly combined

\(^1\) In this paper we restrict the concept of solidarity to so-called “risk-solidarity”, that is solidarity between low- and high-risk individuals. Solidarity between high- and low-income individuals, so-called “income-solidarity”, will not be considered here. Conceptually “income-solidarity” can be easily incorporated in a system with “risk-solidarity” (see Section 3.1).
with open enrolment. Since the early 1990s this type of regulation has been implemented in many states in the United States of America (US) for health insurance offered to individuals (United States General Accounting Office, 1996) and small employers (United States General Accounting Office, 1995). In the period 1991–1997 there has been a gradual trend toward tighter rating reforms in the US small-group market (Curtis et al., 1999). Rating limitations have also been proposed in 1994 by the Dutch government for the one third of the population with voluntary private health insurance. However, a consequence of premium rate restrictions is the creation of predictable losses for insurers on the high-risk individuals. This creates incentives for insurers to avoid individuals with predictable losses and to select predictably profitable consumers, despite an open enrolment requirement. This selection can have adverse effects in terms of access to care, quality of care and efficiency in the production of care (see Section 2).

In this paper we explore another approach to make the equivalence principle compatible with the solidarity principle. Under this approach we refrain from any restriction on rating practices and from open enrolment regulation. We assume that insurers are free to ask risk-adjusted premiums based on the equivalence principle. Therefore, selection problems that result from premium rate restrictions, do not occur. To satisfy the solidarity principle the sponsor provides the high-risk persons with a premium subsidy, funded through mandatory contributions from the low-risk persons. If the subsidies would be based on the premium paid (as e.g., in the case of tax deductible premiums), they would reduce the consumer’s incentive to shop around for the lowest premium and thereby reduce the insurers’ incentive for efficiency. Premium-related subsidies would also stimulate consumers to buy more complete insurance, resulting in more moral hazard, than they would have done in case of no subsidy at the margin. To avoid these incentive problems we primarily concentrate in this paper on risk-adjusted premium subsidies, i.e., subsidies adjusted for the risk factors on which the premiums are based.

The goal of this paper is to analyze the following three strategies to increase a high-risk individual’s access to coverage in a competitive individual health insurance market: (1) premium rate restrictions for a specified health insurance coverage (Section 2), (2) risk-adjusted premium subsidies (Section 3), and (3) a combination of both (Section 4). Basically we analyze a voluntary market, but we also discuss the case of compulsory health insurance coverage. In addition to theoretical arguments we provide empirical results of simulated premium models and subsidy formulae (Section 5). Finally, the conclusions will be summarized and discussed (Section 6).

2 Sometimes the term ‘‘risk-adjusted vouchers’’ is used. We prefer the term subsidies because vouchers, in contrast to subsidies, may be associated with an integral financial compensation (e.g., luncheon-vouchers, hotel-vouchers) rather than a partial compensation.
2. Premium rate restrictions

In this section we analyze the effects of premium rate restrictions which are intended to increase access to coverage for high-risk individuals in a competitive health insurance market. The rate restrictions are assumed to apply to a specified health insurance coverage. To prevent that insurers refuse to (renew a) contract with high-risk individuals, a sponsor may complement premium rate restrictions with, e.g., a periodic open enrolment requirement. Rate restrictions can take several forms: community rating (by class), a ban on certain rating factors, or rate-banding (by class). Community rating in its purest form implies that an insurer quotes the same premium for everyone, independent of the individual’s risk characteristics. In practice we often observe “community rating by class”: the same premium is charged for all individuals within certain risk classes defined by, for example, geographical area, industry or family composition. A ban on certain rating factors — e.g., health status, genetic information, gender, duration of coverage, or claims experience — can be either voluntary (“self regulation”) or subject to sponsor regulation. Rate-banding implies a minimum and maximum premium.

All forms of rate restrictions aim at implicit cross-subsidies from low-risk to high-risk individuals. This is illustrated in Fig. 1, where the average annual health care expenditures for acute care (hospital, physician services, prescribed drugs, physical therapy) are given as a function of age. In an unregulated market the average premium per age group apart from the loading fee would be as given in Fig. 1. If insurers would also use other risk factors (for example, health status or claims history), there would also be a substantial premium differentiation within each age group. If the sponsor requires that premiums should not vary by more than 33% of the applicable index rate, the insurers are effectively confronted with a maximum premium which is not allowed to exceed twice the minimum

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3 Ideally, the variation of only those risk factors should be restricted for which solidarity is desired. An insurer may label someone as a “high-risk” individual for reasons of poor health status, a high propensity to medical consumption, living in a region with high prices and/or overcapacity (resulting in supply-induced demand), or using providers with an inefficient practice-style resulting in a high proportion of inappropriate care. Society has to decide for which risk factors, and to what extent, solidarity is desired. For example, premiums may be allowed to vary according to the price and (in)efficiency of the providers but not to the consumer’s health status.

4 A “periodic open enrollment” requirement implies that during the periodic (for example annual) open enrollment season consumers are allowed to change insurers and each health insurer has to accept any applicant for the specified health insurance contract. Open enrollment implies that the insurers are obliged to offer the specified health insurance contract. A weaker form of regulation is guaranteed renewability, which may be combined with an open enrollment requirement during a certain period for specific groups (e.g., newborns or immigrants) or conditional upon certain events (e.g., a mandatory termination of group health insurance, bankruptcy of one’s insurer, or reaching the age of 65 years). For an analysis of guaranteed renewability in an unregulated insurance market, see Pauly et al. (1995).
Fig. 1. Illustration of the effects of rate-banding: the average predictable losses and profits per age group, given a rate-band of ±33% (2:1) for the Dutch private health insurance market (the average per capita expenditure equals 1500 guilders or 680 euro in 1996).

This regulation implies predictable profits and losses (see Fig. 1). Ideally, for each insurer the predictable profits on its low-risk insureds should then compensate for the predictable losses on its high-risk individuals. However, this ideal situation may not be achieved because of selection.

2.1. Selection

Selection can be described as actions by insurers and consumers to exploit unpriced risk heterogeneity and break pooling arrangements (Newhouse, 1996). Often the term selection is also used to refer to the outcome of these actions. The literature identifies two forms of selection: adverse selection and cream skimming.7

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5 This is a typical rate-band applied in many states in the US; some states (Minnesota, New Jersey, New York) require community rating (United States General Accounting Office, 1995; United States General Accounting Office, 1996).
6 Not including risk-rated pricing by insurers.
7 For the relevance of the distinction between these two forms of selection, see e.g., Pauly (1984).
Because these forms of selection may differ in the insurers’ or consumers’ actions as well as in their effects, we will discuss each of them.

*Adverse selection* is the selection that occurs because high-risk consumers have an incentive to buy more insurance coverage than low-risk consumers within the same premium risk group. A necessary condition for adverse selection to occur is that the consumers themselves know whether they are a high- or low-risk within their premium risk group. As Wilson (1977, pp. 167–168) stated, this consumer information surplus vis-à-vis the insurer may be caused by regulation or by a limitation of the insurers’ knowledge. That is, either premium rate restrictions or asymmetric information between insurers and consumers may result in similar adverse selection problems. In the case of asymmetric information the insurers may know that consumers vary in the level of risk, but it is impossible or it involves too high transactions costs to discern who are the high- and low-risk individuals within a premium risk group. In the case of premium rate restrictions the insurers may know the consumer’s level of risk, but they are not allowed to use this information for risk-adjusting their premiums.

*Cream skimming* (or preferred risk selection) is the selection that occurs because insurers prefer low-risk consumers to high-risk consumers within the same premium risk group. A necessary condition for cream skimming to occur is that the insurers know that there are high- and low-risk consumers within the premium risk groups. Such a situation may be caused by premium rate restrictions or by transaction costs related to (further) premium differentiation.

If in a competitive insurance market the sponsor requires community rating (or rate-banding with a narrow band) for a specified health insurance coverage, this regulation creates incentives for both adverse selection and cream skimming.

### 2.2. Causes of selection

In this paper we assume that in a free competitive market transaction costs would not prohibit risk-bearing insurers from differentiating their premiums for individual health insurance to such an extent that the resulting premiums for high-risks can be considered to jeopardize their access to health insurance coverage. Our assumption differs from the assumption of Newhouse (1996, p. 1240) that in private health insurance markets transaction costs preclude plans’ pricing at an individual’s expected costs. Under Newhouse’s assumption, premium rate restrictions are not a relevant tool to increase access to coverage for high-risk individuals and there would be no selection induced by premium rate restrictions.

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8 Given the empirical results based on simple premium models as presented in Section 5, we consider it realistic that in a free competitive individual health insurance market, where insurers use sophisticated premium models, in the long run the maximum premium for complete health insurance coverage (i.e., without cost-sharing) may exceed the minimum premium for the same product by more than a factor 100.
All selection would be induced by transaction costs. Under our assumption selection may also be induced by premium rate restrictions. The two different assumptions yield different conclusions with nontrivial policy implications (see Section 6).

Our assumption is based on the fact that substantial premium differentiation can be observed in practice. For example, in the Netherlands during the last 25 years we have seen an increasing differentiation of premiums for individual health insurance. Nowadays the premium per person may be related to age, gender, family size, region, occupation, length of contract period, individual or group contract, the level of deductible, health status at time of enrolment, health habits (smoking, drinking, exercising) and — via differentiated bonuses for multi-year no-claim — to prior costs. At least one insurer in the Netherlands has specialized for some decades in offering health insurance to individuals who are classified as ‘‘substandard risks’’. Also in the US the premiums for individual health insurance are substantially risk-rated. Insurers commonly use age, gender, geographic area, tobacco use and family size as risk-adjusters to determine standard premiums; and dependent on the applicant’s health status insurers may charge a higher than standard premium rate (United States General Accounting Office, 1996). Some insurers charge premiums as much as 600% above standard rates (United States General Accounting Office, 1998).

Newhouse’s assumption that selection is only caused by transaction costs, is based on the observation that in the US ‘‘plans typically distinguish between individuals and families in their quoted premiums, but they often do not distinguish by age, sex, or even the number of children’’ (Newhouse, 1996, p. 1258). Although this observation may hold for group insurance via the employer, it does not hold for individual health insurance (United States General Accounting Office, 1996; United States General Accounting Office, 1998). For the interpretation of the absence of premium differentiation in group health insurance in the US a crucial question is how much free price competition there is among risk-bearing insurers at the level of the individual consumer (including free entry to the relevant market). Most employees (80%) in small firms and nearly half of the employees in large firms with insurance have no choice of health plan (Gabel et al., 1997). Their employer offers just one plan. If there is a choice among several

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9 Note that open enrollment regulation does not induce incentives for selection, but aims at preventing selection. As far as open enrollment regulation is not successful, it may result in the more subtle forms of selection as described in Sections 2.3 and 2.4.

10 In the Dutch private health insurance market people over 65 years old and other high-risk groups are covered under a legal risk pool arrangement. In 1997 the maximum premium for the other privately insured persons (i.e., persons under 65 years old who are not an extreme high risk) still exceeds the minimum premium by a factor 60 for comparable insurance policies with a large deductible (2000 guilders per year) and by a factor 8 for comparable policies without a deductible. This premium range reflects the variation in risk factors as well as in insurers’ cost-structure.
plans, these plans may be offered by just one risk-bearing entity, as in the case of
the triple option (Weiner and de Lissovoy, 1993). Competition among risk-bearing
insurers is further reduced because in most cases it is financially unattractive for
employees to choose an out-of-menu insurance policy from a competing risk-
bearing insurer, because they then lose their employer contribution, which on
average ranges from 56% (family coverage, small firms) to 78% (single coverage,
large firms) of the full premium (Gabel et al., 1997). Competition among
risk-bearing insurers is also reduced because of self-insurance by firms. Two thirds
of the employees of large firms and one third of the employees of small firms are
covered by self-insured plans (Gabel et al., 1997). Even in the case that an
employer does contract with more than one risk-bearing insurer, one may wonder
how much free price competition there is at the level of the individual consumer.
If the employer, for reasons of solidarity within the group (Feldman, 1987, p.
308), mandates or (strongly) prefers only four risk groups (single; two adults; one
adult with children; two adults with children) each insurer wanting to do business
with that employer is in fact confronted with a ban on all other rating factors. This
can be considered a form of regulation. \(^{11}\) As long as the insurer’s total premium
revenue for all individuals under the group contract equals their total predicted
future expenditures (a situation which may be furthered by a system of experience-rating), there is no problem for the insurer. In sum, the absence of
sufficient price competition among risk-bearing insurers at the level of the
individual consumer is in our opinion a more plausible explanation for the limited
risk rating at the individual level in US group health insurance than transaction
costs. \(^{12}\)

The increasing willingness in the US and the Netherlands to apply premium
rate restrictions supports our premise that if competing risk-bearing insurers are
free to set their premiums for individual health insurance, the premium for
high-risks will be so high as to jeopardize their access to health insurance
coverage. \(^{13}\)

2.3. Effects of selection

Selection may have several adverse effects. Dependent upon the relative
proportion of the high-risk individuals and the height of the contracting costs,
adverse selection may either cause a competitive insurance market to be unstable
or it may result in a pooling equilibrium or in a separating equilibrium (Rothschild

\(^{11}\) Cf. Newhouse (1996, p. 1246): “…the regulator could be an employer, a coalition of employers,
or the government”.

\(^{12}\) An alternative explanation may be that the current situation is a state of transition towards the long
term situation of risk-rated premiums.

\(^{13}\) This assumption does not exclude that a portion of the selection may be induced by transaction
costs.
and Stiglitz, 1976; Wilson, 1977; Schut, 1995; Newhouse, 1996). In the latter case high-risk individuals pay a high premium for a generous health insurance coverage and low-risk individuals pay a low premium for a stingy coverage. So, adverse selection may decrease access to coverage for non-affluent high-risk individuals as well as for low-risk individuals who are ‘‘forced’’ to buy incomplete coverage. The inefficiencies arising from adverse selection are indicated in Scheme 1.

Without an open enrolment requirement insurers may cream skim by simply refusing to (renew a) contract with the relatively high-risk individuals. In case of a periodic open enrolment requirement insurers may anticipate adverse selection e.g., by raising their premium, or by withdrawing from the relevant market. Furthermore, they may perform subtle forms of cream skimming which can have the following adverse effects. First, the larger the predictable profits resulting from cream skimming, the more insurers have a disincentive to respond to the preferences of high-risk consumers. As a result, insurers may give poor service to the chronically ill and may prefer not to contract with providers of care who have the best reputation of treating chronic illnesses. This may provide physicians and hospitals with a disincentive for acquiring the reputation of being the best provider for treating chronic illnesses. In the case of any risk sharing between insurers and the contracted providers of care, the latter also have an incentive to attract profitable patients and deter patients generating predictable losses. Insurers who specialize in care for high-risk patients have to ask a high premium (because of adverse selection). So, as a result of selection high-risk patients may either receive poor care and poor service, or they have to pay a very high premium for good care and good service. If the regulation implies a nationwide maximum premium instead of a maximum per insurer, health insurers who experience adverse

Effects of adverse selection:

- high premiums for high-risk individuals;
- dependent upon the height of the contracting costs either the low-risk individuals or the high-risk individuals cannot obtain as much insurance coverage as they wish;
- welfare loss in the case of an unstable market (including bankruptcy of adversely selected insurers).

Effects of cream skimming (given a periodic open enrollment requirement):

- disincentive for insurers to respond to the preferences of high-risk consumers;
- incentive to provide poor quality of care and poor service to high-risk individuals;
- disincentives for providers to acquire the best reputation for treating chronic illness;
- dependent upon the form of regulation (per insurer or nation-wide): high premiums for high-risk patients or bankruptcy of adversely selected insurers;
- investments in cream skimming may have higher returns than investments in improving efficiency;
- investments in cream skimming are a welfare loss.

Scheme 1. Effects of selection.
selection cannot raise their premium and will go bankrupt. In that case, providing
the best care for chronically ill is a suicidal strategy, because a health plan with
such a reputation will be flooded by individuals who predictably generate more
costs than revenues.

Second, the larger the predictable profits resulting from cream skimming, the
larger the probability that cream skimming is more profitable than improving
efficiency. So, at least in the short run, when an insurer has a restricted amount of
resources available to invest in cost-reducing activities, it may prefer to invest in
cream skimming rather than in improving efficiency. (In the long run, of course,
improving efficiency is always rewarding, independent of the level of cream
skimming). Efficient insurers who, for whatever reason, are reluctant to cream
skim applicants, might lose market share to inefficient insurers who are successful
in cream skimming, resulting in a welfare loss to society.

Third, while an individual insurer can gain by cream skimming, for society as a
whole, cream skimming is a zero-sum game. Thus, any resources used for cream
skimming represent a welfare loss.14

In sum, premium rate restrictions, which are intended to increase access to
coverage for the high-risk individuals, induce selection, which may have unin-
tended, counterproductive effects (see Scheme 1). So, premium rate restrictions
involve a tradeoff between access to coverage and (the adverse effects of)
selection. Hence, a key question is: how can this tradeoff be avoided, i.e., how can
access be guaranteed and selection prevented?

2.4. Prevention of selection15

A straightforward way of preventing an extreme form of adverse selection —
that is, one in which low-risk individuals do not buy the specified health insurance
coverage and thereby do not cross-subsidize the high risk individuals — is to
mandate that everyone buys the specified health insurance coverage. And a
straightforward way of preventing an extreme form of cream skimming — that is,
one in which insurers refuse to (renew a) contract with relatively high-risk
individuals — is to require open enrolment. But even then selection may occur.
Although an open enrolment requirement reduces the insurers’ ability to select, it
does not reduce their incentive for selection. Therefore, open enrolment increases
the insurers’ incentive to use more subtle forms of cream skimming than simply
redlining. If insurers are free to offer different modalities of the specified health
insurance coverage, they may differentiate their insurance conditions and thereby

14 Resources used by insurers for product innovation or for designing contracts which provide
consumers an incentive to become/remain in good health, but which may also attract low-risk
individuals, are not considered a welfare loss (Beck and Zweifel, 1998).
15 This section concentrates on general measures to prevent selection. Section 3.3 discusses some
specific measures for reducing transaction costs induced selection.
The market. Even if the benefits package (e.g., hospital care and physician services) and the cost-sharing structure are fully specified, insurers can differentiate their products via the quality, the specialty mix and the practice style of the selectively contracted physicians, via the location and accessibility of the contracted facilities, or via the utilization management techniques they apply and the managed care firms they contract. In this way insurers may use adverse selection as a tool for cream skimming. The sponsor could try to prevent this type of selection by requiring complete uniformity of the conditions of the specified health insurance coverage, e.g., by forbidding selective contracting (i.e., by introducing an ‘any-willing-provider’ requirement) and by fully standardizing the benefits package. Given the many subtle ways in which insurers can differentiate the conditions of insurance policies, this type of regulation is hard to make effective. However, even if a sponsor could successfully implement mandatory health insurance with complete uniform conditions it would have several adverse effects. First, it would impede insurers to selectively contract only with cost-effective providers. This reduces the potential for managed care activities by the insurers, implying a loss of efficiency in production. Second, a ‘one-size-fits-all’ plan reduces the consumer’s choice and yields a welfare loss because it reduces the insurers’ responsiveness to consumer preferences. Third, dependent on the generosity of the fully standardized benefits package, a mandatory health insurance policy may increase moral hazard and a ‘one-size-fits-all’ contract may reduce the insurers’ initiatives to design insurance conditions that reduce moral hazard. So, these tools for reducing selection are likely to reduce efficiency.

Even if the implementation of a mandatory health insurance with uniform conditions could successfully prevent that insurers attract low-risk individuals by differentiating their insurance conditions, insurers would still be left with other tools for cream skimming such as selective advertising, financial risk-sharing between the insurer and the contracted providers (such that the providers of care have an incentive for cream skimming), the design of supplementary health insurance, tie-in sales, providing poor services to high-risk individuals, providing insurance agents with incentives to advise the relatively unhealthy persons to buy health insurance from another company, or offering a high-risk client a large sum of money if during the next open enrolment period he will choose another insurer. The sponsor could try to prevent these forms of cream skimming by additional regulation such as the prevention of any direct contact between an insurer’s sales representative and applicants during the enrolment process, by publication of results of consumer satisfaction surveys, by forbidding certain forms of risk-sharing between an insurer and the contracted providers, by ethical codes for insurers, and by ensuring that the pricing and selling of the standard benefits package is not

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16 In contrast to these adverse effects a certain degree of standardization may also have the advantage of making the market more transparent and reducing the consumers’ search costs.
tied in with other products and services. The extent of the success of these measures depends on the size of the predictable profits and losses that result from the regulation as well as on the costs of cream skimming — including an insurer’s costs of losing its good reputation — and the length of the contract period.

A problem with all the above mentioned measurers to reduce cream skimming is that they do not reduce the insurers’ incentives for cream skimming. The most effective method for reducing cream skimming is to reduce the incentives for selection by the implementation of a system of risk-adjusted subsidies. This solution will be discussed in the next section. As fully prospective risk-adjustment methods are still a long way from perfection, Newhouse (1989) proposed mixed payment systems. Under a mixed system the insurer’s compensation for high-risk individuals is a mixture of a prospective payment and cost-based payments. Such a risk-sharing between the solidarity fund and the insurers can take several forms.\(^\text{17}\) The higher the weight on the cost-based payments, the less the insurer’s incentive for cream skimming as well as for efficiency. So, forms of risk-sharing between the solidarity fund and the insurers imply a tradeoff between efficiency in production and selection.\(^\text{18}\)

3. Risk-adjusted premium subsidies

3.1. Subsidies

The most effective way to inhibit regulation-induced selection is to refrain from premium rate restrictions. As an alternative way of increasing access to coverage for high-risk individuals, we consider explicit cross-subsidies from low-risk to high-risk individuals, whereas rate restrictions aim at implicit cross-subsidies. We assume that the insurers are fully free to set their premiums based on the equivalence principle. As argued in Section 2.2, we assume that in the long run a competitive market for individual health insurance will result in high premiums for high-risk individuals such that their access to coverage can be considered to be jeopardized. To satisfy the solidarity principle the sponsor organizes a subsidy system such that the high-risk persons receive a risk-adjusted premium subsidy from a solidarity fund.\(^\text{19}\) This fund is filled with mandatory solidarity contribu-

\(^{17}\) See e.g., Van Barneveld et al. (1996, 1998), Van de Ven and Ellis (2000).

\(^{18}\) Another tradeoff between efficiency and selection occurs if the risk factors for which high-risk individuals should be compensated via the subsidies, are correlated with risk factors that should not be included in the subsidy formula because for these risk factors solidarity is not desired (see Schokkaert et al., 1998).

\(^{19}\) In this section we discuss risk-adjusted premium subsidies as a tool to increase access to coverage for the high risks. In the case of premium rate restrictions, as discussed in the previous section, risk adjustment is considered a tool to reduce selection.
tions from the low-risk persons. The solidarity contributions may be risk-adjusted, in the sense that the lower the risk, the higher the contribution. We assume that the subsidy depends only on the individual’s relevant risk characteristics 20 and not on the premium the consumer pays. The subsidy is earmarked for the purchase of health insurance with a specified health insurance coverage and is not transferable. High-risk persons pay their risk-adjusted premium partly with the subsidy and partly out of pocket. In the extreme case where subsidies and solidarity contributions are fully adjusted for all the risk factors that insurers use in practice, the premium minus subsidy plus solidarity contribution is likely to be the same for all persons insured with the same insurance company. 21 If politically desirable, the mandatory solidarity contributions may (also) be income related.

There are at least three ways to organize the subsidy payment flows (see Fig. 2). According to the first method (modality A), which was explained above, equalization occurs among consumers. An alternative is that the subsidy goes directly to the insurer, and the consumer pays the premium minus the subsidy to the insurer (modality B). Another alternative is that the consumer pays the “premium minus subsidy plus solidarity contribution” to the insurer, while the insurer and the solidarity fund clear the net difference of all the solidarity contributions and subsidies of the relevant clients (modality C). Differences between these modalities are as follows. First, the direct individual payment to the insurer under modality B (premium minus subsidy) is considerably less than under modality A and C. Hence, cost savings by insurers will have a much larger proportional effect on the level of direct payments under modality B than under modality A and C. Both the difference in absolute level and in the proportional change of direct payments may result in different responses by consumers (Buchmueller and Feldstein, 1997). Second, the actual amount of money passing via the solidarity fund under modality C is relatively small as compared with modality A and B. Finally, modality C may have to be supplemented with a mechanism to ensure that low-risk individuals who do not buy voluntary health insurance pay a solidarity contribution. Under modality A and B the solidarity contributions are mandatory (even in the case of voluntary health insurance).

3.2. Incentives for efficiency

Ideally, the risk adjusters used to determine the subsidy value should not reduce incentives for efficiency. This raises the question as to which extent the insurers’

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20 That is, the risk factors for which solidarity is desired; cf. 2.
21 Although then the payment effects are the same as under community rating, the behavioral effects for the low-risk individuals may be different if there are opportunities for substitution, because under community rating it is the price effect that matters, while in the case of a subsidy system it is the income effect that matters. For the high-risk individuals the behavioral effects are the same because the subsidy is a price-subsidy and not an income-subsidy. We thank a referee for bringing up this point.
Fig. 2. Three modalities of a subsidy system. C = solidarity contribution; S = risk-adjusted subsidy; P = risk-rated premium.

or consumers’ incentives for efficiency are reduced if the insurers use claim experience, e.g., prior costs, as a rating factor and if the subsidies are based on prior costs. Let us first consider the situation without subsidies. The weight given
to prior costs in the best predictive formula, apart from cost-inflation, can be expected to be around 0.30 (see e.g., Van Vliet and van de Ven, 1993). So, for each marginal euro spent on health care, the consumer’s premium next year goes up by about 30 cents. The insurer’s costs go up by 1 euro minus 30 cents additional premium next year if the relevant insured does not change insurer. The introduction of subsidies reduces the consumer’s incentive for choosing the most efficient insurer and thereby reduces the insurers’ incentive for efficiency. If it is desirable to let the consumers still have some incentive for efficiency — in addition to existing deductibles and copayments — one may give prior year’s costs (or utilization) a lower weight in the subsidy formula than in the premium model. This effectively boils down to a coinsurance rate (or ‘‘deductible’’) equal to the difference in weights. However, this may hinder access to health insurance coverage for the high-risk individuals. So, to the extent that a subsidy decreases the consumer’s incentive for efficiency, there is a tradeoff between access to coverage and efficiency in production.

3.3. Additional measures

Under a system of risk-adjusted subsidies the high risks’ access to health insurance coverage may be insufficient for the following two reasons.

(1) Individual insurers may not have sufficient information at their disposal to adjust the premiums to a consumer’s risk accurately, especially high-risk consumers and new applicants (Newhouse, 1984). If it is impossible or too costly for an insurer to risk-rate an applicant, the insurer may either reject the applicant (i.e., a form of cream skimming) or ask an extremely high premium.

(2) Because it is hard to fulfill all the criteria that an ideal risk adjustment model should meet (appropriateness of incentives, fairness, and feasibility; see Van de Ven and Ellis, 2000), the solidarity fund may not be able to sufficiently adjust the subsidies to a consumer’s risk. Consequently, the subsidies may not sufficiently reduce the high-risk individuals’ payment for health insurance.

These potential problems may be solved by the following additional measures: a market code, a voluntary reinsurance pool and a system of excess loss compensations.22

3.3.1. Market code

Optimal functioning of the subsidy system is advanced if insurers agree on a market code to use the same risk categories for the major rating factors in their premium rating and develop a nationwide standard rating model based on the

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22 An open enrollment requirement (without premium rate restrictions) does prevent insurers from rejecting applicants, but does not solve the access problem because it does not prevent extremely high premiums.
statistical information of all insurers. Such a standard rating model may provide the average prior-year expenditures per risk category as well as a predicted increase in future expenditures per risk-category.

Such a market code improves the accuracy of the insurers’ premium rating. Each individual insurer may have too few observations in the high-risk categories to apply the law-of-the-large-numbers successfully. Agreements on risk premium calculation and the sharing of statistical information may improve the efficiency and stability of competitive insurance markets (Schut, 1995, pp. 91–116). These arguments led the European Commission in 1992 to grant the insurance industry a bloc exemption from the European Union competition rules for agreements on the calculation of risk premiums.

As a second element of the market code insurers could develop a system of exchanging information about an individual’s risk factors in case a consumer decides to switch to an other insurer. In the Netherlands the association of automobile insurers has a sophisticated bonus-malus rating system, which yields a simple individual rating factor based upon 15 years of claim records. If a consumer decides to switch from insurer A to B, A provides the consumer with a certificate indicating his exact bonus-malus rating-level. B uses this certificate to risk-rate the new applicant. This information exchange system substantially reduces the market imperfection that exists when an insurer cannot accurately risk rate new applicants (Newhouse, 1984).

Such a nationwide standard rating model can serve as the basis for determining the subsidy value per risk category. The sponsor can stimulate insurers to provide the relevant statistical information to the solidarity fund by providing subsidies only to those individuals who are insured with a cooperating insurer. Furthermore, uniform risk categories increase the transparency of the market for consumers. Moreover, a standard rating model based on shared statistical information reduces the transaction costs of both a subsidy system and the insurers’ risk-rating activities.

Although a standard rating model provides the nationwide risk premium per risk category, in a competitive market it is essential that each individual insurer sets its own premium rates. These different rates may reflect differences in insurers’ efficiency and benefits packages. Premium agreements among insurers should remain a violation of antitrust legislation.

3.3.2. Voluntary reinsurance pool

In order to prevent insurers from rejecting high-risk applicants for whom they cannot calculate a risk-adjusted premium (a form of transaction costs induced cream skimming) they may establish a voluntary reinsurance pool with the

23 The risk premium equals the expected health care expenditures to be reimbursed. The actual premium equals the risk premium plus loading charges.
following conditions. An insurer may register each of its clients in the pool for the next contract period, say a year. The pool will pay all health care expenditures of registered individuals falling under the specified health insurance coverage for which the subsidies are valid. To finance the pool each insurer pays to the pool, for each of its pooled clients, the average expenditures of all pooled individuals in the pool year. In a steady state insurers know the contribution to the pool from the previous years and can make a reliable estimate of the per capita contribution to the pool for next year. Then they decide which applicants to pool. The premium that a pooled client has to pay will be equal to the expected per capita pool contribution plus a loading fee. This premium will be an insurer’s maximum premium. The pooled persons receive a subsidy such that their premium minus subsidy is larger than the maximum ‘‘premium minus subsidy’’ for the non-pooled persons. This provides the pooled individuals with an incentive to find an insurer who accepts them as a non-pooled insured and thereby provides the insurers with an incentive for a better risk classification system. This, in its turn, may reduce the rationale for a reinsurance pool. The advantages of a voluntary reinsurance pool have to be weighted against its disadvantage of reducing the insurers’ incentive for efficiency regarding its pooled clients free rider dilemma. Alternative options are that the pool partially reimburses the expenditures per pooled individual, e.g., a certain percentage or only expenditures above a certain threshold amount.

3.3.3. Excess loss compensation

An alternative tool to prevent insurers from rejecting high-risk applicants is an excess loss compensation under which insurers are compensated by the solidarity fund for all expenditures above a certain threshold for each individual insured. Such an excess loss compensation effectively sets a maximum premium (excluding loading fees) for all insurers. If the threshold amount is not too high, a system of excess loss compensation may avoid selection activities like the exclusion of pre-existing medical conditions and rejecting applicants. An excess

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24 In the Risk Pools for the medically uninsurable persons that are currently (1999) applied in many states in the US, all health insurers in the relevant state are obliged to contribute to the pool a fixed payment for each of their insureds. In the voluntary high-risk pool as proposed here, each insurer decides itself how many insureds to pool and therefore how much to contribute to the pool.

25 An essential difference between a voluntary reinsurance pool and a system of excess loss compensation by the solidarity fund is the way that the cost-based ex-post payments to the insurers are financed: voluntary payments (reinsurance premium) from the insurers versus mandatory solidarity contributions from the consumers.

26 An alternative is an excess loss threshold per subsidy-risk-group equal to \( Y \) plus the subsidy value of the respective subsidy-risk group. \( Y \) would then be the maximum of each risk premium minus subsidy.

27 Alternative forms of risk sharing, e.g., a retrospective compensation of a fixed percentage (e.g., 50%) of all expenditures, do not solve the insurer’s problem of the high transaction cost of calculating the premium for high-risk applicants.
loss compensation also increases access for high-cost individuals if the subsidies, for whatever reason, are adjusted for only a part of the risk factors that insurers use. The advantages of an excess loss compensation have to be weighted against its disadvantage of reducing the insurers’ incentive for efficiency.

4. Risk-adjusted premium subsidies combined with premium rate restrictions

If a subsidy system, for whatever reason, does not sufficiently improve access to coverage for high-risk individuals, it may be combined with premium rate restrictions and open enrolment. A combination of subsidies and such regulation is used in several countries. The restrictions on rating practices then apply to the direct consumer’s payment to his insurer, that is, either the premium (modality A), or the premium minus subsidy (modality B), or the premium minus subsidy plus solidarity contribution (modality C). Modality C is currently (1999) used in Colombia, Ireland, Germany and Switzerland. It was also proposed by the White House Task Force on Health Risk Pooling (1993). In Ireland and Switzerland, the regulation requires that direct payments to an insurer are the same for all members (in Switzerland: within the same region). In Colombia and Germany direct payments are a percentage of the consumer’s income. In Colombia this percentage (12% in 1997) is independent of the chosen insurer, while in Germany the percentage figure may differ from one insurer to another but must be the same for all members at the same insurer (sickness fund). Modality B is currently applied in the Czech Republic, Israel, the Netherlands (sickness funds) and the USA (Medicare risk plans). In the latter two countries the regulation requires that the direct payments must be the same for all clients (in the USA: per region) with the same insurer. The level of this direct payment is subject to competition among insurers. In the first two countries the insurers are not allowed to ask for direct payments from their members. Thus, by regulation, the premium equals the subsidy. In all the above-mentioned countries the restrictions on rating practices are complemented with a periodic open enrolment for a specified health insurance coverage.

In most countries age and gender are used as risk-adjusters, sometimes supplemented with an indicator of disability (the Netherlands) and institutional and welfare status (US). Region is often a controversial risk-adjuster. In the next section it will be shown that with these poor risk-adjusters the predictable losses in case of premium rate restrictions can be quite substantial, leaving ample room for profitable forms of cream skimming.

28 The major exception is the US, where some programs have implemented diagnosis-based risk adjustment (Dunn, 1998) and where the Medicare program has announced that it will use diagnosis-based risk adjustment in the year 2000 to pay HMOs for their enrollees (Greenwald et al., 1998). For a review of risk-adjusters used in several countries, see Van de Ven and Ellis (2000).
5. Empirical results

In this section we present the results of an exploratory empirical analysis. Based on simulated premium models we provide an indication of the range of risk-rated premiums in case of free premium setting (Section 5.1). Further we provide an indication of the insurers’ incentives for selection in case of premium rate restrictions (Section 5.2) and an illustration of the potential effectiveness of a subsidy system (Section 5.3). The empirical analyses are based on a panel data base of 37,752 privately insured individuals from one insurance company in the Netherlands over a five year period (1976–1980). The simulated premium and subsidy formulae relate to the total annual health care expenditures for hospitalization, specialist care, laboratory and physical therapy. (The expenditures for prescription drugs and general practitioners are excluded.) The costs for each year are inflated such that the average annual costs per person equal 1500 guilders (1996 level). In order to simulate current practice of the insurers’ method of premium rating we applied ordinary least squares regression analysis, with the total individual annual expenditures in the fifth year of the five year period as dependent variable and the relevant rating factors as independent variables.

5.1. Premium variation in an unregulated market

Because age/gender and prior utilization/costs are known to be good predictors of future individual health expenditures and because this information is routinely available in an insurer’s administration, we simulated the following three premium models that insurers might use in an unregulated competitive market:

1. the demographic model, with 23 dummies for age/gender;
2. the prior admission-model, i.e., the demographic model extended with a rating factor indicating the number of consecutive preceding years without a hospital admission; this rating factor is measured by five dummy’s corresponding to the rating scores 0, 1, 2, 3 and \( \geq 4 \) years;
3. the prior admission/prior costs-model, i.e., the prior admission-model extended with four dummies indicating whether or not the individual belonged to the 5% individuals with the highest costs in each of the four preceding years. The maximum and minimum premiums calculated with the demographic model are 5013 and 276 guilders, respectively. The prior admission-model is illustrated in Table 1. Those who had a hospitalization in the previous year would have to pay, in addition to the age/gender related premium component, a surcharge of 3557 guilders. The 77% of the individuals who had no hospitalization in the preceding four years, would receive a rebate of 460 guilders. The prior admis-

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29 2.2 guilders equal 1 euro.
Table 1
Average premium variation within age/gender groups related to the rating factor “prior admission” in the “prior admission”-model

<table>
<thead>
<tr>
<th>Number of admission-free consecutive preceding years</th>
<th>Percentage insureds</th>
<th>Surcharge (+) or rebate (−)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.3</td>
<td>+ 3557</td>
</tr>
<tr>
<td>1</td>
<td>5.6</td>
<td>+ 964</td>
</tr>
<tr>
<td>2</td>
<td>5.0</td>
<td>+ 588</td>
</tr>
<tr>
<td>3</td>
<td>4.9</td>
<td>+ 333</td>
</tr>
<tr>
<td>≥ 4</td>
<td>77.2</td>
<td>− 460</td>
</tr>
</tbody>
</table>

*All numbers are based on regression coefficients that are significantly different from zero (p < 0.01).

The premium/prior costs-model is illustrated in Table 2. Those who belong to the 5% with the highest costs in a preceding year, would have to pay a surcharge ranging from about 1000 to 5000 guilders in addition to the age/gender/prior admission related premium component. Table 3 presents the premium range and premium frequency distribution for each of the three premium models. The maximum premium in the most extended model is more than 70-times the minimum premium.

5.2. Predictable losses and profits resulting from premium rate restrictions

Premium differences may provide the sponsor with an argument for imposing premium rate restrictions. Here we illustrate the predictable losses and profits that would result from two forms of rate restrictions: rate-banding and a ban on certain rating factors. We assume that insurers have the prior admission/prior costs premium model at their disposal to make a prediction of each consumer’s future health care expenditures.

We simulate the effects of an allowable premium variation of no more than 33% from an index rate (i.e., the maximum premium is not allowed to be more

Table 2
Average premium variation within “age/gender/prior admission”-groups related to the rating factor “prior costs” in the “prior admission/prior costs”-model

<table>
<thead>
<tr>
<th>Yes/no belonging to the 5% individuals with the highest costs in the relevant year*</th>
<th>Yes (+ surcharge)</th>
<th>No (− rebate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year ago</td>
<td>+ 4963</td>
<td>− 261</td>
</tr>
<tr>
<td>2 years ago</td>
<td>+ 2512</td>
<td>− 132</td>
</tr>
<tr>
<td>3 years ago</td>
<td>+ 2050</td>
<td>− 108</td>
</tr>
<tr>
<td>4 years ago</td>
<td>+ 1228</td>
<td>− 65</td>
</tr>
<tr>
<td>All previous four years</td>
<td>+ 10,753</td>
<td>− 566</td>
</tr>
</tbody>
</table>

*All numbers are based on regression coefficients that are significantly different from zero (p < 0.01).
Table 3
Premium range and premium frequency distribution for three premium models

<table>
<thead>
<tr>
<th>Guilders</th>
<th>Demographic model</th>
<th>“Prior admission”-model</th>
<th>“Prior admission/prior costs”-model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1000</td>
<td>39.1</td>
<td>46.5</td>
<td>51.8</td>
</tr>
<tr>
<td>1001–2000</td>
<td>36.5</td>
<td>24.6</td>
<td>25.9</td>
</tr>
<tr>
<td>2001–3000</td>
<td>17.4</td>
<td>14.2</td>
<td>8.5</td>
</tr>
<tr>
<td>3001–4000</td>
<td>0.9</td>
<td>6.1</td>
<td>6.3</td>
</tr>
<tr>
<td>4001–5000</td>
<td>5.7</td>
<td>4.6</td>
<td>1.4</td>
</tr>
<tr>
<td>5001–6000</td>
<td>0.4</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>6001–7000</td>
<td>–</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>7001–8000</td>
<td>–</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>8001–9000</td>
<td>–</td>
<td>0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>9001–10,000</td>
<td>–</td>
<td>–</td>
<td>0.4</td>
</tr>
<tr>
<td>&gt; 10,000</td>
<td>–</td>
<td>–</td>
<td>0.6</td>
</tr>
<tr>
<td>Average</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Minimum</td>
<td>276</td>
<td>199</td>
<td>199</td>
</tr>
<tr>
<td>Maximum</td>
<td>5013</td>
<td>8216</td>
<td>14,496</td>
</tr>
<tr>
<td>Premium range</td>
<td>4737</td>
<td>8017</td>
<td>14,297</td>
</tr>
</tbody>
</table>

than twice the minimum premium). We allow insurers to determine the applicable index rate themselves. In the empirical simulation we assume that insurers calculate the risk premium for each individual based on the prior admission/prior costs premium model, and that each insurer determines its applicable index rate such that total predicted losses equal total predicted profits. In the case of a 33% allowable premium variation from the index rate, an insurer whose members form a representative sample of the population may expect 16% of its clients to be unprofitable (Table 4). Their maximum predictable loss is more than eight times the overall average per capita expenditures. Tightening the rate-band to 0%, i.e., community rating, increases the insurer’s total predictable losses/profits by more than one half, and thereby further increases the incentives for selection.

Table 4
Simulated effects of two forms of allowable premium variation, while insurers have the “prior admission/prior costs” premium model at their disposal

<table>
<thead>
<tr>
<th>Allowable premium variation</th>
<th>– 33% to + 33%</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable index rate</td>
<td>1093</td>
<td>1500</td>
</tr>
<tr>
<td>Percentage of persons with a predictable loss</td>
<td>16.3%</td>
<td>30.9%</td>
</tr>
<tr>
<td>Their average predictable loss</td>
<td>2412</td>
<td>1962</td>
</tr>
<tr>
<td>Maximum predictable loss</td>
<td>12,703</td>
<td>12,996</td>
</tr>
<tr>
<td>Percentage of persons with a predictable profit</td>
<td>68.7%</td>
<td>69.1%</td>
</tr>
<tr>
<td>Their average predictable profit</td>
<td>576</td>
<td>877</td>
</tr>
</tbody>
</table>
A ban on some rating factors implies that insurers are not allowed to use the relevant rating factors in their premium model. A ban on all rating factors boils down to community rating (see Table 4). If the insurers have the prior admission/prior costs premium model at their disposal but are not allowed to use the rating factor "prior costs", the predictable profits and losses are about half of the surcharges and rebates as shown in Table 2. Due to the high correlation between "prior admission" and "prior costs" part of the effect of the non-allowable rating factor "prior costs" is reflected in the effect of the allowable rating factor "prior admission".

We conclude that these forms of regulation result in predictable profits and losses, which generate substantial incentives for selection.

5.3. Risk-adjusted premium subsidies

Risk-adjusted premium subsidies may serve as an alternative for premium rate restrictions. We assume that individuals with above average predicted expenditures are high-risks and receive a subsidy from the low-risks, i.e., individuals with below average predicted expenditures. For the calculation of subsidies and contributions we assume that \( A(X) \) is an estimate of the nationwide expenditures that, on average, are acceptable for the specified basic health insurance coverage for a person with risk characteristics \( X = (X_1, X_2, \ldots, X_m) \) for the next contract period. For our empirical simulations we use the following subsidy formula:

\[
S(X) = A(X) - A
\]  

(1)

with \( A \) the nationwide average of \( A(X) \) over all individuals. An individual with \( S(X) > 0 \) is a high-risk person, receives a risk-adjusted subsidy equal to \( S(X) \) and pays no solidarity contribution. An individual with \( S(X) < 0 \) is a low-risk person, pays a solidarity contribution of \( -S(X) \) and receives no subsidy. It can easily be seen that the sum of all solidarity contributions equals the sum of all subsidies.

If an individual pays a premium \( A(X) \), then his total payments for health insurance (i.e., the premium minus the subsidy or the premium plus the solidarity contribution) would equal \( A \). In practice this may not be the case because:

1. insurers may use more rating factors than \( X_1, X_2, \ldots, X_m \);
2. there may be differences in efficiency among insurers;
3. consumers may choose different modalities of the specified basic health insurance coverage on which the subsidy system is based.

So, in practice we may see a range of different values for premium minus subsidy plus solidarity contributions. However, if the subsidy system is adjusted for the most important rating factors that insurers use in practice, the resulting range will be relatively restricted and may be socially acceptable.

In interpreting our empirical simulations we assume that there are no differences in efficiency among insurers and that all consumers choose the insurance modality on which the subsidy system is based (with \( A = 1500 \) guilders). We now
look at differences in the premium minus subsidy plus solidarity contribution that result because insurers use more risk factors than the subsidy system.

We consider subsidy formulae based on three different prediction models: the demographic model, the prior admission-model and the prior admission/prior costs-model. In each of these models \( A(X) \) is calculated in the same way as the premium is calculated in the three analogous premium models. We assume that the insurers use the prior admission/prior costs premium model. Further we assume that the insurers use in their premium rating the subsidy weights for those risk factors that are also included in the subsidy system. In other words, insurers apply stage-wise regression, that is they regress an individual’s annual health care expenditures minus \( A(X) \) on the additional risk factors that are not included in the subsidy system.

Some key statistics of the simulated subsidy formulae are given in Table 5. The total payments out of the solidarity fund as a percentage of total health care expenditures vary from 27% (demographic subsidy formula) to 40% (prior admission/prior costs subsidy formula). Subsidies appear to be an effective tool for reducing the range of individual payments for health insurance. In the case of fully adjusted subsidies the premium minus subsidy plus solidarity contribution is 1500 guilders for each consumer, i.e., the range is 0. In that case high-risk individuals’ total payments for health insurance are substantially reduced compared with the premium differentiation as presented in Table 3. Consequently, their access to coverage has been increased. For low-risk individuals the total payments for health insurance increase.

| Table 5 | Simulation of subsidy formulae* |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | No subsidies    | Demographic     | “Prior admission” | “Prior admission/prior costs” |
| Percentage individuals with a subsidy | 0               | 39.1            | 33.5            | 30.9            |
| Average value per subsidy            | 0               | 1044            | 1660            | 1962            |
| Average solidarity contribution (per payer) | 0               | 670             | 836             | 877             |
| Total payments out of the solidarity fund as a percentage of total health care expenditures | 0               | 27.2            | 37.1            | 40.3            |
| Range of “premium minus subsidy plus solidarity contribution” if insurers use the “prior admission/prior costs” premium model | 14,297          | 11,571          | 5447            | 0               |

*The average premium equals 1500 guilders.
Table 6
Excess-of-loss compensation above 20,000 guilders, in combination with several subsidy formulae

<table>
<thead>
<tr>
<th>Percentage individuals with a subsidy</th>
<th>No subsidies</th>
<th>Demographic subsidy formula</th>
<th>“ Prior admission”-subsidy formula</th>
<th>“ Prior admission/prior costs”-subsidy formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage individuals with a subsidy</td>
<td>0</td>
<td>24.4</td>
<td>25.4</td>
<td>25.4</td>
</tr>
<tr>
<td>Average value per subsidy</td>
<td>0</td>
<td>647</td>
<td>960</td>
<td>1112</td>
</tr>
<tr>
<td>Average solidarity contribution (per payer)</td>
<td>364</td>
<td>691</td>
<td>815</td>
<td>854</td>
</tr>
<tr>
<td>Total payments out of health care expenditures</td>
<td>24.3</td>
<td>34.8</td>
<td>40.5</td>
<td>42.4</td>
</tr>
<tr>
<td>Range of “premium minus subsidy plus solidarity contribution” if insurers use the “prior admission/prior costs” model</td>
<td>8215</td>
<td>6041</td>
<td>2717</td>
<td>0</td>
</tr>
</tbody>
</table>

The average premium equals 1136 guilders.

Table 6 provides an illustration of the results in case of a full excess loss compensation above a threshold of 20,000 guilders. Eq. (1) then becomes:

\[ S(X;T) = A(X;T) - A, \]

where \( A(X;T) \) is an estimate of the nationwide expenditures below threshold \( T \) that, on average, are acceptable for the specified basic health insurance coverage for a person with risk characteristics \( X \). The sum of all solidarity contributions equals the sum of all subsidies plus all excess loss compensations that insurers receive for all acceptable expenditures above \( T \) guilders per individual. With \( T = 20,000 \) these compensated expenditures are 24% of total expenditures. If the subsidies do not compensate for all the risk factors in the premium model, the excess loss compensation reduces the range of the premium minus subsidy plus solidarity contribution by 40 to 50% (compare Tables 5 and 6). For each subsidy formula the introduction of the excess loss compensation raises the sum of all solidarity contributions. The lower the threshold \( T \), the lower the number of individuals with \( S(X;T) > 0 \) and the lower the number of individuals who receive a subsidy.

6. Conclusion and discussion

In this paper we have dealt with the question of how a sponsor can make the solidarity principle compatible with the equivalence principle in a competitive
individual health insurance market. From our empirical analyses we conclude that in an unregulated competitive market the maximum premium for complete health insurance (i.e., without cost-sharing) based on a simple premium model could be more than 70-fold the minimum premium for the same product. In most societies the solidarity principle will then be considered to be violated.

A straightforward strategy to increase access to health insurance coverage for high-risk individuals is regulation such as premium rate restrictions for a specified health insurance coverage, combined with e.g., an annual open enrolment. Our empirical results based on a simple prediction model indicate that under community rating an insurer whose members form a representative sample of the population, may expect about one third of its clients to be unprofitable. Their average predictable loss exceeds the overall average per capita expenditure, and the maximum predictable loss is more than eight times the overall average per capita expenditure. If in practice insurers use more sophisticated prediction models, the predictable losses will easily exceed these estimates. We conclude that premium rate restrictions create substantial incentives for selection which may have adverse consequences (see Scheme 1). The less stringent the premium rate restrictions are, the less severe are these problems resulting from the regulation-induced selection, but the larger is the access problem. So there is a tradeoff between access to coverage and (the adverse effects of) selection. The sponsor can reduce selection by an adequate risk-adjustment mechanism or by forms of ex-post risk sharing between the sponsor and the insurers. In the latter case the insurers are retrospectively reimbursed by the sponsor for some of their costs. Although risk sharing effectively reduces the insurers’ incentives for selection, it also reduces their incentives for efficiency. So, given imperfect risk adjustment the sponsor is confronted with a tradeoff between access, efficiency and regulation-induced selection.

As an alternative strategy to increase access for high-risk individuals we considered a system of risk-adjusted premium subsidies. If the insurers are free to set risk-adjusted premiums based on the equivalence principle, the selection problems that result from premium rate restrictions do not occur. To satisfy the solidarity principle high-risk persons receive a risk-adjusted premium subsidy from a solidarity fund, which is filled with mandatory contributions from the low-risk persons. A market code concerning the major risk categories and a

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30 For example, the implementation of Washington state’s health insurance reform (guaranteed issue, adjusted community rating, and a 90-day limit on waiting periods for coverage of pre-existing conditions) in January 1996 was associated with a reduction in enrollment in individual plans, an increase in individual plan premium, and a reduction in the number of carriers selling comprehensive individual plans. The promise of expanded access to affordable, comprehensive health coverage in Washington state’s individual market has not been fulfilled (Malkin, 1999).

31 Without any premium rate restrictions, a part of the selection might occur because of high transaction costs related to (further) premium differentiation.
nationwide standard rating model based on shared statistical information can reduce the transaction costs of both a subsidy system and the insurers’ risk-rating activities. As far as transaction costs yet induce selection, insurers could establish a voluntary reinsurance pool complementary to the subsidy system, or the sponsor could provide the insurers with an excess-of-loss compensation. Such a compensation also increases access to coverage for high-risk individuals if the subsidies, e.g., because of imperfect risk adjustment, are adjusted for only a part of the risk factors that insurers use. However, these instruments to reduce selection or increase access also reduce the insurers’ incentive for efficiency. Therefore, in so far as transaction costs induce selection, the sponsor is confronted with a tradeoff between efficiency and (the adverse effects of) transaction costs induced selection, and in so far as the risk-adjusted subsidies do not sufficiently increase access to coverage for high-risk individuals, there is a tradeoff between access and efficiency.32

The conclusion that a sponsor in a competitive individual health insurance market is confronted with a tradeoff between access, efficiency and selection differs from the conclusion of Newhouse 1996 that widespread health insurance creates a tradeoff between efficiency and selection. These different conclusions are caused by different assumptions, as discussed in Section 2.2. If Newhouse’s assumption is right that the selection is only caused by transaction costs, premium rate restrictions are not a relevant tool to increase access to coverage for high-risk individuals and loosening such restrictions is no effective tool to reduce selection. If our assumption is right that insurers in principle have the capability to substantially differentiate their premiums, the selection problem in so far as it is induced by premium rate restrictions, can be reduced by loosening or eliminating these restrictions 33 without reducing efficiency in production. For example, if a sponsor applies a combination of premium rate restrictions and risk-adjusted premium subsidies,34 as is the case in e.g., Belgium, Germany, Israel, the Netherlands, the US Medicare system and in Switzerland, the sponsor may consider to allow the insurers including sickness funds and Medicare±HMOs to differentiate the individual consumer’s direct payment to what they experience to be the residual predictable risk not accounted for by the risk-adjusted premium subsidy. Consequently, any information surplus the insurers might have over the sponsor could result in premium differentiation rather than in cream skimming. If the insurers are required to identify any risk factors they use for premium differentiation, the sponsor could try to include these risk factors in the subsidy

32 A tradeoff between access and efficiency also exists if insurers use prior costs or prior utilization as a rating factor and the sponsor (partly) adjusts the subsidies to this rating factor.
33 The analogue in the provider reimbursement context, as discussed by Newhouse (1996), is to take away the regulation that forbids so-called balance-billing by the providers.
34 In that case, risk adjustment can be seen, dependent on the starting-point, as a tool to increase access as well as a tool to reduce selection.
formula in subsequent years. In this way the reduction of solidarity that results from the insurers’ freedom to further differentiate premiums, may well be a short-term sacrifice to a long term solution.\textsuperscript{35} Furthermore, in spite of the good progress in the risk adjustment research that has been made during the last decade (see e.g., Ellis et al., 1996; Lamers, 1997; Lee and Rogal, 1997; Van de Ven and Ellis, 2000), market-driven improvements of the risk adjustment mechanism may be more effective and more workable than research-driven improvements. So, although the tradeoff between access, efficiency and selection is more complicated than the tradeoff between efficiency and selection, the option of loosening the regulation concerning the premium rate restrictions provides policy makers with an additional degree of freedom to find socially acceptable solutions.

A subsidy system as discussed in this paper provides access to health insurance every new contract period. If a person’s health status deteriorates over time and consequently the insurer raises the person’s premium, the future subsidy value will be adjusted also to the change in the individual’s risk characteristics. In this sense a subsidy system also provides insurance against the risk of becoming a bad risk in the future (Newhouse, 1984; Diamond, 1992; Pauly, 1992; Cochrane, 1995).

Finally, because of its supposed direct effects politicians and policy-makers may be inclined to prefer premium rate restrictions rather than risk-adjusted premium subsidies as a strategy to increase high-risk individuals’ access to coverage in a competitive individual insurance market. However, in order to eliminate the adverse effects of the selection induced by the rate restrictions, these restrictions have to be supplemented with an adequate risk-adjustment mechanism.\textsuperscript{36} Because a system of sufficiently risk-adjusted premium subsidies eliminates the need for premium rate restrictions and consequently avoids their adverse effects, the subsidy approach is the preferred strategy.

Acknowledgements

Previous drafts of this paper have been substantially revised while finishing the chapter ‘‘Risk adjustment in competitive health plan markets’’ (Van de Ven and Ellis, 2000). The authors thank Randy Ellis and Joe Newhouse for the stimulating discussions on that chapter which were also of great value for this paper. Further

\textsuperscript{35} Temporarily, the sponsor could provide low-income high-risk individuals also with a premium-related subsidy to increase their access to coverage.

\textsuperscript{36} Given the findings of this paper, it is remarkable to read so many reports and proposals with respect to premium rate restrictions without any reference to a risk-adjustment mechanism (e.g., United States General Accounting Office, 1995; Astorino et al., 1996; Claxton and Levitt, 1996; United States General Accounting Office, 1996; Curtis et al., 1999; Levi et al., 1999). On the other hand, in most of the risk-adjustment literature it is not well recognized that the selection problems are caused by the premium rate restrictions. This paper aimed at building a bridge between the two approaches.
the authors thank Tony Culyer and two anonymous referees for their comments on a previous draft of this paper. This study has been financially supported by the Ministry of Economic Affairs, the Netherlands. Only the authors are responsible for the content of this article.

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