ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis International Bachelor Economics and Business Economics

The Effect of the Own Risk in Dutch Health Care Insurance on Health Care Costs

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Date final version: 25-06-2024

Abstract

This paper examines the effect of the implementation of the own risk in 2008 in Dutch health care insurance on total health care expenditures. Building on Abadie et al. (2010), the counterfactual is constructed using the synthetic control method. The findings reveal a significant reduction in health care costs associated with the implementation of the own risk, amounting to an annual 9.96 billion euros, or 10.83%, as of 2019. As established in the literature, this reduction is due to a larger disincentive to use health care when one must personally bear first part of the costs of treatment. However, a careful balance must be struck, since it is found that delayed and forgone care may lead to higher health care expenditures in the future. In all, this research provides policymakers with critical insights into the economic implications of the implementation of own risk.

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I. Introduction

Background information

In the Netherlands, as in many other countries, the belief prevails health care should be universally accessible and affordable. Consequently, the health care system is based on solidarity: health care insurance is mandatory for everyone and a large portion of financing comes from taxes. Financing, nonetheless, has changed over the years to hold sway over the continuously increasing health care costs (Rijksoverheid, 2023).

In 2008, an own risk policy was implemented in the Dutch health care insurance. This policy, stemming from other insurance markets, entails that one must personally pay the first 385 euros of health care costs in a year, thus attempting to increase the barrier to see a medical specialist and lower costs (Rijksoverheid, 2023). As will be discussed later on, voices have been raised to abolish the own risk in the current health care system. Whereas supporters of the abolition aim to level out differences between rich and poor, abolition may also lead to an undesired effect on the total magnitude of health care costs, which is detrimental to everyone. Hence, reflection is required.

Central Research Question & Preview

This research aims to provide an answer to the following research question:

"What is the effect of the own risk in Dutch health care insurance on health care costs?"

This question shall be answered using a set of sub-questions:

1. What is own risk? When does one pay own risk?
2. How much financing comes from own risk?
3. What do unnecessary care and avoidance of care as a result of own risk cost in the long term?

The answer to question 1 will provide a comprehensive overview of the functioning of the own risk policy in the Netherlands, discussing for what treatments the own risk is applicable and the levels of mandatory and voluntary own risk one can take. Question 2 studies the current financing of health care costs in the Netherlands. It will discuss how much finance comes from the voluntary and mandatory own risk. Consequently, it can be determined how much financing is directly forgone if the own risk policy were to be abolished. Attention will predominantly be paid to the last research question. This question concerns the indirect effects of the own risk. It studies whether the current policy induces people to not take essential care because of monetary reasons and whether this increases health care costs in the long run because more expensive treatments are needed when not intervened duly.

The first and subsequent questions will be answered through performing a literature review. The third question will be answered empirically using a difference-in-difference design with a synthetic control. This entails the comparison of the evolution of Dutch health care costs against a weighted average of a basket of carefully selected OECD countries. This weighting occurs to make the pre-intervention trend of the weighted average resemble the trend of Dutch health care costs as closely as possible. It is found that as of 2019, the estimated annual reduction in health care expenditures as a result of the own risk amounts to 9.96 billion euros, or 10.83%.

Relevance & Purpose of Research

The own risk in health care insurance has played a crucial role in the Dutch elections of November 2023. Pivotal was a moment in the 'Debate of the Netherlands', an election debate broadcasted on live television in which the audience of 'ordinary' Dutch people could make comments: 'I am chronically ill, I pay 385 euros, every year. I cannot pay this with a welfare benefit, and many more are like me.' Responding to this harangue, Geert Wilders replied to Frans Timmermans 'You can wait, this lady cannot wait, she must have this money now', followed by a round of applause by the audience.

Hence, abolishing the own risk has become a playing ball of political interests. The aim of abolishing the own risk is purely social: it seeks to bridge the divide between rich and poor in the Netherlands. Increasing support for this measure is inextricably linked to the larger tendency of 'bestaanszekerheid' or livelihood security, i.e. the assurance of being able to meet basic needs (Nibud, 2023). Having a health insurance system with a combination of voluntary and mandatory own risk causes some people to pay more for health care than others, even though health care is considered essential. This phenomenon is thought to conflict with the conceptual notion of a solidary society, in which those with the broadest shoulders should bear the greatest burden. It is seen as particularly troublesome that, on a macro-level, low-income groups require more health care and thus incur more costs, creating an even bigger disparity between rich and poor (Kamerstukken, 2018).

Furthermore, the existence of own risk induces families with little means to not take essential care, because they believe the costs do not outweigh its benefits. According to the Centraal Planbureau, one in five Dutch people postpones or avoids health care, of which half does so because of monetary reasons (Remmerswaal & Boone, 2020). As for the differential of costs in care users and non-care users, politicians are perturbed by the poor access to care for low-income groups.

Striking the inherent balance between solidarity and efficiency cannot be done empirically and is thus the task of politicians. The purpose of this research, then, is to provide a comprehensive overview of the economic effects of the own risk policy, such that policymakers can make a calculated assessment of the desirability of the own risk in Dutch health care.

II. Literature Review

Conceptual Framework

As noted, the Dutch health care insurance system is based on solidarity. Everyone is obliged to take out an insurance policy, the 'basispakket' or core package. This includes all medically necessary care. This core package is equal for everyone and determined by the Dutch government. The insurance policy cannot differ across age and health groups, which precludes adverse selection.

Besides the core package, individuals can voluntarily opt to take out additional insurance, which includes, for example, dental care. The composition and price of this additional insurance is not regulated, but is at the discretion of the health insurer (Rijksoverheid, 2023).

In 2008, an own risk policy was implemented into the Dutch healthcare system. Under this policy, adults incur the first part euros of annual health care costs themselves. Over time, this threshold has risen from 150 euros at the implementation to the current 385 euros. If one exceeds this threshold, the rest is paid for by the insurance. Some care, such as the general practitioner and maternity care, is exempt. This 385 euros is a mandatory own risk. Individuals can raise it by up to 500 euros in voluntary own risk in exchange for a lower health insurance premium. Typically, the annual premium decreases by 50% of the chosen voluntary own risk (Rijksoverheid, 2023).

The underlying notion of the own risk policy is that one makes a personal consideration of benefits and costs of taking health care over the first 385 euros. Then, if one needs a lot of care and exceeds the threshold, the costs are borne by the collective. Consequently, health care remains affordable and accessible (Rijksoverheid, 2023).

Several effects of the own risk have to be distinguished. Firstly, a portion of the financing of health care costs comes from the own risk policy. As of 2020, total health care costs amounted to €116 billion in the Netherlands. A fraction of 4.5% was financed through the own risk, resulting in total financing of €5.2 billion through the own risk policy (CBS, 2022).

When this own risk is abolished, users of health care no longer contribute to health care costs on the margin. Hence, a source of financing of health care costs is forgone by the government, creating a gap in financing (Remmerswaal & Boone, 2020). This gap must be filled, for example through a higher insurance premium. This is the direct implication of abolishing the own risk premium and does not concern total health care costs, merely the composition of the financing ('financieringsverschuiving').

The own risk policy is also thought to have indirect effects, which affect the magnitude of health care costs. Currently, the costs and the benefits of the decision of taking health care are put in the same hands, conditional on that a person has spent less than the own risk. From a microeconomic perspective, this induces the optimal decision, as one reaps all benefits and bears all costs. As a result, one does not want to see a doctor for a trifle, because the small benefit of possibly feeling marginally better does not weigh up to the high cost of paying the doctor. If the own risk was to be abolished, one would only receive the benefit of seeing the doctor, whereas the costs are borne by society, constituting a moral hazard problem. Solidarity between healthy and ill people erodes, however, as the ill have to pay more for health care than the healthy (Remmerswaal & Boone, 2020). Hence, abolition of the own risk is expected to lead to more unnecessary care, which is costly to society, but a strengthening of solidarity between the ill and the poor.

The current own risk policy can also induce individuals to not take essential healthcare, because they do not believe the benefit weighs up to the cost of care. This leads to avoiding or postponing (potentially necessary) health care (Remmerswaal & Boone, 2020). As a result, more extensive and costly treatments might be necessary later on. Hence, in the long term, the own risk policy can also increase the health care costs.

Underlying Theory

Ideas of American economist Kenneth J. Arrow form the cornerstone of the own risk or deductible. In his 'theorem of the deductible', he concludes the following: "If an insurance company is willing to offer an insurance policy against loss desired by the buyer at a premium which depends only on the policy's actuarial value, then the policy chosen by a risk-averting buyer will take the form of 100 percent coverage above a deductible minimum." (Arrow, 1963).

A person wants to ensure that he does not suffer future large financial losses since he is risk-averse, and thus buys insurance. Through the introduction of a deductible, the premium is lowered since the insurance company must only cover larger, less frequent losses, while providing a safeguard against catastrophic losses. Without a deductible, the insured will have no disincentive to cause damage, which raises damage costs and thus the insurance premium, which makes the insured worse off. Hence, a deductible balances a lower premium against large, unpredictable losses, rendering an optimal policy. The optimal size of this deductible can then be determined by maximizing the expected utility of the insured, depending on his risk-aversion and the decrease in premium cost as a result of the deductible (Arrow, 1963). For further technical proof of this Arrow's statement, please refer to the appendix of Arrow's article.

In subsequent literature, Arrow's theorem has been corroborated and expanded. Gollier & Schlesinger (1996) use an alternative approach to prove Arrow's theorem. By defining preferences of a risk-averse individual through preference functionals that align with first- and second-degree stochastic dominance, it is proven that Arrow's findings also hold without expected-utility maximization by an individual. Furthermore, Dreze & Schokkaert (2013) demonstrate that Arrow's theorem remains applicable to situations in which moral hazard is present.

Hence, own risk in health insurance has been long understood and discussed and, in theory, proven to be optimal. Despite this, implementation in health insurance is relatively new. As a result of sharply rising health care costs and considering that 30 percent of health spending is ineffective in the US, own risk policies have been proposed as the solution to curb expenditures. Consequently, prevalence of high-deductible health plans (HDHP) has surged in the US (Health Policy Brief, 2016).

In HDHPs, like in Dutch health care insurance with the voluntary own risk, enrollees can balance a higher monthly premium against a lower own risk. This renders the voluntary risk unsuitable for estimating the effect of own risk on health care costs, since young, healthy people are less likely to incur health care expenses, and thus opt for a higher own risk. Hence, a separating equilibrium is created in which young, healthy people take out a high own risk in return for a low premium and ill elderly opt for a low own risk and a higher monthly premium. Waters et al. (2011) study the impact of HDHPs on health care expenditures using insurance data from over 60,000 individuals in the US, with an own risk varying between $1,700 and $6,000. In absence of exogenous variation of the own risk, causal effects cannot be directly inferred from this data. Nevertheless, interesting results were found.

It was established that the effects of the own risk differ strongly between patient groups. Across all groups, medication use is positively associated with HDHPs, suggesting that people who opt for the plan anticipate future health care expenditures that are covered better under this plan than under alternatives. Individuals who are likely to stay well under their deductible saw a rise in preferred drug use, whereas those who are likely to meet their deductible experienced a rise in non-preferred medication usage. Preferred drugs, i.e. drugs that have been selected by the health insurer, are commonly cheaper than non-preferred medication. Those who are likely to stay under the limit of the deductible thus used cheaper drugs, because they had to pay themselves, whereas ill people, who exceed the limit of the deductible, do not contribute on the margin and can thus use more expensive drugs, insensitive to the higher price. This strongly indicates that people indeed react to the incentives provided by deductibles (Waters et al., 2011).

For the purpose of causal inference, exogenous variation is necessary. Experiments concerning the effect of own risk on health care use in the Netherlands do not exist (Van Kleef, Douven & Newhouse, 2017). In the US, however, two notable experiments have been conducted in which health insurance was assigned randomly: the RAND and the Oregon experiment. The former entails an experiment studying 3958 individuals between 14 and 61 years of age over the period 1974-1982. Individuals from six different locations throughout the US were selected to account for regional differences. Participants were randomly assigned one of the 14 insurance policies with varying own risk, allowing for the estimation of causal effects. It was found that individuals with very high own risk amounting to 130 percent of mean individual health care costs, had 31 percent lower health care costs than those without an own risk (Brook et al., 1984). External validity remains limited, however, due to the focus on low-income groups below the age of 62 (Van Kleef, Douven & Newhouse, 2017).

In the Oregon experiment, the state of Oregon randomly offered individuals a health insurance program. This experiment was conducted in 2008. This insurance plan had no own risk and a monthly premium of maximum $20. The authors study the 10,405 individuals that were selected for the study and compare their results to a control group of similar size. It was then found that individual annual medical spending increased by $1,172 or 35% as a result of selection into the insurance program. Health outcomes, however, remained largely similar (Baicker et al., 2013). Therefore, results of these experiments are in line with the underlying notion of the own risk, i.e. that individuals strongly react to financial incentives in health care.

This latter study, however, focuses on the effect of insurance rather than the direct effect of an own risk policy and only considers low income groups. Furthermore, both experiments were conducted in the US, which has a different health care system. For example, a visit to the general practitioner is mandatory in the Netherlands before receiving access to specialistic health care, and the general practitioner is exempted from the own risk in the Netherlands, unlike in the US. These factors make extension of the results to the Netherlands unrealistic (Van Kleef, Douven & Newhouse, 2017).

In response to the RAND experiment and wishing to establish the effect of own risk in the Netherlands, Oortwijn et al. (2012) study the effect of the own risk using a difference-in-difference design. They use data from Vektis on health insurance claims of health insurances of over 500 thousand individuals, aged between 15 and 18 in 2008 in the Netherlands. The treatment groups consists of individuals aged 17 in 2007 and 18 in 2008, the control group consists of individuals aged 14, 15 and 16 in 2007 and 15, 16 and 17 in 2008. Individuals who turn 18 in 2008 will fall under the own risk policy, whereas this policy does not apply to those under the age of 18. It is then assumed that the development of health care costs, apart from the influence of the own risk, is similar. Also, it is assumed that there are no other factors that could cause differences between the two groups. Then, through comparing increase in the mean health care costs of the treatment group and the control group, the implementation of the own risk policy is estimated to lead to a reduction in health care costs between 2.6 and 7.3 percentage points for the collective. Extrapolation to older age groups, however, is difficult since it is deemed likely that there are factors that could cause differences between the two groups, specifically age.

The Centraal Planbureau (CPB) or Dutch Bureau for Economic Policy Analysis, has conducted multiple studies concerning this topic, using statistical models. These models render quantitative insights in the effects of abolishing the own risk. Remmerswaal & Boone (2020) study all data of total individual health care costs of all insured people in the Netherlands in the period between 2008 and 2013. A Bayesian mixture model is used to estimate the effects of own risk on health care costs. This model assumes data originates from a mixture of underlying probability distributions. It is found that health care costs would increase by 2.1 billion euros if the current own risk policy of 385 euros was completely abolished.

This study was a follow-up on the study performed by Remmerswaal et al. (2015), that found a much smaller effect amounting to 630 million euros. This amount was found using the results of Van Vliet (2004), who estimated the price sensitivity of the demand for health care. Data from 1996 on the health care costs and own risk of 100,048 privately insured Dutch individuals is used, finding a price sensitivity of -0.14. This implies that individual health care costs decrease by 0.14% when the own risk increases by 1%. The interpretation of this results is complicated since individuals who are more healthy tend to take out higher voluntary own risk, which confounds the estimator (Van Kleef, Douven & Newhouse, 2017).

The difference between the studies is attributed to the new model being more advanced, the increased health care costs since 2015 and the use of data of all Dutch insured individuals, which allowed for separation of the effect of the own risk and other factors that influence health care costs. The results of Van Vliet (2004) were based on privately insured individuals, who generally have a higher income and are in better health. They are therefore less likely to make use of health care services, leading to a lower estimate of the effect of the own risk policy. Even though the results from the 2020 study are deemed more accurate and are in line with prior research, areas for improvement remain. Only the mandatory own risk is considered, which precludes the possibility of studying the effect of voluntary own risk. Furthermore, mental health care and individuals with very high health care expenditures have been excluded in the analysis (Remmerswaal & Boone, 2020).

Hence, the majority of evidence points towards a reduction in health care expenditures as a result of an own risk policy. These findings give rise to the following hypothesis:

H1: In the short run, health care expenditures decrease as a result of the own risk

It is uncertain, however, how such savings are realized. Brot-Goldberg et al. (2017) identify three possible causes: reduction in quantity of care, price shopping and substitutions in quantity. They study health insurance data of 105,000 employees in the US. Most individuals were in a traditional plan without own risk. After a policy change, the traditional plan was suspended, forcing participants into the plan with an own risk. Using a simple OLS regression, it is established that as a result of the own risk, spending decreases by between 11.79 and 13.80 per cent. This drop is almost entirely due to a reduction in the quantity of care.

Galbraith et al. (2011) studied over 500 individuals from New England with either an HDHP or a traditional plan using a questionnaire. It was found that the probability of delaying or forgoing care was 3.79 times as high for adults with an HDHP compared to those with a traditional plan without an own risk.

When the quantity of care decreases, it is possible that individuals cut back on unnecessary care, which validates an own risk as an instrument to manage health care expenditures while retaining access to and quality of care. Alternatively, though, individuals might become reluctant to take essential care because they do not believe the costs weigh up to the benefits, which is an undesirable result. Hence, it is crucial to study whether the decline in the quantity of care is due to lower non-essential or essential care.

Mazurenko et al. (2019) conducted a meta-analysis of studies pertaining to the effect of own risk on preventive care. Results between studies differ considerably, which might stem from a lower consciousness of the positive effects of preventive care in the past, rendering older studies incomparable. The authors conclude that, despite the diverging results, the preponderance of evidence indicates a negative effect of own risk on preventive care.

Therefore, own risk can be concluded to lead to deferred and foregone (preventive) care, which possibly leads to more severe medical conditions in the future, raising health care costs and potentially nullifying the desired effect of the own risk. These results prompt the second hypothesis:

H2: In the long-term, health care costs rise again due to effects of delayed care

After analysis of the relevant academic literature, it can be concluded that implementation of an own risk policy lowers health care costs in the short-term. Due to diverging results, however, the exact quantity cannot be determined. Furthermore, most studies focus on effects just after implementation of an own risk, disregarding the long-term effects of postponed or forgone care, which proves to be a relevant adverse effect of an own risk policy. Therefore, a new approach is necessary which encompasses all effects of the own risk policy in Dutch health insurance, both in the short and long term.

III. Research Methodology

The initial and subsequent research questions have been answered by performing the literature review. The third sub-question will be answered empirically through conducting a difference-in-difference study with a synthetic control group. Current Dutch literature predominantly relies on statistical models, using the price elasticity for the demand for health care. Oortwijn et al. (2012) used a difference-in-difference design, but a regular control group and micro-data was used. It is believed that a synthetic control group, using data on an aggregate level, can provide an accurate estimate. A simple comparison in health care expenditures between countries disregards differences between countries prior to intervention, whereas a synthetic control, as a mix of units, is thought to offset these differences better than an individual unit (Abadie et al., 2003). Furthermore, a synthetic control group is a data-driven procedure, whereas a regular control group inherently involves subjective selection (Abadie et al., 2010). Lastly, other than past papers which only focus on the direct implication of own risk on health care costs, a difference-in-difference design offers the possibility to study effects in the long-term, allowing for estimation of the effects of delayed and forgone care on health care expenditures.

In 2008, the own risk was introduced in the Dutch health care system (Remmerswaal & Boone, 2020). The evolution of the Dutch health care costs per capita at the country-level will be compared to a synthetic control group, comprising a basket of OECD countries. A comparative case study is conducted, in which the effect of a policy intervention is studied. This requires that one unit, in this case the Netherlands, is exposed to treatment, whereas other units are not. Therefore, the basket of potential control countries consists of OECD countries that have no form of own risk in their health care system.

The synthetic control group is a weighted average of the selected countries, such that the trend in health care costs prior to intervention best resembles the trend of the Netherlands during that period. The choice has been made to construct the synthetic control group based on mimicking the path of health care expenditures in the Netherlands rather than using determinants of health expenditures, such as median age and average BMI in countries. Health care costs have very pluriform determinants. When making a selection of these determinants, cherry picking is inevitable, which can form a serious problem to the application of the synthetic control method. Various combinations of determinants can then be tried, picking the one with significant results (Ferman et al., 2020). Choice for the health care costs in pre-intervention periods as the only predictor, on the contrary, precludes this possibility and is thus preferred in this specific setting.

A difference-in-difference study with a synthetic control relies on several assumptions. Firstly, through comparing outcomes before and after treatment as well as with and without treatment, it is assumed that in the event of no treatment, the outcomes of the treatment and control group would have evolved similarly. This is known as the 'parallel trends assumption' or PTA and it can be empirically tested by assessing whether the trends run parallel prior to intervention (Dimick & Ryan, 2014). Through synthesizing the control group, this assumption naturally holds, since synthetic control is inherently aimed at making the pre-intervention trend run parallel.

Furthermore, the difference-in-difference with synthetic control requires that nor the treatment group nor countries in the control group experience idiosyncratic shocks. That is, there should be no event that affects the health care expenditures of one group differently than another. Contrary to PTA, this assumption cannot be examined empirically and hence forms the largest threat to the internal validity of the study (Dimick & Ryan, 2014). Naturally, some countries in the control group, such as Italy and Spain, have still undergone specific changes as a result of the financial crisis in 2008, which may have impacted health care costs atypically (Otero-Garcia et al., 2023). It is necessary, however, to strike a balance between a larger control group and countries in that control group that do not suffer any shocks. Therefore, countries in the synthetic control group, though suffering some changes, have been selected to suffer as little shocks as possible, limiting the severity of the threat.

Lastly, the method could be invalidated if countries in the control group are subject to spillover effects. It is thus assumed that health care expenditures in countries in the control group are not affected by implementation of the own risk in the Netherlands (Abadie et al., 2010). This assumption is deemed likely to hold, since no countries in the control group share borders with the Netherlands, making going to these countries for care complicated. Furthermore, less than 0.3 per cent of people reported to go abroad for health care because it was cheaper (CBS, 2018).

The treatment effect of the own risk is defined as $\alpha_t = Y_t^I - Y_t^N$, with Y_t^I denoting the actual health care costs per capita in the Netherlands and Y_t^N as the outcome in absence of intervention, i.e. the outcome of the synthetic control group. Time periods are denoted by $t = 1, \dots, T$, with T_0 reflecting the number of pre-treatment periods, in this case 8. The regression equation is then as follows:

$$Y_t^I = \alpha_t D_t + Y_t^N$$

In this equation, D_t is a dummy equal to one if the country of interest has been exposed to treatment, in this case the Netherlands to implementation of the own risk. In mathematical terms, this can be denoted as follows:

$$D_t = \begin{cases} 1 & \text{if } t > T_0 \\ 0 & \text{otherwise} \end{cases}$$

The actual outcome Y_t^I is known from the data. Hence, to estimate treatment effect α_t, the counterfactual Y_t^N must be estimated. Health care expenditures in 'counterfactual' or synthetic Netherlands without own risk is then compared to the actual Netherlands to determine the effect of the own risk implementation.

Following Abadie et al. (2010), the counterfactual is constructed as follows. J is defined as the number of potential control countries, which comprises the 10 OECD countries. Then, W denotes the $(J \times 1)$ vector of weights $(w_{1,} w_2, \dots, w_J)$. Then, w_j reflects the relative weight of country j in the synthetic control. To prevent extrapolation from occurring, weights of countries are restricted to be nonnegative and all weights sum to 1, i.e. $w_1 + \cdots + w_J = 1$ and $w_j \geq 0 \; \forall \; j$.

Naturally, many different combinations are possible in the weights of potential control countries. The vector of optimal weights, W^*, is constructed by weighing the potential control countries such that the synthetic control best resembles the health care costs in the Netherlands prior to intervention. This is done by minimizing the root means squared prediction error (RMSPE) of the synthetic control with respect to pre-intervention health care costs in the Netherlands (Galiani & Quistorff, 2017). In mathematical terms, this is done as follows. Let Z_0 denote a (8×1) vector of the health care costs per capita of Netherlands and let Z_1 denote a $(8 \times J)$ matrix with the health care costs per capita of the potential control countries, both in the period 2000-2007 (Abadie et al., 2003). Then, with $\mathcal{W} = (w_{1,} w_2, \dots, w_J)'$, optimal W^* is given by

$$W^* = arg \min_{W \in \mathcal{W}} (Z_1 - Z_0 W)'(Z_1 - Z_0 W)$$

Each potential control country is thus assigned an optimal weight w_j^*. The outcomes of the units in the control group, Y_{jt} being the outcome of country j, are then weighed accordingly, resulting in the estimate of the outcome in absence of intervention. Thus, the estimated treatment effect is described by the following equation:

$$\widehat{\alpha_t} = Y_t^I - \widehat{Y_t^N}$$

$$= Y_t^I - \sum_{j=1}^{J} w_j^* Y_{jt}$$

Thus, $\sum_{j=1}^{J} w_j^* Y_{jt}$ constitutes the outcome of the synthetic control group, which is the estimate of the counterfactual. The estimated treatment effect is then the difference between the actual outcome for the Netherlands and the estimate of its counterfactual. Constructing the synthetic control group and estimating treatment effects has been performed using the statistical software package Stata 18.

Finally, the results of the empirical analysis will be linked to the available literature and it will be examined whether these results are in line with prior research.

IV. **Data**

For the analysis, country-level annual panel data on health care expenditures per capita will be used. In total, 10 countries were selected to constitute the synthetic control group: Australia, Canada, Ireland, Italy, Japan, New Zealand, Norway, Portugal, Spain and Sweden. Only countries with a health care system without an own risk policy were selected. Furthermore, some countries (Denmark, United Kingdom, Finland) were excluded because they suffered large idiosyncratic shocks. The United Kingdom implemented the Health and Care Act in 2012, radically changing the health care system (Gov.UK, 2012). Correspondingly, Danish and Finnish health care have transformed fundamentally in the addressed period (Christiansen, 2012; Kangas & Kalliomaa-Puha 2016). These changes are likely to specifically affect their trends of health care expenditures, which render them incomparable.

The analysis will be performed over the period 2000-2019, with the treatment occurring in 2008 when the own risk was introduced in the Dutch health care system. The years prior to intervention are used to construct the control group, the years after to establish the effect of the own risk. The pre-intervention period has been set at 2000, because from this year, new reforms started to be implemented that resulted in the current health care system (Bertens & Palamar, 2021).

Admittedly, major reforms in the Dutch health care system were implemented in 2006. On January 1, 2006, the Zorgverzekeringswet (Zvw) or Health Insurance Act went into effect in the Netherlands. This act replaced the former system of private health insurance and a public health fund with a basic insurance that is mandatory for everyone ('basispakket'). Also, regulated competition between health insurers was introduced in an attempt to reduce health care costs. In sum, the act aimed to keep Dutch health insurance accessible and affordable (CBS, 2006). Hence, the trend of health care costs has likely been affected and years before and after 2006 are not exactly comparable.

Despite this reform and its effect, the choice has been made to construct the synthetic control group based on the years 2000-2007. This has been done because a short pre-intervention period severely weakens the use of this method. Not only is it not able to capture a trend as well as a longer period, robustness tests are also limited in use, since pre-dating the intervention is no longer feasible (Abadie et al., 2010). With a longer period, however, in-time robustness checks can be performed, as displayed in figure 5. In this analysis, the years 2006 and 2007 are also used in the weighting of the control group and thus the effects of the reforms are still taken into consideration. No strong deviation from the trend occurs between 2006 and 2008, indicating that these reforms do not have a strong immediate effect and that the choice for a longer pre-intervention period is valid. Hence, a longer ‘training’ period is preferred, despite incorporating both years before and after the reforms of 2006.

Nevertheless, a comparison of results between the short and long pre-intervention period has been included in the results section for robustness purposes.

The decision has been made to study the effects until 2019, the last year before the Covid-19 crisis. The years during Covid are deemed incomparable to earlier years, since health care costs rose sharply but heterogeneously among countries, depending on the severity of the crisis per country rather than the own risk policy. This long period studied increases the chances of the occurrence of unknown shocks that affect the development of health care costs. However, this long period is needed to study the delayed effects of the own risk, i.e. the avoidance of necessary care (Bonander et al., 2021).

Variable – Health Care Expenditures per Capita

Both the outcome and predictor variable in this analysis is the health care expenditures per capita. This variable comprises all expenditures (out-of-pocket, government etc.) to all sorts of health care (specialist, general practitioner etc.). The prices and purchasing power parity (PPP) have been held constant, since the analysis concerns a long period of time. By keeping these factors constant, the results are not troubled by influences of inflation and exchange rate fluctuations.

Data on health care costs per capita in the Netherlands and the selected OECD countries have been obtained from OECD.Stat in the dataset ‘Health expenditure and financing’, which provides data on health care costs per capita in all 38 OECD countries over the period 1970-2022. Over a period of 20 years, this renders 220 observations regarding health care expenditures (including the Netherlands).

Summary Statistics

Table 1 displays the summary statistics in the first year studied (2000), the year of the implementation of the Zvw (2006), the year of the implementation of own risk (2008), the year after sharp increases in the own risk (2014) and the final year studied (2019). It is noteworthy that health care expenditures have risen sharply in the period studied for all countries under scrutiny. The country with the highest health care costs per capita, Norway, had lower expenditures in 2000 than the country with the lowest health care costs per capita, Portugal, in 2019. Furthermore, the standard deviation of the health care costs more than doubled during this period, indicating a strong difference in the development of health care costs among countries.

Table 1

Summary Statistics of Health Care Costs per Capita

Year	Mean	SD	Min	Max
2000	2,071	403	1,524	2,794
2006	2,981	561	2,241	3,966
2008	3,357	674	2,448	4,604
2014	4,094	944	2,537	5,707
2019	4,728	958	3,224	6,476

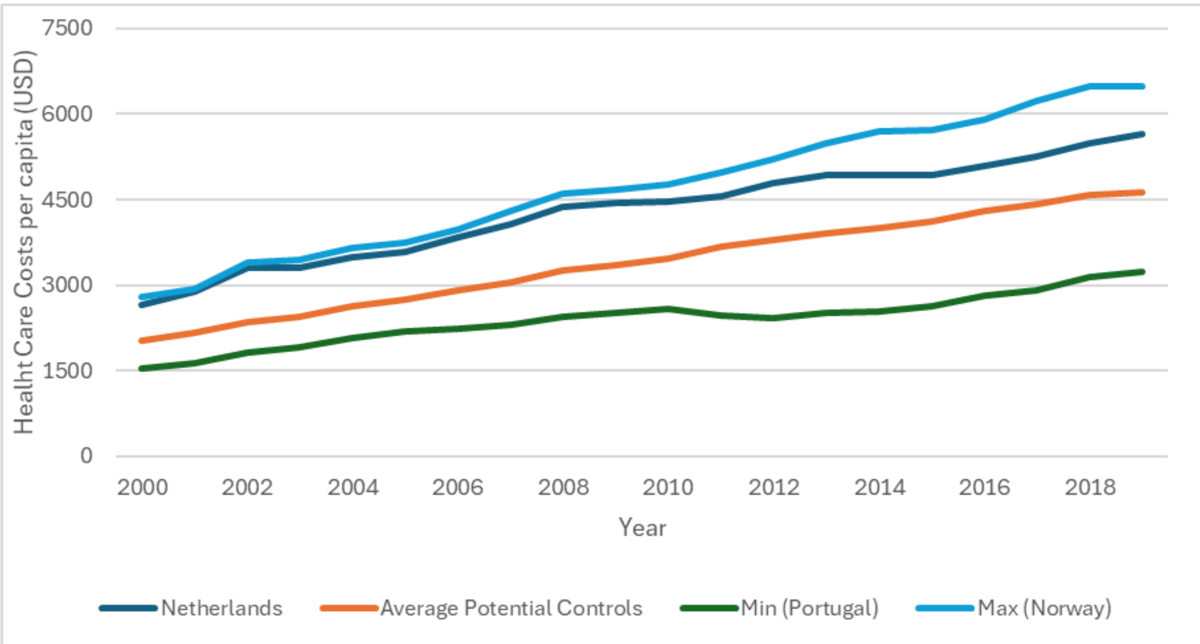
Note. Monetary amounts are in US$, with constant PPPs and prices. All variables have 11 observations (one for each country in the potential control group and the Netherlands).

Figure 1 displays the trend of health care expenditures over the studied period. The Netherlands and the average of the countries in the control group have the semblance of a parallel development. The countries with the lowest and highest health care costs per capita, Portugal and Norway respectively, remain the extremes throughout the entire period, suggesting that health care expenditures in a country are not very volatile. In 2000, the health care expenditures of Norway are very similar to those of the Netherlands, but they rise more strongly over time than those of the Netherlands and the average. On the contrary, the trend of Portugal demonstrates a smaller growth in health care expenditures. This pattern implies that countries with health care costs that were initially high, also experienced a stronger surge in costs over time. Also, none of the trends are exactly similar, confirming that the Netherlands cannot be reproduced by a single control country.

There does not seem to be a significant break in the trend of health care costs in the Netherlands in 2006, the year a new health care system was introduced. This provides evidence that the choice of the starting year 2000 rather than 2006 is valid.

Figure 1

Health Care Expenditures per Capita, Netherlands v Average of Countries in Control Group, Minimum (Portugal) & Maximum (Norway)



Note. Expenditures are in US$, with constant prices and PPPs.

V. **Results**

In this section, the estimates from the empirical analysis are presented. The estimates for the effect on health costs do not disentangle the two effects of a lower barrier to use health care and delayed or forgone care.

As mentioned, a synthetic control of the Netherlands is constructed through weighing health care costs of potential control countries to resemble the pre-intervention trend of the Netherlands as closely as possible. In table 2, the results of this weighing are displayed. The average of the potential control countries does not establish a proper reflection of the trend of health care costs in the Netherlands. A weighted average as the synthetic control, however, closely approximates the health care costs of the Netherlands.

Table 2

Health care costs per capita predictor means

Country	Netherlands	Synthetic Netherlands	Average of Potential Controls
Costs 2000	2647.46	2689.19	2012.84
Costs 2001	2883.08	2844.06	2162.94
Costs 2002	3296.97	3257.66	2360.61
Costs 2003	3308.87	3312.84	2453.34
Costs 2004	3494.77	3501.17	2621.49
Costs 2005	3583.43	3578.09	2737.52
Costs 2006	3829.77	3799.93	2896.22
Costs 2007	4076.88	4121.73	3054.26

Note. Amount given in US$ per capita.

Table 3 displays the weights given to potential control countries. As can be seen from the table, the trend of the Netherlands is best represented by a combination of the trends of Norway and Sweden, with a large weight given to the former. Other countries are assigned weights zero and thus do not contribute to the synthetic control group. They are, however, used in computation of the permutation distribution for the purposes of statistical inference.

Table 3

Country weights in synthetic Netherlands

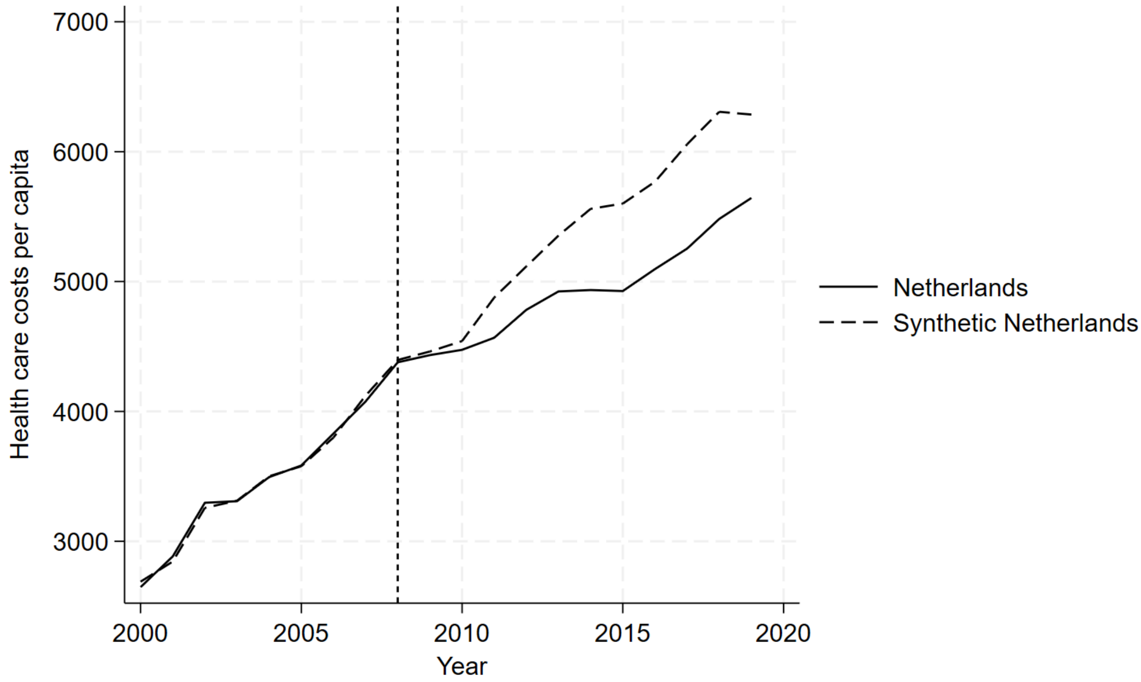
Country	Weight	Country	Weight
Australia	0	New Zealand	0
Canada	0	Norway	0.825
Ireland	0	Portugal	0
Italy	0	Spain	0
Japan	0	Sweden	0.175

Accordingly, figure 2 plots the trends in health care costs per capita of the Netherlands and the synthetic control group. Before the intervention, indicated by the vertical dashed graph, the health care costs per capita of synthetic Netherlands closely resemble the path of health care costs of the Netherlands. This suggests that this method of approximation is reasonable. The estimated effect is the difference between the graphs of the Netherlands and synthetic Netherlands after the intervention.

Following the intervention in 2008, a clear dispersion arises between the Netherlands and its counterfactual. Both graphs continue to increase, rendering a simple before-after comparison of health care costs in the Netherlands inappropriate. The disparity grows over time, with a sharp increase between 2010 and 2015, after which the gap remains stable. At the end of the studied period, the difference starts to decrease again, indicating a positive effect of the own risk on health care costs. Figure 3 plots the difference between the two graphs, using lognormal data, to provide a more intuitive interpretation in relative terms. The exact estimates of the effects, both absolute and relative, can be found in table 4.

Figure 2

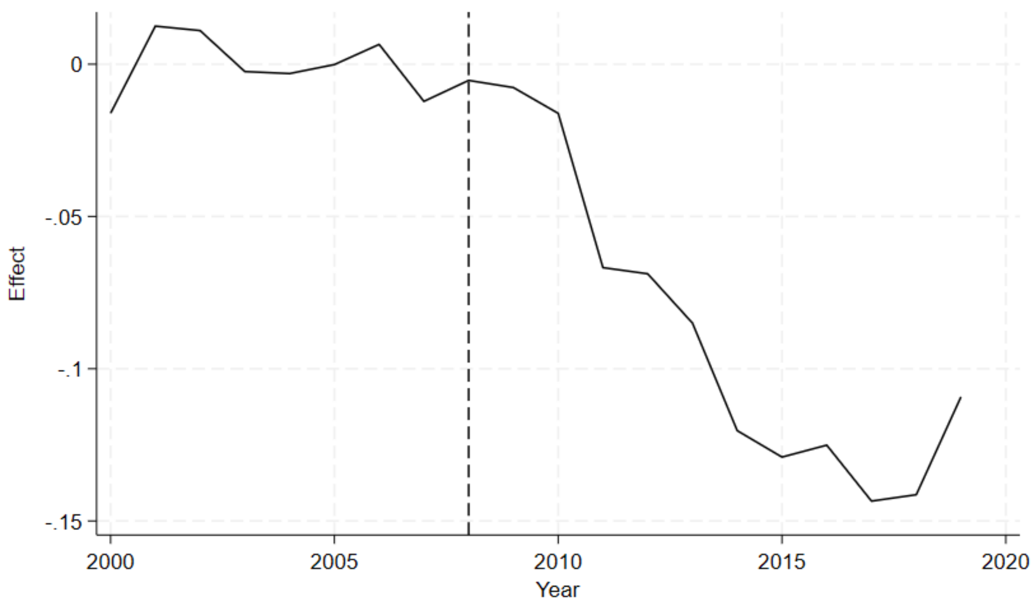
Trends in health care costs per capita: Netherlands v. Synthetic Netherlands



Note. Amounts in US$

Figure 3

Relative effect of implementation of own risk in 2008 on health care costs per capita (lognormal data)



Note. Effect is measured in relative terms (-0.1 indicates a 10% decrease).

Taken at face value, these results suggest that initially, health care costs decline as a result of the own risk policy, but increase again in the long term. This endorses both the hypothesis that health care costs decline in the short run as a result of a larger disincentive to take care, as well as that the costs increase in the longer term, suggesting an effect of delayed care. The effect increases steeply between 2011 and 2014, potentially stemming from the increase in own risk in this period from €170 to €360 annually. As of 2019, the effect is estimated at –642.28 US$ per capita, amounting to € -573.49 at the average exchange rate of 2019. With a population of 17,363,261, the implementation of own risk is estimated to have led to 9.96 billion euro, or 10.83%, in lower health care costs in 2019 (CBS, 2024).

These results closely approximate the findings by Brot-Goldberg et al. (2017), estimating a drop between 11.79 and 13.80 per cent in annual health care costs. They are inconsistent, however, with the findings of Remmerswaal & Boone (2020), who estimated the effect at 2.1 billion euros. This discrepancy can be explained by the following. Firstly, their research only focused on the period 2008-2013. Using the synthetic control method, the effect of the own risk is estimated at –430.03 US$ per year per person in 2013, rendering a total effect of 5.46 billion euros lower health care costs, computed with the mean exchange rate and population corresponding to that of 2013 (CBS, 2024). Furthermore, Remmerswaal & Boone merely study the change in own risk from 150 to 350 euros and thus neglect the initial implementation of own risk. This initial change is thought to affect the health care costs strongly, since most people stay under the threshold of the own risk (Remmerswaal & Boone, 2020). Lastly, the remaining difference can be attributed to Remmerswaal & Boone leaving the voluntary own risk out of consideration. Taking out a higher, voluntary own risk provides a larger disincentive to take out health care, amplifying the effect of the own risk. The synthetic control method, however, does consider the voluntary own risk, resulting in a larger estimate of the effect of the own risk policy.

Also, the estimate is larger than the effect found by Oortwijn et al. (2012) of a reduction in health care costs between 2.6 and 7.3 per cent. This difference is potentially due to the difference in the sample studied: Oortwijn et al. (2012) only studied individuals around the age of 18, whereas this paper considers the entire population. Different age categories potentially differ in their response to the own risk, causing a disparity in the found estimates.

Inference & Robustness

It might be argued that the disparity between the Netherlands and synthetic Netherlands results from the incapacity to construct a representative counterfactual of the Netherlands. For example, the implementation of the 'Zorgverzekeringswet' (Zvw) in 2006 might have had delayed effects on health care costs that distort the trend in health care costs and thus results in an erroneous estimate of the effect of the own risk. Since aggregate data is used, zero standard errors are produced, and traditional inferential techniques are inappropriate. Uncertainty, however, can also stem from the inability of the control group to form a 'true' counterfactual; it is uncertain how health care costs in the Netherlands would have developed without the own risk (Abadie et al., 2010). For this reason, placebo studies have been conducted, both in-time and in-space. Moreover, as explained in the methodology section, reforms have been implemented in the Dutch health care system in 2006 that possibly influenced health care costs. To verify the robustness of the results, an analysis has been performed only based on the years 2006 and 2007.

In-space Placebo Study

Firstly, the method to compute the effect of the own risk policy for the Netherlands has been applied iteratively to the 10 countries in the potential control group. Accordingly, it is pretended that an own risk policy was implemented in countries in the control group, after which the estimated effect is computed. This method renders a distribution of estimated effects for countries that did not experience an own risk policy. Then, the effect on health care costs of synthetic Netherlands (without own risk) is compared to this distribution, allowing for the computation of a p-value, presented in table 4. The objective is to evaluate whether the estimated effect is large in comparison to other countries and thus whether it might have a different cause than the own risk policy (Abadie et al., 2015). If the estimated effect is small relative to the permutation distribution, the belief that the estimated effect is truly the result of the own risk policy cannot be upheld.

The results of this analysis are presented in figure 4. The dark line represents the gap between the Netherlands and synthetic Netherlands, the gray lines the estimated effect of the placebo tests for all 10 potential control countries. As can be seen from the figure, the effect in the Netherlands is substantial in comparison to the effect in other countries, indicating that the measured effect is truly that of the implementation of the own risk policy.

The effect, however, is not statistically significant at the 5% level as displayed in table 4. Due to the low amount of countries that have not suffered large idiosyncratic shock, the potential control group consists of only 10 countries. As the outcomes of these countries are used in the computation of the permutation distribution, the lowest attainable p-value 0.1, which is also not statistically significant. Therefore, with the method used and number of control countries, it was not feasible to identify statically significant effects, regardless of the size of the effect. Hence, causal interpretation is precluded.

Table 4

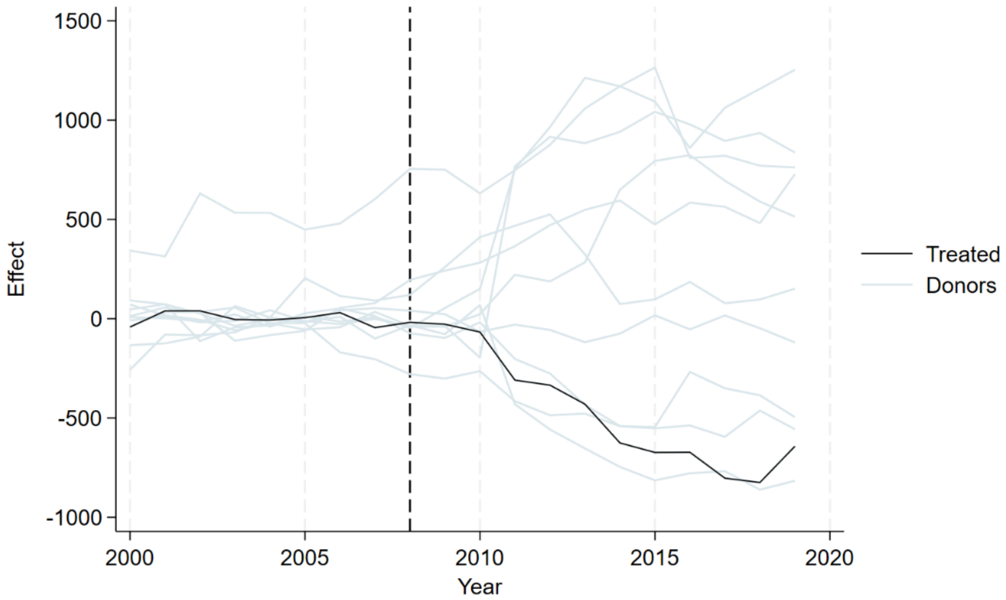
Estimated effects of implementation of own risk over time on health care costs per capita, p-values from placebo tests

	Effect ($)	Effect (%)	P-value
2008	-17.99	-0.47	0.9
2009	-27.78	-0.72	0.9
2010	-67.06	-1.58	0.5
2011	-309.31	-6.62	0.3
2012	-334.51	-6.82	0.2
2013	-430.03	-8.42	0.3
2014	-625.48	-11.93	0.3
2015	-673.29	-12.80	0.3
2016	-672.47	-12.42	0.3
2017	-802.99	-14.25	0.2
2018	-824.54	-14.04	0.2
2019	-642.28	-10.83	0.2

Note. Monetary amounts given in US$ per capita. Negative effect indicates lower health care costs than the synthetic control (counterfactual)

Figure 4

Per capita health care costs gaps in Netherlands and placebo gaps in 10 control countries



Note. Amounts in US$.

In-time Placebo Test

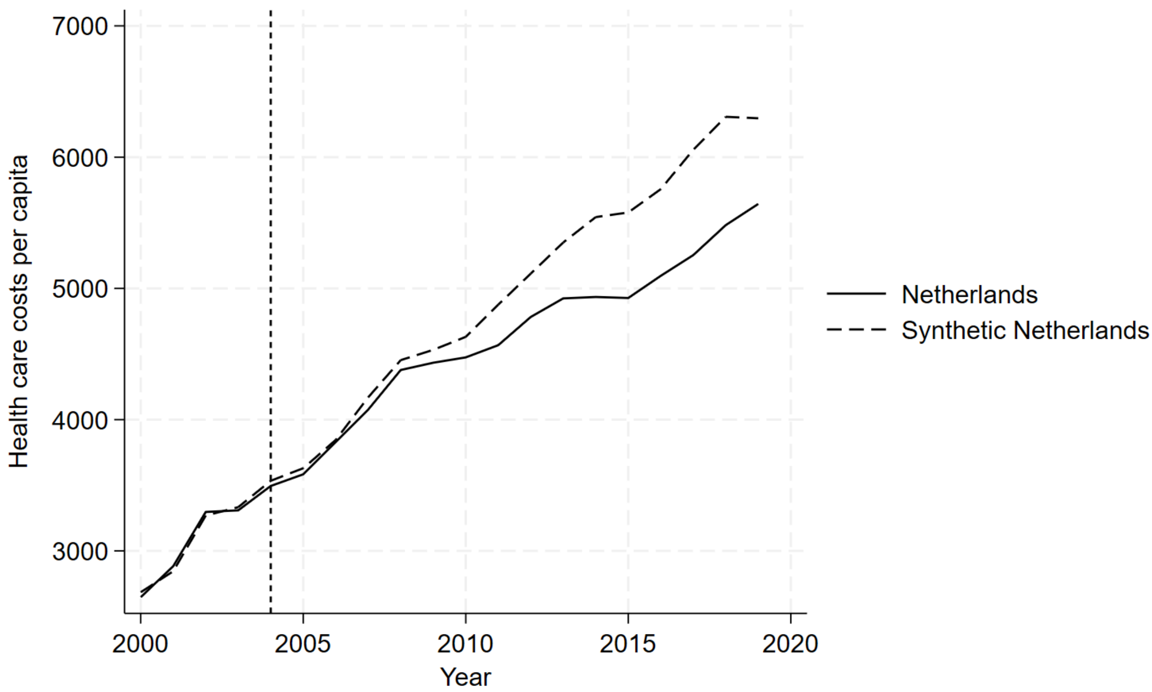
In addition to the latter, an in-time placebo test has been conducted to evaluate the robustness of the results. Since data is available on multiple periods before the intervention, it is possible to evaluate differences between the projected outcomes of the synthetic control and of the Netherlands, prior to intervention (Cavallo et al., 2013). Even though this yields no absolute assurance post-treatment trends would have been similar in the absence of treatment, it is a good indication of the appropriateness of the applied method.

Akin Cavallo et al. (2013), half of the pre-treatment period is used as 'training period'. The synthetic control group is then constructed based on the years 2000-2003. Since treatment only occurs in 2008, no effect is expected until that period. Figure 5 plots the results of this analysis. As becomes apparent from the figure, the graphs only start to differ considerably after the actual treatment in 2008. There is no notable difference in the 'testing period' between 2004 and 2008. The graphs remain virtually unchanged in comparison to the analysis in which the full pre-treatment period is used. This is compelling evidence of the robustness of the results.

The exact estimates of the effects, the balance of predictors and the weights given to potential control countries can be found in the appendix. The estimates of the years until 2008 are relatively small compared to the estimates of effects after 2008, which closely resemble the estimates of the effect found in table 4. Also, the trend of strong strongly rising costs in the beginning of the post-intervention period, followed by stabilization and a slight decline near the end of the studied period, closely resembles the trend found when using 2000-2007 as the pre-intervention period. This provides a strong indication of the robustness of these results.

Figure 5

Robustness check with hypothetical intervention in 2004



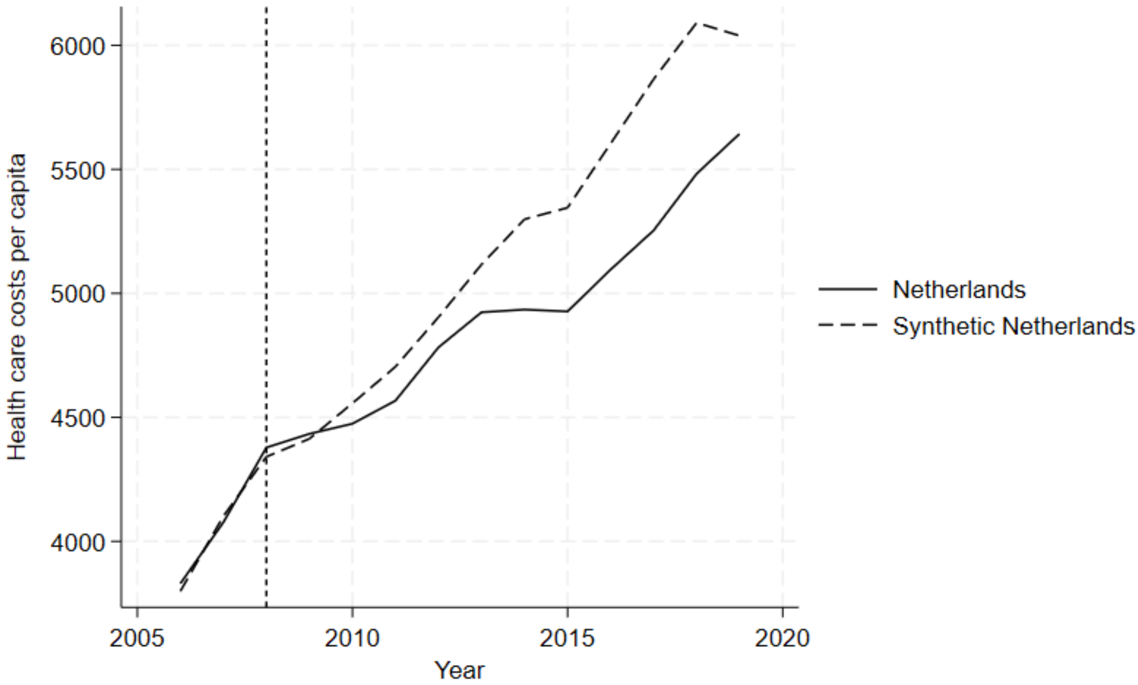
Note. Amounts in US$.

Robustness Check with Short Pre-intervention Period

As noted, the implementation of the Zorgverzekeringswet in the Netherlands occurred in 2006, which is during the pre-intervention period studied. To verify robustness, an analysis of the effect of the own risk is performed using only the years in between the implementation of the Zorgverzekeringswet and the own risk, i.e. 2006 and 2007. If similar results are found with both techniques, this strongly suggests that the found estimates are robust to changes in analysis techniques, and thus increases the reliability of the results. The results of this analysis can be found in figure 6. The exact estimates of the effects, the balance of predictors and the weights given to potential control countries can be found in the appendix. These estimates imply a smaller negative effect of the own risk on health care costs than under the other estimation methods. Nevertheless, the trend displayed is very similar, indicating a strong initial negative effect on health care costs, which stabilizes over time and becomes smaller near the end of the studied period.

Figure 6

Robustness Check with 2006 & 2007 as pre-intervention period



Note. Amounts in US$.

VI. **Discussion**

Recommendations for Future Research

This study aimed to find the effect of the implementation of the own risk policy in the Netherlands on health care expenditures. As explained, the own risk policy may lead to postponed or forgone health care, which leads to a worse quality of life. To advance this study, it is proposed to consider the effect on health outcomes and quantifying these in monetary terms. As a result, policy makers can make a complete, rational deliberation on whether to abolish the risk policy.

A method that can be used to accomplish this is the application of Quality-Adjusted Life Years (QALYs). QALY is a metric that can be used to evaluate the cost-effectiveness of medical interventions through combining the quality and quantity of life gained because of the intervention. One QALY resembles one year of life in perfect health and assigns a value to this year. Commonly, one QALY is valued at 80 000 euros (Prieto & Sacristán, 2003). If the effect of the own risk on health outcomes can be measured, these results can be converted to monetary terms using the QALY metric. Accordingly, the total effect of the own risk, both in health care costs and health outcomes, is presented in a single unit, allowing for a sensible comparison of alternatives

Furthermore, it is suggested to study alternatives to the own risk policy. Remmerswaal & Boone (2020) study several alternate solutions. For example, they address a percentual own risk policy in which the insured pays a portion of every treatment until a certain maximum. If this portion was set at 10% and the own risk remains unchanged at 385 euros, this would offer a disincentive to use health care until a total health care cost of 3850 euros, while ensuring the affordability of individual treatments. Since these policies have not been implemented in the Netherlands, empirical analysis is challenging. Therefore, it is advised to perform a cross-country analysis.

Limitations

This study identified a clear effect of the own risk policy on health care costs in the Netherlands. Nevertheless, the relevance of these results is bounded by the limitations of the study. Firstly, the sample size of the potential control group was small. With 10 potential control countries, a close approximation could be formed of the pre-intervention health care expenditures in the Netherlands. Statistical inference, however, was limited by the sample size. The permutation distribution was formed based on 10 countries, which precludes finding statistically significant effects, as the lowest possible p-value is 0.1. Also, the results are more susceptible to random fluctuations, whereas these are averaged out with a larger sample. Future research could address this weakness through also considering non-OECD countries in the analysis.

Moreover, the control group was formed under the premise that there were no significant alterations in the healthcare systems during the period studied. Yet, it is very likely that health care systems of potential control countries have undergone small changes that have affected the health care expenditures. These amendments, albeit of marginal significance, hinder exact interpretation of the found results. Again, with a larger sample size, small alterations in potential control countries can be averaged out to strengthen internal validity.

VII. **Conclusion**

In this paper, the effect of the implementation of the own risk policy in the Dutch health care system in 2008 has been analysed. This policy implied that from then on, individuals must cover the first part of health expenditures themselves. This currently renders an annual financing of 5.2 billion euros, which must come from an alternate source, such as insurance premiums, if the own risk is abolished. In academic literature, it has been established that, because of a larger disincentive to use health care, health care costs decrease after implementation of an own risk policy. The exact amount, however, is disputed, as well as long term effects. Available experiments have only been conducted in the US, which results cannot be extrapolated to the Netherlands. Research in the Netherlands, on the contrary, relies on quasi-experimental techniques. Furthermore, it has been determined that the own risk also leads to higher amounts of delayed and forgone care, which may increase health care expenditures in the long run.

In the empirical analysis, evidence is provided of a strong, negative effect of the own risk on health care expenditures. As of 2019, the introduction of the own risk is associated with a decrease in health care costs of 9.96 billion euros, or 10.83%, annually. This estimate is large compared to the effects found in previous academic literature, which can be explained by reasons addressed in the results section. In addition, it was found that in the long term, the disparity in health care expenditures declined, which can be an indication of the increased costs of delayed care.

When the pre-intervention period was altered, smaller estimates were found. Yet, the trend of an short-term increase in health care costs, which becomes smaller in the long-term, remains visible from all analyses. This suggests that people consume less care as a result of the own risk policy, which includes essential care that increases costs in the long term. Hence, both hypotheses were corroborated.

In the in-space placebo test, no statistically significant effects were identified and due to limitations, no causal claims can be made. The dominant limiting factor is the low number of potential control countries (10), which makes the results more prone to random fluctuations.

Nevertheless, the results remain relevant for policy choice, since they provide a strong indication of the profound effects of own risk on the behaviour of individuals, which are corroborated by academic literature. Also, in extension of previous literature, it elucidates the effects of the own risk over a longer period of time, incorporating both the impact of a larger disincentive to use health care, as well as costs resulting from delayed care. Hence, the obtained results are pertinent to the discussion concerning the abolition of the own risk in Dutch health care.

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IX. **Appendix**

Table 6

Estimated effects of implementation of own risk over time (Placebo-test 2004 and robustness check with pre-intervention period 2006-2007)

Year	Effect (placebo-test 2004)	P-value	Effect (pre-intervention period 2006-2007)	P-value	Effect (pre-intervention period 2000-2007)
2004	-39.46	0.7			
2005	-46.44	0.5			
2006	-15.96	1			
2007	-93.63	0.7			
2008	-75.14	0.7	37.34	0.8	-17.99
2009	-98.12	0.7	19.91	1	-27.78
2010	-156.32	0.8	-82.21	0.7	-67.06
2011	-308.56	0.7	-136.85	0.7	-309.31
2012	-330.58	0.7	-121.73	0.7	-334.51
2013	-426.22	0.7	-192.59	0.7	-430.03
2014	-608.73	0.6	-364.22	0.7	-625.48
2015	-651.33	0.6	-418.07	0.7	-673.29
2016	-660.60	0.7	-508.06	0.6	-672.47
2017	-802.01	0.4	-609.68	0.6	-802.99
2018	-825.31	0.2	-608.78	0.6	-824.54
2019	-652.39	0.6	-395.23	0.7	-642.28

Note. Amount given in US$ per capita. Negative effect indicates lower health care costs than the synthetic control (counterfactual). Most right column resembles effects from analysis with the complete pre-intervention period 2000-2007, corresponding to table 4. These have been added for comparison purposes.

Table 7

Health care costs per capita predictor means (Placebo-test 2004)

Outcome variable	Netherlands	Synthetic Netherlands	Average of Potential Controls
Costs 2000	2647.46	2685.19	2012.84
Costs 2001	2883.08	2844.89	2162.94
Costs 2002	3296.97	3269.11	2360.61
Costs 2003	3308.87	3333.25	2453.34

Note. Amount given in US$ per capita.

Table 8

Country weights in synthetic Netherlands (Placebo-test 2004)

Country	Weight	Country	Weight
Australia	0	New Zealand	0
Canada	0	Norway	0.86
Ireland	0.068	Portugal	0
Italy	0	Spain	0
Japan	0	Sweden	0.072

Table 9

Health care costs per capita predictor means (Pre-intervention period 2006-2007)

Outcome variable	Netherlands	Synthetic Netherlands	Average of Potential Controls
Costs 2006	3829.78	3798.942	2896.22
Costs 2007	4378.36	4341.02	3054.25

Note. Amount given in US$ per capita.

Table 10

Country weights in synthetic Netherlands (Pre-intervention period 2006-2007)

Country	Weight	Country	Weight
Australia	0	New Zealand	0
Canada	0.349	Norway	0.651
Ireland	0	Portugal	0
Italy	0	Spain	0
Japan	0	Sweden	0