The Health Insurance Game

1 Introduction

By using a simple game concept, students are introduced to some basic ideas about health insurance by active participation and in a playful way. The basic idea goes back to a concept that Jennifer Kohn from Drew University in Madison, New Jersey presented at the iHEA conference 2017 in Boston at a preconference session on "Teaching Health Economics" (THE) and carried out with some 100 participants. This concept is described in the Handbook on Teaching Health Economics (Kohn, J. (2021)). Florian Buchner adapted the concept to the conditions in Austria and Germany. In the course of the Covid19 circumstances, a pure online version of the game was developed and implemented in cooperation with Simone Flaschberger, Jan-David Wasem and Jürgen Wasem. In a next step we use a combination of online and in person play: We play the game on campus, which makes the negotiations more realistic, and we use the web-based platform of the game to make the background calculations a lot faster.

The didactical goal of the game is to enable students to experience different policies associated within a health insurance system. Often, students are so familiar with the framework conditions of their own system that they often do not even think of alternative conditions. Different selection effects known from health insurance theory can be shown. Students are confronted - in a quite simple way - with autonomously calculating health insurance premiums under different conditions.

From a didactical point of view, a simulation creates for the students a change from the usual teaching and invites them to actively participate in the event. Especially in the situation of Covid19, in which lectures and exercises are largely carried out in the form of online events, the approach of a web-based simulation of a health insurance market offers a useful addition to synchronous and asynchronous video lectures. A recent study by Chernikova et al. (2020) shows that simulations are very well suited to conveying complex concepts to students in a university context. The meta-analysis of 128 studies from the period between 1979 and 2018 with 145 independent experiments and 409 effect estimates (a total of 10,000 participants) comes to a strong positive average effect size of g = 0.85 (Hedge's g). This concept also offers a promising opportunity to play the game in an international setting with students from very different health care financing systems.

In the following, the basic concept of the event is described first and then the game is presented in detail, including four policy scenarios.

Basic Concept

First, the participants are divided into insurers and customers. These roles are maintained throughout the game. Insurers offer insurance at a premium they determine under different policy scenarios and customers choose whether or not to purchase health insurance for the offered premium. The objective of the insurer is to maximize profit over all rounds. The objective of the customers is to keep their own expenses for illness (including insurance premiums) as low as possible.

In the current version four "rounds" are played. Each round is characterized by a different policy scenario (different framework conditions for taking out health insurance described below). Each round consists of 3 years. The reason for implementing three years per round is that the impact of coincidence (by the risk scores of the customers and by the dice roll, see below) does not become too great. For the different scenarios, it is important to pay close attention to whether there is an obligation for customers to subscribe an insurance contract, an obligation for insurers to accept everybody and an obligation to disclose the respective risk score.

At the end of the game, the results and the statistics of the four rounds are displayed. As a rule, effects such as risk aversion or adverse selection can already be seen with a quite small number of participants (from ten customers and two to three insurers as an absolute minimum). It makes sense here to go into more detail on the calculation of an actuarially fair premium, on risk aversion and on adverse selection. If necessary, appropriate health economic theory may enrich the lecture. In addition, for the different scenarios the appropriate premium calculation approaches, the expected selection effects and possible regulatory approaches may be discussed.

Besides the overview of these results with relation to health economics, a leaderboard, a ranking of the participants is displayed at the end of the game (this may also be shown after each round), separated by customers and insurers. When interpreting this ranking, it should be borne in mind, especially among customers, that a good ranking not only contributes to a good assessment of their own risk and good negotiating skills but also contributes to a certain degree to luck with risk scores and dice rolls.

2 Detailed Description

In the following, the game is first described in detail (2.1), then the concrete implementation is discussed (2.2), the four scenarios are described with the respective expected effects (2.3) and at the end some suggestions for the evaluation are given (2.4).

2.1 Initial Situation of the Game

All participants are in a health insurance market with suppliers of insurance (health insurers) and customers of health insurance (customers). First of all, it has to be clarified who is acting as a health insurer in this game and who is acting as a customer. The customers have a uniform annual budget of € 100,000 for their living expenses, the risk of falling ill differs for the customers (different risk scores). These risk scores lie between 1 and 6 and are reassigned for every round (**not** for every year within a given round) so that the disclosure of the risk score in one round has no effect on the following rounds. Risk differentiation takes place in this game only via the risk score and thus via the probability of occurrence of health care costs. The potential medical costs amount in every case to € 50,000. Whether these costs materialize for an individual customer depends on a die roll. If the assigned risk score is greater than or equal to the value on the die, an illness occurs in the relevant year and the corresponding costs have to be paid. Similarly, if the dice roll is higher than the risk score the customer stays healthy. For example with a dice roll of 3 all customers with a risk score of 3, 4, 5 or 6 become ill and the individuals with risk scores of 1 or 2 stay healthy. In case an insurance contract has been subscribed, the respective costs are to be borne by the insurer; if no insurance contract has been subscribed, the customer has to pay the respective costs from his income. Each round consists of three years, i.e. three

dice rolls. Insurers start at the beginning of the game with equity capital that depends on the number of potentially insured persons. This is calculated from the number of customers multiplied by € 100,000.

The risk profile of the total population, i.e. the distribution of the risk scores in the total population, is preset as follows:

Risk score	1	2	3	4	5	6
Share of population	30%	20%	20%	15%	10%	5%

For the numbers in the respective risk score clusters are the results are rounded to integers, and if the result does not add up to the number of the total population, the number of customers with risk score 1 is adjusted accordingly. The risk profile of population remains the same over the entire course of the game and is particularly to be communicated to the insurers at the beginning of the game.

2.2 Implementation of the game

There are two instruction documents available for implementing the game, as well as the web-based game platform. The instruction documents are a manuals for the students (insurers and customers) and a manual for the administration of the game. Both documents contain screenshots of the web-based game and try to make access as easy as possible. From the authors' point of view, it makes sense to make the student manual available to students in advance and, in the case of a purely online course, to have them printed out by the students (this reduces the number of open windows required on the screen during the game). An additional document can be used to explain the basics of the game to the participants in advance. From our point of view, however, it should definitely be part of the event to present the basic elements of the game again for everyone.

With these documents and the web-based form of the game, the game can be carried out both as a face-to-face event and as a purely online event. We recommend a face-to-face event in combination with the web-based platform whenever possible. For example, negotiations are easier to organize (doors are simply closed during the negotiations and then opened again), they are more realistic (body language, eye contact etc.), the group dynamics are generally more positive and the game is more fun.

There are situations when an online event is the only possible alternative. Then a video conference system such as Zoom or MS-Teams may be used for communication. For the implementation of the game it is essential that this system provides the opportunity for outbreak-rooms that students can enter and leave independently, and – ideally it can be seen from outside, how many participants are in such an outbreak-room. This is to allow negotiations of health insurance contracts between insurers and customers. Such solutions should be tested in advance and the participants should be instructed accordingly.

2.3 The scenarios

Currently four scenarios are installed which are played in the four "rounds" of the game. The scenarios are schematically presented here including the expected effects

(A) Free health insurance market I

Framework conditions:

- No premium regulation
- No obligation to contract, no compulsory insurance
- **Perfect information**, i.e. customers must disclose their risk score to insurers on request

Expected effects:

- Risk-based/actuarially fair premiums
- Extensive cover of population by insurance (risk aversion)

(B) Free health insurance market II

Framework conditions:

- No premium regulation
- No obligation to contract, no compulsory insurance
- **Asymmetrical information**, i.e. there is no obligation for customers to disclose their risk score

Expected effects:

- Either largely average calculation
  ⇨ premiums too low and
  adverse selection (self-selection of the good risks who do not subscribe insurance)
- or extensive risk disclosure
  ⇨ problems to insure for those who do not want to disclose their risk score

(C) Premium Regulation (Community Rating)

Framework conditions:

- Premium regulation by government: Insurers must ask a **uniform insurance premium** from all of their policyholders (community rating). Insurers are therefore not allowed to differentiate between different risk levels in their premiums
- No obligation to contract, no compulsory insurance
- Asymmetric information, insurers are not allowed to ask for the risk scores

Expected effect:

- Largely average calculation
  ⇨ premiums too low and
  adverse selection (self-selection of low risk individuals that do not buy insurance)
  higher rate of uninsured

(D) Risk Adjustment

Framework conditions:

- No premium regulation
- No obligation to contract, no compulsory insurance
- Asymmetric information: Customers are not obliged to disclose their risk scores
- A compensation mechanism is set up by government, which on average puts all insured persons at the same risk. (This compensation mechanism is usually not a zero-sum game - even if everyone buys insurance)

Expected effect:

- The same premium by every insurer for all insured persons
- Lower losses for insurers than in scenario C
- Adverse selection

2.4 Evaluation and discussion

After the fourth round of the game, it makes sense to take a break. During this time, the results and the ranking of the four rounds can be transferred to a PowerPoint presentation (insert a screenshot of the results and the leaderboards in the PowerPoint file). The final presentation may focus on different areas, e.g. the calculation of a risk-based premium / actuarially fair premium, the difference of risk averse, risk neutral and risk seeking individuals, the summarized results of the game and the selection (adverse selection, risk selection) are meaningful topics. At the end, the authors usually go through the four scenarios with their problems and possible solutions and discuss why state regulation may make sense.

Literature

Chernikova, Olga, Heitzmann, Nicole, Stadler, Matthias, Holzberger, Doris, Seidel, Tina, & Fischer, Frank (2020). Simulation-Based Learning in Higher Education: A Meta-Analysis. *Review of Educational Research, 90*(4), 499-541. doi: 10.3102/0034654320933544

Kohn, Jennifer (2021): The Health Insurance Game in Platt, Maia & Goodman, Allen: *Handbook on Teaching Health Economics*, Edward Elgar Publishing, Northampton, USA p. 17-31.