RISK ADJUSTMENT IN THE GERMAN HEALTH INSURANCE SYSTEM – DOES THE RISK COMPENSATION SYSTEM LEAVE ANY INCENTIVES FOR RISK SELECTION?*

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ABSTRACT

Germany’s Statutory Health Insurance (SHI) more or less dates back to the late 19th century when Chancellor Bismarck implemented a forerunner of the present system to combat social unrest. Without any doubt, this was a great achievement for the social welfare state in Germany, of which the SHI is one pillar – and the SHI has proved to be remarkably stable ever since, both against reform efforts and social change.¹

In the beginning, the SHI system was not designed to foster competition. Rather, sickness funds, as health insurance corporations are called under the SHI, were forced to contract and act uniformly to ensure equity and to maximize market power. This was necessary as e.g. in the middle of the 20th century there were still more than 1,800 sickness funds – many of them operating only regionally.² Also, the cost-containment policies which remained in place until the mid-1970s did not encourage competition. Not until the early 1990s did the political will change and the implementation of competitive elements into the SHI was seen as a way to raise efficiency potentials.³⁴⁵⁶⁷

This was the result of a general shift in the social climate favoring deregulation, questioning the effectiveness of top-down cost containment regulations and a raising societal debate over unequal options in choosing and switching sickness funds. As a consequence, the Health Care Structure Act was passed in December 1992, and almost all mandatorily insured individuals, including blue- and white collar workers, were given the same right to choose a sickness fund in order to promote competition among sickness funds.⁸⁹¹⁰ From then on, sickness funds could be switched on a yearly basis with three months’ notice starting in 1997. To provide all sickness funds with a level basis for competition, a risk compensation system (RCS) was implemented two years before free choice of sickness funds was granted.¹¹ Thus, the implementation of open enrollment in Germany was the aggregate

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¹ Bärninghausen T, Sauerborn R. One hundred and eighteen years of the German health insurance system: are there any lessons for middle- and low-income countries? Social Science and medicine 54 (10), 2002: 1559-87.


⁵ Wörz M, Busse R. Analysing the impact of health-care system change in the EU member states – Germany. Health Economics; 14 (Suppl.1), 2005: 133-49.


result of the concern to provide equity of choice for all mandatorily insured individuals and the hope to improve efficiency within the system by strengthening competition. With time, the discussion concerning the RCS evolved to transforming the RCS, and to linking the risk compensation system to incentives for sickness funds to manage care and to implement a fully morbidity adjusted RCS while providing sickness funds with increasing leeway to compete with each other. Therefore, further refinement of the RCS has been on the political agenda ever since its implementation in 1994, leading to various expert reports and evaluations of the functioning of the RCS and its role in leaving incentives for risk selection.12

In this article, we focus on the latest health care reform refining the RCS and present an empirical analysis of its effects on risk selection for sickness funds.

**Keywords:** Statutory Health Insurance, health care, risk compensation system, risk adjustment

**BACKGROUND**

**The Statutory Health Insurance**

The Statutory Health Insurance, or SHI, is the major pillar of German health care. It insures around 90% of the population while ca. 10% buy private health insurance.13 For employees whose gross earnings do not exceed a certain income threshold enrollment in the SHI is mandatory. For the year 2010 this threshold was fixed at 3,750€ of gross monthly income or 45,000€ of gross yearly income.

The threshold is recalculated and adjusted each year by the Ministry of Health. Besides mandatorily insured employees, pensioners, students, farmers, artists, the unemployed, and other population groups may be insured under the SHI. Non-working spouses and children are covered without contribution payment if their husband / wife or parent is a member of an SHI sickness fund.14 Employees whose gross earnings exceed the dynamic income threshold for mandatory insurance may choose to opt out of the SHI and buy private insurance or remain voluntarily in the SHI (around 10% of all members). For most of them enrollment in the SHI is economically attractive compared to buying private health insurance because either their children and / or spouses are covered free of charge or they have chronic illnesses which would require a risk agio in private health insurance.

At the moment there are around 196 sickness funds in the SHI,15 Their number has declined steadily during the past years and is expected to decrease even further during the coming years. Seven different traditional groups of sickness funds can be distinguished: General regional funds (Allgemeine Ortskrankenkassen, AOKs), substitute funds (Ersatzkassen) which originally consisted of blue- and white collar substitute funds, company-based funds (Betriebskrankenkassen, BKKs), gild funds (Innungskrankenkassen, IKKS), farmers’ funds (Landwirtschaftliche Krankenkassen, LKKs), a miners’ fund (Bundesknappschaft) and one sailors’ fund (Seekrankenkasse).16 All the funds are non-for-profit, based on the principle of self-governance and operate in a corporatist system, which means that they act uniformly and collectively.

When Bismarck established a comprehensive statutory insurance system in 1883 he could build on the forerunners of these sickness funds – mainly regional relief funds, company-based funds, and fund -like gildstructures.1 Also, quite a number of the principles the sickness funds use today were already in existence before Bismarck implemented them. Namely, the principle of self-governance with both employers and employees being represented in the bodies of most company-based sickness funds, the principle of contribution payment sharing between employers and employees, the principle of rendering benefits in kind, and compulsory insurance which had been introduced by quite a few municipalities early on. Another feature which dates back to the Bismarck reform is the comprehensive and uniform benefits package of the SHI, which is determined by law for over 90% of all the benefits the sickness funds may offer. It includes ambulatory care, hospital care, drugs, dental care, transportation costs, auxiliary

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13 http://www.vdek.com/presse/daten/Auf_keinen_Blick/index.htm
devices such as hearing aids, massages, physiotherapy, and sickbenefit payment. While all in-kind benefits are independent of income and are rendered according to medical needs, the sickbenefit payment is income-related and usually becomes the sickness fund’s responsibility after the first six weeks of illness, during which the employer continues to pay the wages without any deductions. The insured will be required to pay for drugs, inpatient care, and services such as massage or transportation, by contributing co-payments, which are fixed by law and capped at 1% of gross annual income for the chronically ill and at 2% of gross annual income for any other insured individuals (§ 62 Social Code Book V).

**Solidarity and competition in the SHI**

Basically, the system rests on two governing principles: (1) it is financed on the “pay as you go” principle, which means that contribution rates are income-related and the sickness funds have a financial reserve of only between 25% and 100% of their average monthly expenditures and (2) solidarity has been the overriding doctrine since the implementation of a social security system under Bismarck. The establishment of the forerunners of sickness funds as well as of the sickness funds themselves as risk-sharing and solidaristic organizations, has deeply influenced the understanding of the social welfare state in the hearts and minds of German citizens and politicians. Although solidarity has increasingly come under siege during the debate over deregulation and increased competition in healthcare to facilitate efficiency, it has never been abandoned, mainly due to the fact that over the decades a certain amount of trust and willingness has been established within politics and among citizens to share in solidarity. To understand the German system and the debate regarding the RCS it is essential to understand the meaning of “solidarity” in the German SHI. In essence, the term “solidarity” implies a redistribution scheme which is subsidizing in nature: Rendering benefits according to medical needs and independent of income involves cross-subsidies from healthy (low risk) to sick (high risk) individuals. Setting contribution rates as a percentage of gross income includes cross-subsidization from higher income to lower income members. Free coverage of non-working spouses and children transfers money from singles to families, and, lastly, the health and young working population subsidizes old age pensioners. This redistribution is confined to the healthcare system. Before open enrollment, it was limited to the individual sickness fund. Through the implementation of the RCS, solidaristic redistribution was expanded to all sickness funds in the SHI which has been a matter of debate ever since its implementation.

Regarding competition, sickness funds in the SHI have been granted increasing options to differentiate themselves from their competitors by permitting for selective contracting with providers and pharmaceutical companies under certain prerequisites, allowing sickness funds to offer a supplementary insurance package that could so far only be offered by private health insurance and by giving them (very) limited options in managing health care. Still, the main business of sickness funds in the SHI remains “selling statutory health insurance”.

**RISK COMPENSATION SCHEME**

**Why risk adjustment in statutory health insurance?**

In a solidaristic health care system, sickness funds are not allowed to charge risk equivalent premiums. Hence, they have a very strong incentive to adjust the risk to the contribution. This is called risk selection. To ensure choice (via open enrollment) and equal access to healthcare for all consumers risk selection is banned in social health care systems. Nevertheless, a ban on risk selection does not reduce the incentives for the sickness funds to use it unless they are adequately compensated for the highrisk insured. This requires some kind of mechanism to determine the difference between the average contribution

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sickness funds may charge for carrying high risk and their additional expenditures.\(^{18}\) Usually, this so-called risk adjustment is based on socio-demographic risk factors such as age, sex, and health status. In the German SHI, this differential is financed by redistributing contribution payments from low risk and / or higher income members. The better the RCS adjusts for such differences, the better solidarity and competition can be aligned. Ideally, the risk adjusters should reflect the differences in risk for the RCS to provide a level playing field for all sickness funds independent of the risk profile of their members.

Traditionally, most of the insured were assigned to a sickness fund based on job characteristics or regional criteria. This lead to a disintegration of risks between sickness funds with the AOKs for instance insuring mainly blue collar workers with less income and a higher morbidity compared to e.g. the white collar members of substitute funds. With the implementation of open enrollment in 1996, these differences had to be compensated for by a RCS to ensure a level playing field for competition.

**The risk compensation scheme**

When the RCS was implemented in 1994, four risk adjusters were used to reflect the differences in risk structures between sickness funds: age, sex, inability to work and entitlement to sick benefits. Average expenses were then calculated for each group of the insured defined by the four risk adjusters resulting in approximately 732 different categories. For example, average expenses were determined for 50-year-old males who were able to work and were entitled to sickbenefit payments. The resulting average expenditure was assigned as credit to the sickness fund in the RCS calculations. The mechanisms is a complicated procedure involving several steps to determine if a sickness fund will receive payments from the RCS or be a net payer into the RCS. Besides differences in morbidity structures, differences in contribution rates between funds were considered in the calculations.

**PERFORMANCE OF THE RCS AND INCENTIVES FOR RISK SELECTION**

**RCS performance and health care reforms**

Several expert reports assessed the performance of the system and independently concluded that the adjusters used under-compensated sickness funds for the chronically ill and left in place considerable incentives for risk selection.\(^{19}\) This is not surprising, as actual morbidity was not reflected directly in the risk adjusters. Since its beginning in the late 1980s, research into risk adjustment has consistently shown that age and gender alone are insufficient risk adjusters.\(^ {20,14,21}\) The reason is that in each of the 732 clusters used in the RCS there is a relatively small number of chronically ill or insured with costly diseases who will have expenditures well above average, while the majority of the insured in each cluster will have expenditures below average. As a first reaction in 2000, the German government introduced a high risk pool for insured with high-cost diseases such as hemophilia (§ 269 Social Code Book V). If an insured individual had expenditures above a certain threshold, all cost beyond that threshold could be claimed from the high risk pool introducing risk sharing for these insured among all sickness funds in the SHI. Since the chronically ill usually have predictably higher costs than the average insured in their cluster AND these costs may be influenced by good management, another option was chosen for the chronically ill. If sickness funds succeeded in enrolling those patients in quality-assured disease management programs, they were grouped in special disease-specific clusters. Thus, the average compensation from the RCS for these insured individuals

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was raised substantially, giving sickness funds a strong incentive to enroll patients in the programs.\textsuperscript{22} Although this was a step forward in risk adjustment in the SHI, sickness funds with a sicker population, such as the AOKs, continued to lobby for further refinement of the RCS risk adjusters regarding actual morbidity. The next step was taken in 2009 with the SHI-Competition Enhancement Act (GKV Wettbewerbsstärkungsgesetz). It further refined “solidarity-based” competition by implementing a “health fond” in conjunction with a more morbidity-oriented RCS. In essence, the health fond acts as a central allocation and distribution agency.\textsuperscript{23,24} It bundles all revenues from all sickness funds together with tax subsidies and allocates a premium payment of approximately € 170 per month for each member to each fund which includes standardized expenses for administration and statutory benefits. This premium is increased or decreased according to the prospectively expected morbidity-based expenditure for each member in the following year.

Eighty diseases were chosen as risk adjusters for morbidity (§ 31 Absatz 4 Satz 1 Risikostruktur-Ausgleichverordnung).\textsuperscript{25} The selection of the diseases was based on the fact that expenditures for the insured with the relevant disease were to be at least 50% above the average expenditures of all other insured individuals in the same cluster.

To fill the fond a uniform contribution rate of 14.9% is collected from all insured under the SHI, which is directly transferred to the fond. Thus, income-related differences in member structures are no longer accounted for under the health fond. The high risk pool implemented earlier together with a special grouping of patients enrolled in Disease Management Programs was abolished with the implementation of the health fond. To leave an incentive to manage care efficiently, the fond will not be filled to meet 100% of the expenses of the funds. If sickness funds need to generate additional revenues, they are provided with the opportunity to levy an additional premium in case they cannot balance their budget with the allocations from the fond. This additional premium may either be raised as a lump sum payment or a certain percentage of the individual’s income. So far, very few sickness funds have chosen to levy additional premiums for fear of competitive disadvantages.

### Incentives for risk selection

Before the implementation of the health fond, differences in income structures between sickness funds were not accounted for in risk adjustment. Sickness funds therefore had a strong incentive to attract members with high incomes because expenses for administration and statutory benefits were not part of the RCS mechanism. Sickness funds with higher income members could secure a competitive advantage as they could offer lower contribution rates compared to sickness funds with lower income members.\textsuperscript{21} Since this incentive was eliminated with the implementation of the health fond, there are two potential risk selection incentives left:

- Differences in income are not accounted for in the morbidity oriented RCS. If a sickness fund needs to raise additional premiums because the transfer payments generated from the RCS are insufficient, these additional premiums will not be adjusted for income. Individuals with higher income pay a higher contribution compared to individuals with lower income if a percentage of income is levied as premium (or may pay higher absolute premiums before reaching the cap of 1% of income). Therefore incentives to attract individuals with high income still exist.

- Because non-working spouses and children (which are covered free of charge and are fully compensated within the RCS) would not pay additional premiums, there is as well an incentive to attract singles rather than families.

The following analysis evaluates if there are still incentives for risk selection left after the implementation of the morbidity-oriented RCS in the German SHI. Since risk selection is prohibited by law it can be expected that mechanisms will mainly include passive measures such as targeted advertisement or offering targeted statutory benefits such as paying for acupuncture to attract middle class members.

\textsuperscript{22} Stock S, Redaelli M, Lauterbach KW. Disease Management and health care reforms in Germany – does more competition lead to less solidarity? Health Policy 80(1), 2007:86-96.


\textsuperscript{24} Fischer B. Wettbewerb zwischen Krankenversicherungen - Position einer GKV. Z Evid Fortbild Qual Gesundhwesen 103, 2009: 635-8.

\textsuperscript{25}http://www.hausarzt-bw.de/upload/pdf/Liste_Morbi.pdf
METHODS

Model parameters

The original model used by the Federal Agency of Insurance (Bundesversicherungsamt) is based on the legal prerequisites for the morbidity-oriented RCS, in place since January 1, 2009. It consists of a uniform lump sum payment of ca. €170 per individual insured under the RCS. Supplements to and deductions from this amount are based on age groups (20 groups in 5-year clusters), sex (two groups), inability to work and sickbenefit entitlement (6 groups), and 106 different morbidity-based supplements (80 diseases with different morbidity levels), resulting in 152 different clusters to calculate the average lump sum payment for the insured.

According to this, our model determines whether there are any parameters that have an influence on expenditures that are already adjusted for age, sex and morbidity as in the RCS.

Data and statistical analysis

The data set from the TNS Healthcare Access Panel of the year 2002 was used in our analysis. In 2002, survey questionnaires were sent out to 54,977 households with a response rate of 53.5%, providing information on 28,754 households with 75,122 individuals. Of these, 22,713 (30.23%) had to be excluded from further analysis because of missing or invalid information (4,087 cases or 5.44%) in the fields of “region of residence” and “highest completed educational level”, and because only persons above age 18 were considered (18,551 cases or 24.69%), since below that age individuals are not independently insured but covered through their parents. This resulted in 52,484 (69.86% of original sample) persons to be analyzed. The female to male ratio in the sample was 46.43% to 53.57%.

To enhance the response rate, in-kind bonuses of up to €10 were offered. The sample was age- and sex-adjusted to the German average population with the standard cell-weighting method.26,27 The validity of the data was judged to be adequate by comparing income and morbidity characteristics of the sample with other representative analyses. Thus, our sample can be assumed to be adequately representative.

In the calculation, morbidity documented in the survey was assigned to the diseases accounted for in the RCS. If the disease documented in the survey was not incorporated in the RCS morbidity adjusters, it was allocated to the non-RCS affiliated disease cluster (Table 1).

Table 1. Diagnoses used as risk adjusters in the RCS and diseases that are not adjusted for in the RCS

<table>
<thead>
<tr>
<th>Diseases incorporated in the RCS</th>
<th>Diseases not incorporated in the RCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Cardiac arrhythmia</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Venous thrombosis</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>Allergy</td>
</tr>
<tr>
<td>Angina pectoris</td>
<td>Acne</td>
</tr>
<tr>
<td>Stroke</td>
<td>Sleep disorder</td>
</tr>
<tr>
<td>COPD</td>
<td>Erectile dysfunction</td>
</tr>
<tr>
<td>Asthma</td>
<td>Headache</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>All diseases that are not chronic in nature</td>
</tr>
<tr>
<td>Breast cancer</td>
<td></td>
</tr>
<tr>
<td>Other forms of cancer</td>
<td></td>
</tr>
</tbody>
</table>

Source: own work

Average expenses / cost of the insured were determined by accounting for average health care utilization. In the survey, all relevant areas of utilization such as inpatient care, ambulatory care, medication, devices such as hearing aids or services such as massage and rehabilitation were covered. Costs were determined by weighing utilization with charges or with average prices (Table 2).


The resulting individual utilization expenses were than weighed with the actual average SHI expenditures for each utilization area. This was done to correct for distortions due to differences in documentation frequency.

Possible incentives for risk selection with respect to health care expenditure were defined according to the following criteria:

- Sickness funds must be able to identify individuals or groups of persons with the given criteria;
- Sickness funds must be able to attract individuals or groups of persons with the given criteria with their limited measures of passive risk selection strategies such as advertisement or special programs.
- Based on this reasoning the following criteria were chosen as possible risk selection incentives for sickness funds:
  - Place of residence based on the average number of inhabitants (< 20,000; 20,000 to 100,000; > 100,000)
  - Highest completed educational level (did not graduate from school, elementary school, junior high school, senior high school, college degree, university degree)
  - Net household income per month in € (< 1,500; 1,500 to < 2,250; 2,250 to < 3,000; > 3,000)
  - Dependents (children) in the household (yes/no)
  - Health care utilization / expenditure was standardized by conducting a regression analysis with age, sex, and diseases as determining factors and an ex post consideration of the factors “region of residence”, “highest completed educational level”, “net household income” and “children in household” using the given weight factor for age and sex. Possible selection incentives were analyzed using standardized expenditures with a linear regression of the independent variables. All calculations were carried out using SAS 9.2.

### Table 2. Appraisal of health care utilization with costs

<table>
<thead>
<tr>
<th>Outpatient consultations (per consultation)</th>
<th>Doctor</th>
<th>Costs (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General practitioner</td>
<td>73.00</td>
<td></td>
</tr>
<tr>
<td>Internist</td>
<td>158.00</td>
<td></td>
</tr>
<tr>
<td>Gynecologist</td>
<td>44.00</td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>52.00</td>
<td></td>
</tr>
<tr>
<td>Orthopedist</td>
<td>57.00</td>
<td></td>
</tr>
<tr>
<td>Surgeon</td>
<td>75.00</td>
<td></td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>51.00</td>
<td></td>
</tr>
<tr>
<td>Otorhinolaryngologist</td>
<td>45.00</td>
<td></td>
</tr>
<tr>
<td>Neurologist</td>
<td>61.00</td>
<td></td>
</tr>
<tr>
<td>Radiologist</td>
<td>121.00</td>
<td></td>
</tr>
<tr>
<td>Urologist</td>
<td>68.00</td>
<td></td>
</tr>
</tbody>
</table>

| Regular medication (per year)               |                               | 135.51    |
| Healthcare services (per prescription)     | Physiotherapy                | 126.00    |
| Acute inpatient treatment (per hospitalization) |                         | 3,086.09  |
| Sick benefit payment (per sick leave longer than 6 weeks) | 2,147.73 |
| Prevention (per realized check-up)         |                               | 50.00     |

Source: own work
RESULTS

Validity of calculated health care expenditure

To validate the calculated health care expenditure from the panel data the results were compared to the average health care expenditure in the SHI stratified into age groups (Figure 2).

This shows quite good consistency in all areas of the curves. The burden of morbidity and stratification into age groups seems to be accounted for adequately in our analysis.

Standardization

After standardization for age, sex, and morbidity, the course of the expenditure curve was exponential (Figure 1). Due to this, a logarithmic transformation was conducted to permit the use of linear regression, which explained 20.14% of the variability.

Influence of analyzed risk selection incentives

Two regression analyses were conducted using the standardized logarithmic expenditure data as dependent variable and “region of residence”, “income”, “children in household” and “highest completed educational level” as determining factors.

Regression analysis was carried out separately for persons with diseases accounted for in the morbidity-adjusted RCS and for persons without diseases accounted for in the morbidity – adjusted RCS.

For persons with diseases accounted for in the morbidity-adjusted RCS, the adjusted model could explain 1.35% of total variance. All variables except “region of residence” had a significant influence on health care expenditure. The greatest part of variance was explained by the factor “children in household” followed by “income” and “highest completed educational level” (Table 3).

Table 3. Results of regression analysis / analysis of variance (F-test) on factors explaining...

<table>
<thead>
<tr>
<th>Variable</th>
<th>Persons with RCS - accounted diseases</th>
<th>Persons without RCS - accounted diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-statistics  p-value</td>
<td>F-statistics  p-value</td>
</tr>
<tr>
<td>Children in household</td>
<td>61.85  &lt; 0.0001</td>
<td>27.34  &lt; 0.0001</td>
</tr>
<tr>
<td>Income</td>
<td>18.30  &lt; 0.0001</td>
<td>17.64  &lt; 0.0001</td>
</tr>
<tr>
<td>Highest completed educational level</td>
<td>3.94  0.0034</td>
<td>10.25  &lt; 0.0001</td>
</tr>
<tr>
<td>Size of the region of residence</td>
<td>2.19  0.1121</td>
<td>1.71  0.1812</td>
</tr>
</tbody>
</table>

Source: own work
THE AMOUNT OF HEALTHCARE COSTS

For persons without diseases accounted for in the morbidity-oriented RCS, 0.41% of total variability could be explained by the model.

All variables except “region of residence” had a significant influence on health care expenditure. The greatest part of total variance was explained by the factors “income”, “highest completed educational level” and “children in household”.

As a result, the largest part of variability can be explained through the variables of age, sex, and morbidity, which are already used in the RCS. This result was to be expected. Nevertheless, the variables “children in household”, “income” and “highest completed educational level” have a small but significant influence.

Relationship of analyzed risk selection incentives

To determine the effect size of significant variables on health care expenditure, the following reference categories were defined for the independent variables: “university degree”, “income > 3,000 € per month”, “no child in household”. Analyses were carried out separately for persons with and without RCS accounted diseases. For persons with RCS accounted diseases no homogenous picture can be drawn (Table 4).

Insured individuals with elementary education had significantly lower health care expenditures compared to those with a university degree. But the trend of higher health care expenditures with a higher completed educational level is not consistent. Rather, the insured without any educational attainment seem to have the highest healthcare expenditure. With regard to income, the size of the effect is inconsistent as well. The insured with an income between €1,500 to €3,000 have significant higher healthcare expenditures compared to the insured with an income above €3,000. But the insured with an income of < €1,500 have the least healthcare expenditures (not statistically significant).

A highly significant result can be observed for the insured with RCS-accounted diseases and for parenthood. The insured with RCS-accounted diseases and children in their household generate health care expenditures about 24% higher compared to individuals without children in the household.

Table 4. Individuals with chronic conditions: relative differences in health care expenditure for the variables of education, income, and children in household

<table>
<thead>
<tr>
<th>Reference category</th>
<th>Relation category</th>
<th>Health care expenditure</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>University degree</td>
<td>Without any educational attainment</td>
<td>+ 6.07 %</td>
<td>0.6764</td>
</tr>
<tr>
<td></td>
<td>Elementary school</td>
<td>- 8.58 %</td>
<td>0.0061</td>
</tr>
<tr>
<td></td>
<td>Junior high school</td>
<td>- 3.10 %</td>
<td>0.3657</td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>+ 4.12 %</td>
<td>0.4111</td>
</tr>
<tr>
<td>Income €3,000 per month</td>
<td>&lt; €1,500</td>
<td>- 5.66 %</td>
<td>0.0651</td>
</tr>
<tr>
<td></td>
<td>€1,500 - &lt; 2,250</td>
<td>+ 13.95 %</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td>€2,250 - &lt; 3,000</td>
<td>+ 9.63 %</td>
<td>0.0077</td>
</tr>
<tr>
<td>No children in household</td>
<td>Children in household</td>
<td>+ 23.93 %</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Source: own work
For persons without RCS-accounted diseases, a consistent connection can be shown (Table 5). A lower level of education correlated with higher healthcare expenditures, although not all results were significant. The insured without any educational degree have health care expenditures that are about 18.13% higher compared to the insured with a high-school degree. In terms of income, the insured with a gross monthly income of less than € 1,500 have significantly higher healthcare expenditures (18.42%) compared to the insured with an income of above € 3,000 per month. The characteristic “children in household” resulted in significantly lower expenditures (-8.96%).

**DISCUSSION**

Providing the insured with the right to choose their sickness fund was an important step in German politics, as it is seen to promote consumer responsibility and to encourage sickness funds to engage in healthcare management. Although the RCS has been viewed critically from its beginning and several analyses disclosed various shortcomings in risk adjustment, it has succeeded in leveling differences in contribution rates which were to a certain degree related to differences in risk structure.\(^{28,29}\) After the implementation of a uniform contribution rate, this was no longer necessary. Now, the main task of the RCS is to prepare a level playing field for all sickness funds to compete in terms of health care quality and efficiency.\(^{21}\) Thus, the RCS is seen as a major prerequisite for sickness funds to move from payers to players in the field of healthcare management. Whether the new RCS can meet this challenge remains to be seen. It will depend to a large extent on the future arrangement of the additional contribution sickness funds can levy in case the revenues from the RCS do not balance their budget. If these additional payments are not risk adjusted, the RCS might undermine fair competition instead of promoting it.


Irrespective of this discussion, in our analysis we explored to what extent the morbidity – adjusted RCS leaves incentives for risk selection for the sickness funds. We analyzed the association of several possible risk selection criteria with higher or lower healthcare utilization after adjustment for age, sex and RCS -accounted diseases. Our analysis leads to the following conclusions. Regarding the income side, there are still incentives for sickness funds to attract higher income members because this will give them a competitive advantage if they have to levy additional premiums. Since these are not risk -adjusted, to date sickness funds with higher income members are likely to be able to levy marginally lower additional payments compared to sickness funds whose members are less well -off. Additionally, sickness funds may discriminate against potential members with dependents such as children or non-working spouses for the same reason.

With respect to the expenditure side, the morbidity -adjusted RCS pretty much succeeds in leveling differences due to sex, age and several chronic diseases. However, if the insured did not have any of the RCS -accounted diseases it was favorable for sickness funds to attract potential members with a higher income and a high educational status. For potential members diagnosed with one or more RCS -accounted diseases, the picture is mixed. In this category, the insured with a high income and / or a high educational status may have high utilization / expenditure. The same holds true for the variable “children in household”. If the parents have RCS -accounted diseases, children in the household are an additional risk factor for high expenditure. Area of residence, on the other hand, does not have a significant influence on health care expenditure.

There are several limitations which need to be addressed in interpreting the above -mentioned results. The model is based on survey data. Any self-assessment of the insured tends to be subjective and might have some data missing due to neglect. It would be desirable to augment the analysis with actual healthcare utilization data from the sickness funds. However, in Germany sickness funds often do not have the relevant data such as educational status or income, or their data are not sufficiently valid to be used in analysis. The strength of our model is the merging of socio-demographic data such as income and education with healthcare utilization data. This is an international standard, but for Germany it is fairly new.

Another limitation is the fact that we could not identify costly procedures leading to possible over- or underestimation for low and high utilizers. However, due to the high numbers of the insured who were analyzed, we expect that there is a random distribution without a strong bias. Additionally, it does not seem to be a feasible strategy for sickness funds to discriminate against individuals with costly diseases.

One more limitation of our study is that in the real RCS the expenditures calculated for the period t compensate for morbidity in t-1, but in our study morbidity and expenditures were estimated in the same period t. This could lead to attenuated effects of expenditure differences between groups of the insured.

**CONCLUSION**

The morbidity adjusted RCS succeeds in adjusting pretty well for risk factors such as age, sex and RCS accounted diseases. However, it leaves a considerable incentive for sickness funds to carry out risk selection in the population of “healthy” insured (without an RCS -accounted diagnosis). In this population, members with a higher income and a higher educational status are attractive for sickness funds on both the income and the expenditure side. However, from a health policy perspective, it does not seem to make sense to expand the RCS adjusters to include income and educational status, especially because these individual factors do not show a rectified effect in our analysis. Rather, they are only determinants for possible factors for risk selection in the “healthy population” without any RCS -accounted diseases. Additionally, the largest part of the variation in health care expenditure is explained by the current risk adjusters used in the morbidity -oriented RCS. Only less than 1% of incremental variance can be explained by using the additional factors we analyzed in our model. We conclude, therefore, that risk selection is still possible but only in very specific settings such as e.g. advertisement strategies.

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A more important question our analysis raises seems to be: what are the underlying causes of the differences in health care expenditure? From the literature, it is well known that lower social status correlates with lesser utilization of prevention programs. Also, less educated and less well-off individuals seem to engage more often in health-compromising behaviors such as smoking, insufficient exercise, and eating too much fat and sugar relative to fruits and vegetables, thus becoming overweight. The bottom line of our analysis could be that the health policy should invest in reaching those at risk of higher morbidity due to poor education and lower income, not only to educate them in an adequate way, but to possibly invest in broad population-based programs. This might be one feasible way to lower healthcare expenditure for the sickness funds.

REFERENCES

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