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The interaction of direct and indirect risk selection

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ABSTRACT

This paper analyzes the interaction of direct and indirect risk selection in health insurance markets. It is shown that direct risk selection – using measures unrelated to the benefit package like selective advertising or 'losing' applications of high risk individuals – nevertheless has an influence on the distortions of the benefit package caused by indirect risk selection. Direct risk selection (DRS) may either increase or decrease these distortions, depending on the type of equilibrium (pooling or separating), the type of DRS (positive or negative) and the type of cost for DRS (individual-specific or not). Regulators who succeed in reducing DRS by, e.g., banning excessive advertising or implementing fines for 'losing' applications, may therefore (unintendedly) mitigate or exacerbate the distortions of the benefit package caused by indirect risk selection. It is shown that the interaction of direct and indirect risk selection also alters the formula for optimal risk adjustment.

1. Introduction

Risk selection is considered to be one of the main problems in regulated health insurance markets. If there is community rating, so that insurers are not allowed to charge premiums according to risk, they will make profits with some individuals and losses with others. Insurers who act on these incentives to attract profitable and repel unprofitable individuals are said to engage in risk selection.[1]

Two forms of risk selection can be distinguished: direct risk selection (DRS) and indirect risk selection (IRS).[2] With DRS, insurers know that a particular individual or group of individuals is characterized by non-average risk. DRS is therefore targeted at an individual the insurer has identified to either be a high or a low risk type (like, e.g., a hypochondriac) or at a group of individuals the insurer knows to have non-average expected cost (like, e.g., a certain age group or individuals living in a high cost area). Usually, the measures taken for DRS are not related to the benefit package (i.e. the medical services) offered; examples are selective advertising or 'losing' applications of high risk individuals.[3] It has been shown that potential profits associated with successful DRS can be substantial.[4]

With IRS, insurers do not know which particular individual is of high or low risk (or are prevented from using this information), and so only act on their knowledge that there are different risk types in the population. The measures taken to engage in IRS usually consist of distorting the benefit package, so that it is attractive for low risks, but not for high risks. Several studies have shown that the incentives for IRS can be severe, and that insurers do indeed act on these incentives.[5]

A regulator can counteract the incentives for both DRS and IRS by implementing a risk adjustment scheme, setting transfers to (and from) insurers depending on signals which are informative about individuals' expected cost. In almost all risk adjustment schemes, the formula used to calculate these transfers is based on a regression of actual health care expenditures on a set of explanatory variables like age, gender and morbidity. Most of the literature on

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[1] See van de Ven and Ellis (2000).

[2] See Breyer et al. (2011).

[3] van de Ven and van Vliet (1992) provide an extensive list of measures insurers may use for risk selection; for differential treatment of low and high risks' applications see Bauhoff (2012).

[4] See Shen and Ellis (2002).

[5] See Frank et al. (2000), Cao and McGuire (2003) and Ellis and McGuire (2007).

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risk adjustment has been concerned with improving this underlying regression by, e.g., including additional variables or altering the grouping algorithm for diagnoses in morbidity based risk adjustment, so that a larger part of the variance of actual expenditures is explained. The larger the explained part of the variance, the closer transfers are to actual cost, and the lower the incentives for risk selection should be.

Initiated by the very influential study of Glazer and McGuire (2000), there has developed a small literature that departs from this statistical approach and instead explicitly models insurers' incentives for risk selection. One study in this literature has shown that conventional, i.e. regression-based, risk adjustment may decrease welfare if there is imperfect competition, another, that it may even increase the extent of risk selection.[6] These undesirable effects of conventional risk adjustment exemplify the need for what Glazer and McGuire (2000) have termed optimal risk adjustment. They have shown that a regulator can increase the effectiveness of a risk adjustment scheme by distorting the payments as calculated from a regression: there has to be overpayment for signals which are correlated with high risks and underpayment for signals which are correlated with low risks. If the over- and underpayments are chosen optimally, incentives for IRS can be eliminated completely.[7] Optimal risk adjustment has also been derived for a setting where individuals differ in their elasticity to switch insurers or where insurers are allowed to vary their premium in some dimension, as is the case in the insurance exchanges in the US.[8]

A concern, already raised by Glazer and McGuire (2000) themselves, is that such over- and underpayments create incentives for DRS regarding the signal, but so far it has not been analyzed whether this has an influence on optimal risk adjustment. In fact, we are not aware of any theoretical study that explicitly models the interaction of direct and indirect risk selection, even in the absence of risk adjustment.[9] In this study we therefore develop such a model and show that in general (the degree of) DRS has an influence on the distortions of the benefit package caused by IRS and that this alters the formula for optimal risk adjustment. DRS may either increase or decrease the distortions caused by IRS, depending on whether insurers try to attract the low risks (positive DRS) or to repel the high risks (negative DRS), whether a pooling or a separating equilibrium emerges, and whether the cost for DRS is individual-specific or not.

If insurers' expenditures for DRS are at least to some degree individual-specific (and not just a fixed cost), they affect risk-type-specific cost: Positive DRS increases the cost per low risk, negative DRS the cost per high risk. In the first case, the cost difference between the risk types is reduced, in the second, it is increased. In the pooling equilibrium where both risk types pay the same premium, positive DRS therefore reduces the incentives for IRS, while negative DRS increases it.

In the separating equilibrium, insurers' expenditures for positive DRS translate into a higher premium for the contract offered for the low risks; this makes this contract less attractive for the high risks, so the distortion of the benefit package necessary to repel the high risks is reduced. Negative DRS on the other hand creates a 'substitution effect': If insurers are (somewhat) successful in repelling the high risks by DRS, they can reduce the degree of IRS. For an overview of these results see, Table 1.

Table 1
Effect of DRS with individual-specific cost on the distortion of the benefit package.

Type of equilibrium	Positive DRS	Negative DRS
Pooling equilibrium	Distortion decreases	Distortion increases
Separating equilibrium	Distortion decreases	Distortion decreases

A regulator who succeeds in reducing negative DRS (by, e.g., charging a fine for 'losing' applications of high risk individuals) will therefore simultaneously reduce IRS in the pooling equilibrium, but unintendedly increase the distortion of the benefit package in the separating equilibrium. The distortions caused by IRS will also be increased if he succeeds in reducing positive DRS (by, e.g., banning excessive advertising), in this case for both the pooling and the separating equilibrium.

In three of the four cases, optimal risk adjustment then becomes even more important. We therefore derive the impact of DRS on the formula for optimal risk adjustment developed by Glazer and McGuire (2000). We show that the overpayment for a signal that indicates a high risk has to be increased exactly by insurers' expenditures on positive DRS; likewise, the underpayment has to be reduced by the expenditures on negative DRS. With this modification, their formula can eliminate the incentives for IRS even in the presence of DRS.

In the literature on optimal risk adjustment, some of the results regarding the distortions caused by IRS have been derived under perfect competition, but DRS seems incompatible with such a setting where individuals are perfectly informed about all benefit packages and premiums and always choose the insurer that offers the best benefit package-premium combination. We therefore derive our results within a discrete choice model, which can easily capture different levels of competition. To keep the model simple, we assume that the benefit package is one-dimensional, but the model can be extended to a multi-dimensional benefit package. Also, to simplify the notation when deriving the results, we first consider the case of two risk types, but then show that the results also hold for an arbitrary number of risk types.

The remainder of this paper is organized as follows: In Section 2, we introduce the basic discrete choice model and show how DRS can be incorporated in such a model. We analyze the pooling equilibrium in Section 3 and the separating equilibrium in Section 4. Section 5 concludes.

2. The model

2.1. Basic model without DRS

Individual preferences regarding the benefit-premium bundle are given by

$$u = p^r v(m) - R, \tag{1}$$

where R denotes the premium and m the level of medical services (measured in monetary terms). p^r is the probability of becoming ill, and there are two risk types $r = H, L$, with $p^H > p^L$; the share of the low risks is λ. The utility of receiving medical treatment, $v(m)$, is increasing at a decreasing rate, i.e. $v'(m) > 0$ and $v''(m) < 0$. The efficient level of medical services is implicitly defined by $v'(m^{FB}) = 1$.

There are n insurers j, each offering a benefit-premium bundle $\{m^j, R^j\}$. The individual's decision of which insurer to choose may, however, not only depend on these benefit-premium bundles, but

[6] See Lorenz (2013) and Brown et al. (2011), respectively. In the empirical part of their study, Brown et al. (2011) find such an increase in the extent of risk selection for the Medicare Advantage program in the U.S.; however, there has been some disagreement on this finding, see Newhouse et al. (2012).

[7] See also Glazer and McGuire (2002) and Jack (2006).

[8] For the first setting, see Bijlsma et al. (2011), and for the second, McGuire et al. (2013) and Shi (2013).

[9] Eggleston (2000) derives the optimal mix of supply and demand side cost sharing for a setting with a single (semi-altruistic) HMO that can influence the level of medical services (according to the outcome of a patient–provider bargaining process) and can dump a share of the high risks at some cost; however, there is no competition as there is only one provider.