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Improving risk equalization for individuals with persistently high costs: Experiences from the Netherlands

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ABSTRACT

Background: Risk-equalization (RE) models in competitive health insurance markets have become increasingly sophisticated. However, these models still have important imperfections. A specific problem in the Netherlands is that insurers are insufficiently compensated for individuals who can persistently be found in the right-end tail of the cost distribution.
Objectives: The goal of this study is to explore and evaluate options for improving compensation for persistently high-cost individuals in the Dutch basic health insurance.
Methods: Prescription drugs claims (2012) and administrative data on costs and risk-characteristics (2010–2013) for the entire Dutch population are used to identify high-cost individuals and evaluate improvement options. These options – including new risk-classes and a form of risk-sharing – are evaluated in terms of insurers' incentives for risk-selection and efficiency.
Results: Three significantly undercompensated high-cost groups are identified: users of specific expensive drugs for rare diseases, hemophilia-patients, and individuals whose costs are in the top-0.50% in 3 prior years. The improvement options effectively remove the undercompensations for these groups and lead to a considerable improvement in individual-level model fit. However, the options differ in terms of their (potential) effects on insurers' efficiency incentives.
Conclusions: Although this study provides useful insights in the possibilities for improving RE-models for persistently high-cost individuals, improving compensation remains challenging and dependent on the ongoing debate regarding coverage and reimbursement of expensive drugs.
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1. Introduction

In an increasing number of competitive health insurance markets, risk equalization (RE) is applied to provide insurers with a compensation based on each enrollee's risk-adjusted 'expected' costs. As a result, insurers receive a higher payment for the elderly and chronically ill than for the young and healthy. In the presence of premium regulation, the goal of RE is to mitigate incentives for risk-selection while maintaining insurers' incentives for promoting efficiency of care [1].

In the last decades, RE-models in Europe [2–6] and the United States [7,8] have evolved to sophisticated 'morbidity-based' models using pharmacy- and diagnosis-based indicators of health. For example, the Dutch RE-model 2016 for curative somatic care comprises about 160 risk-classes, half of which are based on diagnoses or prior utilization related to chronic illness [4]. Even these sophisticated models, however, have important imperfections. One specific problem is that these models do not always succeed in compensating insurers sufficiently for the *predictably* high costs of relatively small groups of individuals who can *persistently* be found at the right-end tail of the cost distribution. One reason for this is that for practical reasons, RE-models are typically estimated by ordinary least squares (OLS) regression, which is ill-equipped to deal with skewness [9,10]. Another reason is that the relevant patient groups are typically small (e.g. people with rare diseases, using orphan drugs), potentially impeding inclusion of explicit risk-classes for these groups by the regulator due to stability issues (e.g. unstable coefficients). Despite potential stability issues resulting from small patient numbers and high variance, however, insurers may still use their own (cost) estimates as a basis for risk-selection against those patient groups.

In the Dutch basic health insurance market, skewness of costs for which insurers bear full financial risk increased considerably over the past five years [11]. One reason has been the transfer of care (e.g. home care provided by district nurses) to the basic insurance package from a separate public insurance program for long-term care [12]. Another reason is the abolition of all ex-post risk-sharing (with

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the goal to increase insurers' incentives for efficiency), resulting in insurers being fully risk-bearing for virtually all care covered under the basic insurance (comprising 70% of total healthcare spending in the Netherlands in 2016). The increased skewness of the cost distribution is reflected by the fact that in the period 2013–2016, cost growth occurred mainly in the 2 highest cost deciles (9% and 37%, respectively, compared to an average growth of 1% in deciles 1 through 8). In addition, the number of individuals with annual costs above €100.000 doubled in the same period [11].

The Dutch RE-model 2016, estimated prospectively by OLS, is unable to predict the (extremely) high costs of relatively small groups of individuals. For example, the maximum predicted costs generated by that model is about €145.000, while there are hundreds of individuals exceeding this amount based only on their costs for orphan and other expensive drugs [11]. Thus, insurers are consistently undercompensated for these individuals, leaving incentives for risk-selection (given that insurers are not allowed to risk-rate their premiums). Risk-selection is undesirable, particularly since it may threaten quality of care for undercompensated groups of patients [13].

Using claims data (2012–2013) on all covered prescription drugs as well as administrative data on healthcare costs (2010–2013) and the risk-adjusters of the Dutch RE-model 2016 for the entire Dutch population, the goal of this paper is to explore and evaluate options for improving the compensation for specific groups of 'persistently high-cost individuals', i.e. individuals with (very) high costs who can be designated ex-ante. To our knowledge, thus far this issue has not received explicit attention in the scientific literature on RE. Specifically, we aim to answer 3 questions: (1) How can specific groups of persistently high-cost individuals be identified, what are their characteristics, and what is their undercompensation based on the current RE-model? (2) How can compensation potentially be improved for these individuals? (3) What are the potential consequences of the identified solutions in terms of estimated coefficients and insurers' incentives for risk-selection and efficiency?

This paper is organized as follows. The next section provides a brief background on the Dutch health insurance system and RE-model. Next, the data and methods are explained, followed by the main results. The final section discusses the results and contains the conclusion.

2. The Dutch health insurance system and RE-model

Since 2006, Dutch residents have been obliged to buy basic insurance coverage for a standardized benefits package. This scheme, which is based on the principles of managed competition with insurers competing on price and quality, comprises 3 main financial streams: a community-rated premium from adult enrollees to the insurer, an income-related contribution from enrollees to the RE-fund (a national account from which the RE-payments are financed), and RE-payments between insurers and the RE-fund. The RE-payments are based on the expected costs of insurers' enrollees in year t, which are calculated using the coefficients of an OLS-regression of costs from year t-3 on risk-characteristics from year t-3 to t-6 (depending on the risk-adjuster). The RE-payments for 2016 have thus been calculated using cost data from 2013 and data on risk-characteristics from 2010 to 2013.

The RE-model 2016 for curative somatic care contains the following risk-adjusters: age interacted with gender (40 risk-classes), region (10 risk-classes for clusters of zip-codes), socioeconomic status (17 risk-classes based mainly on income, interacted with age), source of income (24 risk-classes for self-employed, students, higher-educated, and people with social security benefits; interacted with age), pharmacy-based cost groups (PCGs, 30 risk-classes based on the use of drugs – prescribed mainly in ambulatory settings – for chronic illnesses in the prior year), DCGs (15 risk-classes based on specific diagnoses from in- and outpatient hospital treatments in the prior year), durable medical equipment cost groups (DMECGs, 4 risk-classes based on prior use of durable medical equipment), multi-year high cost groups (MYHCGs, 6 risk-classes based on high costs in the prior 3 years), physiotherapy utilization groups (1 risk-class based on physiotherapy costs in the prior year), and 4 risk-classes based on interaction between age and the 'morbidity-based' risk-adjusters (i.e. PCGs, DCGs, DMECGs, and MYHCGs).

In addition, the model contains 2 risk-adjusters based on the costs of home care and of geriatric rehabilitation care in the prior year. However, both adjusters are excluded from this study because these adjusters may have confounding effects on the results and the Dutch Minister of Health aims to abolish these 'endogenous' risk-adjusters by the end of 2018 [14].

3. Materials and methods

For this study 3 datasets are available. First, we use individual-level data on insurance claims for drugs prescribed in 2012 and 2013. Each claim at least contains the Anatomical Therapeutic Chemical (ATC) code and the claim amount. Second, individual-level administrative data on costs and risk characteristics for virtually the entire Dutch population ($N \approx 16.8$ million) are used. This dataset, which was actually used for calculating insurers' RE-payments for 2016, contains the total curative somatic healthcare costs of 2013 and the full set of risk-adjusters of the RE-model 2016. Finally, the total curative somatic healthcare costs over three prior years (2010–2012) are available. Using an anonymized enrollee identification key, these 3 datasets can be merged at the individual enrollee-level.

Given these datasets, we address the research questions using a four-step procedure, in which we were assisted by a supervisory team of medical professionals, experts from insurers, and experts from the Dutch Ministry of Health:

1 Identify persistently high-cost individuals using 2 complementary approaches. First, we conducted a focused literature review in Medline and Google to identify relevant sources on this topic (e.g. empirical research papers, descriptive articles or websites, databases, etc.), both in the context of the Dutch health insurance system and with respect to relevant experiences in other countries with a similar health insurance system and RE-model. In reviewing potentially relevant sources, our focus was explicitly on high-cost chronic conditions that can be identified using claims data from year t-1 (similar to the morbidity-based risk-adjusters in the current Dutch RE-model), but are not yet included in the current model. Second, to ensure that relevant high-cost individuals would not be missed, we also analyzed enrollees' multi-year cost history. As it is highly likely that at least some of the high-cost individuals identified through the first (content-driven) approach will also be identified by a (data-driven) analysis of enrollees' cost-history and the latter is principally meant to complement the former, high-cost individuals identified through the first approach are excluded from the cost-history analysis. In this way, *additional* high-cost individuals can be identified. Regarding this analysis, it is important to note that the Dutch RE-model already contains a risk-adjuster for multi-year high costs [15], consisting of 6 risk-classes; the class with the highest coefficient is reserved for about 24,000 individuals who are in the top 1.5% of the cost distribution in each of the 3 prior years. As splitting this risk-class may improve compensation for high-cost individuals without necessarily resulting

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