Physicians response to payment changes

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Discussion paper

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Abstract

This study examines the impact of financial incentives for physicians on the behaviour of physicians and the utilization of health care. Three reforms in the Dutch health care system are used: the abolition of fixed budgets for fee-for service physicians and an unintended tariff increase in 2008, tariff cuts for fee-for-service treatments in 2010/2011 and the re-implementation of fixed budgets in 2012. We exploit differences in the remuneration system of physicians who are remunerated either fee-for-service or according to a fixed salary. The analyses are based on longitudinal data and adopt panel data methods. We find that the abolition of a fixed budget increased output, while the re-introduction of the fixed budget decreased output. The tariff increases had a downward effect on output, while tariff cuts increased output, indicating that the income effect of the tariff cuts is stronger than the substitution effect. We expected a larger upward effect on output of the tariff cuts, than the downward effect of the tariff increases, due to loss aversion. This was not confirmed in our analysis; we found symmetrical effects of tariff increases and tariff cuts. Furthermore, our findings confirm that financial incentives for physicians have effects on the conditional number of physician visits, but not on the probability of the first visit. Physicians are barely able to influence the first visit, which is initiated by the patient and the GP, but may influence follow-up visits.

JEL Classification
I11, I18

Key words
Financial incentives, physicians, tariff regulation, loss aversion

1 Introduction

Health care costs have been growing faster than the economy in most developed countries in the last decades. In order to reduce costs, supply side measures may be effective. However, these measures do not always work out as expected. It is therefore important to understand in what way the supply side of the health care sector reacts to financial incentives. More specifically, this paper studies how physicians respond to increases and decreases in tariffs and the abolition and re-implementation of a remuneration cap.

The impact of financial incentives on the behaviour of physicians has been examined in multiple studies. The impact of a remuneration cap is straightforward: introduction has a downward effect on production, while abolition has an upward effect. The impact of tariff changes is not straightforward. Economic theory would predict an upward effect on output of an increase in tariffs, based on an upward sloping labour supply curve. However, empirical studies often find the opposite effect: tariff cuts lead to higher production instead of lower production, indicating a backward bending supply curve. Mcguire and Pauly (1991) reconcile the empirical findings with classical economic theory in a model with a profit-maximizing physician and opposing income and substitution effects. They predict the income effect prevails if tariff cuts affect a large part of the income of physicians, while the substitution effect dominates if tariff cuts affect a minor part of the income of physicians. Based on research of Rizzo and Zeckhauser (2003) we expect tariff cuts to have a larger effect than tariff increases, because of loss aversion.

This study analyses effects of financial incentives for physicians on health care utilization in the Netherlands in the period 2007-2012. The Dutch health care system consists of physicians who are remunerated either fee-for-service (FFS physicians) or according to a fixed salary. We study the effects of the abolition of a fixed budget and (unintended) higher tariffs for FFS physicians in 2008, a lowering of tariffs in 2010/2011 and the re-implementation of a fixed budget in 2012. As salaried physicians are not affected by the policy changes, differences in behaviour between salaried physicians and self-employed physicians are used to analyse the effects of the policy reforms.

The analyses use the LISS panel study that records information on health care usage, health status, demographic characteristics and other variables. We are able to follow individuals over time due to the longitudinal structure of the data. Therefore, this study is able to model health care usage with fixed effects panel data models and, subsequently, to correct for unobserved individual heterogeneity. The analyses distinguish between the probability of at least one physician visit and the number of visits conditional on at least one visit as outcome variables. In the Dutch health care system the decision to initiate physician contacts is primarily made by patients and GPs who serve as 'gatekeepers' and have to refer patients to physicians. Therefore physicians have little opportunity to affect the first visit. In contrast, physicians are able to influence the number of recall visits. Hence, we expect financial incentives to influence the conditional number of visits, but not the probability of a visit.

The results provide evidence that the abolition of the remuneration cap increased production of physicians, while the re-implementation decreased output. The unintended tariff increase led to a decrease in production after one year (after it became apparent that the reform led to a tariff increase), while the subsequent tariff cuts led to an increase in production. The income effect is thus stronger than the substitution effect. As the tariff changes affected the whole income of physicians this is in line with expectations. Administrative data indicated that the responses of physicians to tariff cuts were much stronger than to tariff increases, consistent with the effect of loss aversion. However, our empirical analysis does not confirm these results. We find symmetrical effects of tariff cuts and tariff increases. All reforms had an impact on the conditional number of physician visits, whereas they did not affect the probability of the first visit.

This study adds to the small body of evidence about the effects of tariff changes. Most studies concentrate on tariff cuts, while our study also studies a (unintended) rise in tariffs. This makes it possible to see if loss aversion causes tariff cuts to have a larger impact than tariff increases. Furthermore we confirm the findings in one previous study that physicians are not able to influence the first visit, only the recall visits.

The remainder of this paper is organized as follows. Chapter 2 discusses related literature on effects of financial incentives on physicians' behaviour and health care use. Chapter 3 describes the Dutch health care system and the relevant reforms. Chapter 4 treats the empirical strategy. It discusses the data and the model specifications. chapter 5 presents an overview of the results. Finally, chapter 6 concludes and provides a discussion.

2 Behavioural effects of financial incentives for physicians

This study analyses in what way financial incentives affect physicians' behaviour and, succeeding, health care utilization. This topic has been studied previously in the empirical literature in multiple ways: studies analyse differences in physicians' behaviour remunerated by capitation or FFS. They also exploit the implementation of practice budgets and institutional changes due to reforms. The effects of tariff cuts for certain treatments are examined as well.

It is well documented that the remuneration system influences physician's output. Several studies show that FFS physicians produce more than physicians remunerated by capitation (Barro and Beaulieu 2003, Devlin & Sarma 2008, Melichar 2009, Van Dijk et al. 2013). Hennig-Schmidt et al. (2011) shows, based on an experiment in a laboratory setting, not only that physicians provide significantly more services under FFS than under capitation remuneration systems, but also that patients are overserved in FFS systems and underserved in capitation systems. Physicians in FFS systems only overserve patients in a good and intermediate state of health, while physicians under capitation systems only underserve patients in a bad and intermediate state of health. The degree of overserving under FFS is larger than the degree of underserving under capitation. Patients in a good state of health get twice as much care as they need under FFS. On the other hand, patients in a bad health state get 20% less care than they need under capitation. Overserving under FFS thus seems to be a larger problem than underserving under capitation.

The introduction of a remuneration cap has a downward effect on production, while releasing it has an upward effect. Schmitz (2013) shows that the implementation of a remuneration cap for publicly insured patients did not change the probability of physician visits, but decreased the conditional number of physician visits by publicly insured patients, while increasing the conditional number of visits of privately insured patients. Dusheiko et al. (2006) analyse the abolition of fundholding for English general practices in 1999 with a differences-in-differences strategy. This fundholding implied that GPs were able to choose to receive a fixed budget per patient for costs of certain surgeries. They could keep any potential surplus. The findings indicate that the abolition of fundholding resulted in a volume increase of 3.5%-5.1%. Croxson et al. (2001) analyse whether health care providers adapt their activity prior to the installation of a fundholding scheme in the UK in 1991 that is based on historic expenditures. The results show that health care providers respond to financial incentives by increasing their hospital-based activity prior to the reform to inflate their budgets in the following years.

The effect of changes in tariffs is mixed. Traditional economic theory expects an upward sloping supply curve for physicians and thus a decrease in production if tariffs decline. As a number of empirical studies showed the opposite effect, the 'target income' theory emerged: physicians respond to tariff cuts with increased production to restore their target income. McGuire and Pauly (1991) argue that the 'target income' theory is inadequate in predicting differences in behaviour across physicians and does not match economic principles. They explain the effect of tariff cuts within a traditional profit-maximizing framework, from an opposing substitution and

income effect. The substitution effect has a negative impact on the production of physicians: as tariffs are cut, leisure time (or other activities) becomes relatively more attractive. The income effect implies a positive effect on production because physicians want to compensate for income losses due to lower tariffs. They predict that the income effect will be most pronounced for physicians with a large share of their practice devoted to procedures with large fee cuts. Rizzo and Zeckhauser (2003) reinvent the target income theory, based on behavioural economics. They state that due to loss aversion physicians strongly respond when they earn less than their reference income and take unappealing actions to boost income. Earning more than the reference income has little influence on output. They empirically test their hypothesis by comparing the income growth of physicians who earn below and above their stated reference income. Earnings of physicians who earned less than their reference income increased more than earnings of physicians who were above their reference income. However, they did not investigate the effect of tariff changes. The empirical evidence on tariff changes is mixed. Some studies find a negative relationship between tariffs and production, indicating the income effect is stronger than the substitution effect (Rice 1983, Rice 1984, Rice and Labelle 1989, Christensen 1992, Yip 1998, Jacobson et al. 2010), while others find a positive relationship (Gruber et al. 1999, Mitchel et al. 2000, Grytten et al. 2008, Hadley et al. 2009). Gruber et al. (1999) argue (following the prediction of McGuire and Pauly) that the studies showing a negative relationship between tariffs and production, study tariff changes in a Medicare context, which accounts for a large part of physician's income. They expect other results in a Medicaid context, because fewer patients are involved, and thus the income effects are smaller. They indeed find a positive relationship between Medicaid-tariffs and production.

Our paper adds to the small body of literature on the effect of changes of tariffs of physician in health production. The changes in tariffs affected all outputs, thus affecting the complete income of physicians. Income effects are thus suspected to prevail above substitution effects. The policy reforms in the Netherlands consisted of a rise in tariffs and a subsequent decline of tariffs. This offers the possibility to see if loss aversion occurs. Loss aversion would predict that tariff cuts would have a larger impact than tariff increases.

3 The Dutch health care system and the reforms

Healthcare in the Netherlands is financed by a state-controlled mandatory private insurance: individuals are obliged to buy private health insurance. The levels of co-payments are relatively low. The Dutch health insurance contains only a deductible. Table 1 shows the development of the mandatory deductible in the period 2007-2012. Individuals can choose a higher deductible, in exchange for a lower contribution. In 2006 and 2007 the deductible had the form of a no claim: instead of paying extra when health care was used, insured that did not use health care got the 'no claim' back at the end of the year. The 'no claim' provided fewer incentives not to use health care and also complicated the combination with a voluntary deductible. It was therefore replaced by a regular deductible in 2008 with an expected equal incentive as the 'no claim'. GP visits are exempted from any co-payments.

Table 1: Mandatory deductible slowly increases

Year	Mandatory deductible per year
2007	€ 255 (no claim)
2008	€ 150
2009	€ 155
2010	€ 165
2011	€ 170
2012	€ 210

Physicians in the Dutch health care system

There are two types of remuneration systems for specialist physicians in the Dutch health care system. There are self-employed physicians, who are paid fee for service, and salaried physicians. Both work in the hospital, although some FFS physicians have a private practice outside the hospital. FFS specialists work within the hospital in a partnership with physicians in the same specialty. A new physician in the hospital can only become self-employed if the existing group of physicians is a FFS partnership. So in one hospital all cardiologists are FFS while in another hospital they are all salaried. In university hospitals all physicians are salaried. In non-university hospitals the majority of the specialist physicians are FFS. Of all medical specialists around 60% are FFS and 40% salaried. There are differences between specialties in the share of FFS specialists. Traditionally psychiatrists and paediatricians are mostly salaried, while cardiologists and anaesthetists are mostly FFS. The ratio of FFS and salaried physicians per specialty declines over the years, mainly due to the entrance of female physicians.

Developments in the financing of hospitals and the remuneration of physicians

In the Netherlands there exist separate financing systems for hospitals and FFS specialist physicians, working within or outside the hospital. Multiple reforms occurred in the period 2007-2012, leading to more output dependent payments for both hospitals and physicians. The reforms aimed at decreasing waiting lists and at the same time gave insurers more freedom in negotiating with hospitals about prices, quality and quantity of care.

Hospitals faced a fixed budget until 2005. In 2005, a so-called 'A-segment' and 'B-segment' were introduced. For the A-segment hospitals still received a fixed budget, while for the B–segment hospitals received compensation per treatment. Treatments where defined as Diagnoses Treatment Combinations (DBC), comparable to the DRGs' in other countries. The B-segment contained high quantity, low complexity treatments for which hospitals could compete with each other. The B-segment gradually expanded from 10% in 2005 to 20% in 2008, 34% in 2009 and 70% in 2012. Negotiations of tariffs for these DBCs' take place directly between hospitals and insurance companies. The size of the B-segment differs between specialties. In 2012 the fixed budget for the A-segment was abandoned, although tariffs were still set by the government.

In 2012 there were multiple policy interventions that in effect led to a re-installation of a fixed budget for hospitals. In 2012 the DBC system was changed. The number of products decreased form 30,000 to roughly 3,000. This led to a financial risk for hospitals. They had no information about the costs of the new DBCs' and therefore were not able to correctly set prices for the DBC's in the B-segment, which now was 70% of the budget. Therefore a safety net was created: in 2012 they were guaranteed almost the budget in 2011, irrespective of the prices and quantities they agreed with insurers. They had to pay back (or were reimbursed) 95% of the difference between actual income in 2012 and the budget of 2011. At the same time the minister of health reached an agreement with the hospitals and insurers that the total hospital budget would not grow by more than 2,5% (volume), far less than growth in the preceding years. These two changes induced hospitals and insurers to negotiate lump sum contracts instead of price and volume for separate DBCs. Hospitals thus up till 2011 had an incentive to increase production in the B-segment, while in 2012 they had an incentive to decrease production, as well in de A as in the B-segment.

FFS specialist physicians had fixed budgets until 2007. This lump sum budget per FFS partnership was based on the level of health care utilization in 1995. From 2005 they were paid per DBC for treatments in the B-segment, as were hospitals. However, in contrast to hospitals, the DBC-tariffs for physicians were not negotiated with insurers, but set by a government agency (the NZa). In 2008 the fixed budgets for specialist physicians were dropped for all treatments, also those in the A-segment. At the same time DBC tariffs were changed, in order to equalize the income differences between medical specialties. The change in DBC tariffs was meant to be cost neutral, but turned out to increase tariffs with around 26%. This led to a sharp cost increase in 2008 and 2009 of around 30% (Vektis 2009). As a result, the government decided to decrease the DBC-tariffs with 24%. This was done gradually, with a first step in January 2010, a second step in September 2010 and a third step in January 2011 (NZa 2010). The tariff cuts were higher for those specialists who benefited most from the change in DBC-tariffs in 2008. Table 2 shows the sharp rise in income of medical specialists in 2008 and 2009 and the sharp decline in 2010 and 2011 (figures for 2012 are not yet available).

Table 2: Income Dutch FFS physicians, 2007-2011

	2007	2008	2009	2010	2011*
Average income	205,300	236,100	259,200	213,600	189,600
% Change		15%	10%	- 18%	-11%

Source: Statistics Netherlands
*Provisional estimate

In 2012 the Dutch government re-installed a fixed budget for FFS physicians. The budgets were set per hospital, and physicians had to divide the hospital budget themselves over the different partnerships. The fixed budgets decreased the incentives for physicians to produce more than their budget allowed.

Salaried physicians had no incentives to increase or decrease their output over time, unless the hospital rewarded them for increasing or reducing output in the form of performance pay. Hospitals might have encouraged salaried physicians to produce more B-segment DBCs in the period 2005 to 2011, maybe at the expense of DBCs in the A-segment. The B-segment gradually expanded from 10% in 2005 to 20% in 2008, 34% in 2009 and 70% in 2012. This percentage however varied widely per specialty. In 2009 it varied from 65% for gynaecologists to 0% for paediatricians (see Table 3). Hospitals might have rewarded especially specialists with a high share of their production in the B-segment. As can be seen in Table 3, those specialties with a high share of their budget in the B-segment are usually also the ones where the majority works FFS. For them the incentives of hospital and physicians are already in line. But for neurologists, incentives are not in line with those of the hospital. Hospital management might have given them incentives to produce more in the B-segment.

Table 3: Share of budget in B-segment

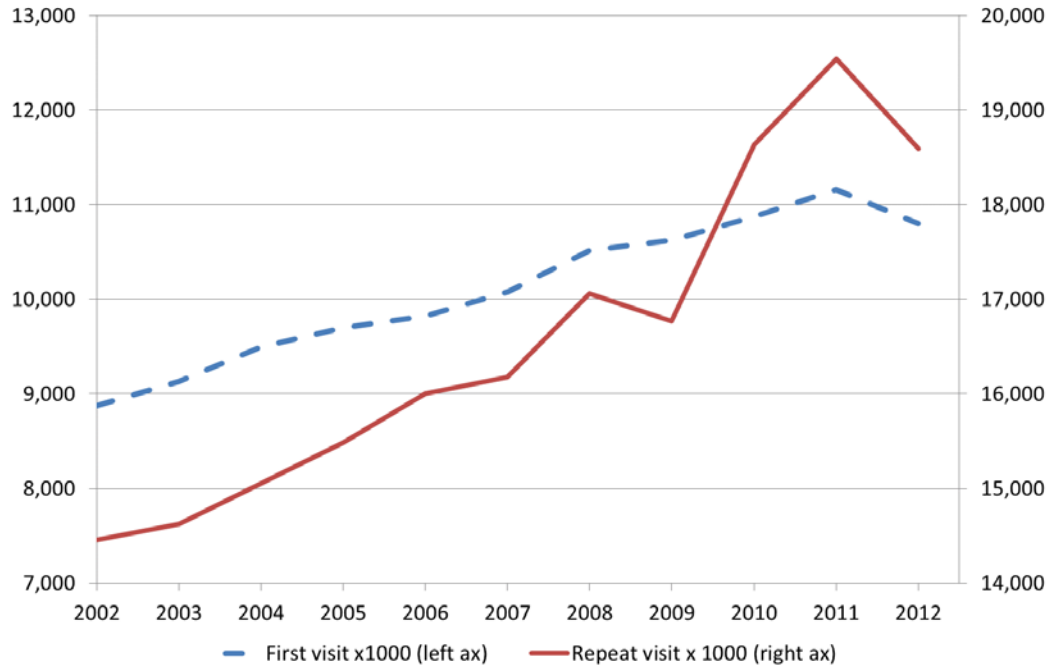
	Share FFS physicians per specialty 2009*	Share of budget in B-segment 2009**
Paediatrics	5%	0%
Psychiatry	8%	0%
Internal medicine	44%	9%
Neurology	49%	44%
Surgery	60%	21%
Gynaecology	62%	65%
Gastroenterology	63%	18%
Ophthalmology	65%	56%
Otolaryngology (throat, nose and ear)	68%	35%
Cardiology	66%	29%
Orthopaedics	71%	51%
Dermatology	71%	33%
Urology	72%	43%

Source: *Statistics Netherlands
**NVZ Brancherapport algemene ziekenhuizen 2011 (Industry report general hospitals)

Developments in physician output

Figure 1 shows the change in the number of first physician visits and recall visits observed in the years 2002-2012. The number of first visits rises steadily from 2006 to 2011, with an increase in the growth rate in 2008 and a decrease in 2009. In 2012 the number of first visits decline. The number of recall visits shows another pattern. The number of recall visits increases sharply in 2008, declines in 2009 and rises again sharply in 2010 and 2011. In 2012 the number of recall visits declines.

Figure 1: Number of physician visits



Source: Dutch Hospital Data: Kengetallen Nederlandse Ziekenhuizen (Key figures Dutch Hospitals) 2006, 2010 and 2012

The rise of the number of first visits and recall visits is in accordance with expectation about the abolition of the remuneration cap of FFS physicians. The sharper rise of the number of recall visits is in accordance with empirical evidence that shows physicians are not able to influence first visits, but are able to influence recall visits. The decline in the number of recall visits in 2009 seems odd. Tariffs did not change in 2009, compared to 2008, so the decline cannot be caused by a substitution effect. But physicians discovered only at the end of 2008 that their income had increased much more than they expected. As the change in DBC tariffs was meant to be cost neutral it was unknown beforehand that the change of DBC-tariffs would lead to an overall increase of tariffs. So in 2009 they could slow down and keep their income well above the 2007 level. This reaction can be interpreted as a postponed income effect of the rise in tariffs in 2008. The sharp rise in the number of recall visits in 2010 is in line with expectations: as the tariff cuts were differentiated per specialism, and not per DBC, the cuts affected the complete income of physicians. They were not able to substitute away from DBC's with a large tariff cut because all DBC's were subject to the same tariff cut. Therefore theory predicts that the income effect is dominant. There seems to be an asymmetric response to the rise in tariffs in 2008 and the tariff cuts in 2010-2011: the tariff cuts seem to lead to a larger increase in production than the tariff decline leads to a decline of production. This is consistent with the presence of loss aversion. The decline in the number of first visits in 2012 for both FFS physicians and salaried physicians can be attributed the re-introduction of the remuneration cap for FFS physicians and the lump sum budgets for hospitals. In the next section we will test these hypotheses by exploiting the differences in output between salaried physicians, which were not subject to reforms, and FFS physicians. In this way we can identify the effect of the policy reforms and distinguish it from other effects.

4 Empirical strategy

4.1 Data descriptions

The LISS panel (Longitudinal Internet Studies for the Social Sciences) is a high quality panel, which comprises 8,000 individuals from 5,000 households. The households are representative for the Dutch population. Panel members receive a monthly compensation for filling in the questionnaires. The panel covers the years 2007-2012. The panel contains information on household characteristics, health care utilization, health status and other characteristics. The advantage of using panel data is that we can control for the effect of health status and demographic characteristics on health care utilization. Table 6 presents the descriptive statistics of the variables used in the analyses.

To study the effects of changes in the remuneration scheme for FFS physicians, we compare their behaviour to the behaviour of salaried physicians. The data do not allow us to identify the remuneration type of the physicians at an individual level. Therefore, we exploit the variation in the share of FFS physicians per specialty. We distinguish between specialties that occupy mainly FFS or salaried physicians. Table 4 shows the percentage of FFS physicians for specialties that are observed in the LISS panel.

Table 4: Share FFS physicians per specialty, 2007-2011

	2007	2008	2009	2010	2011*
Psychiatrists	7%	7%	8%	8%	8%
Surgery	61%	61%	60%	61%	59%
Internal medicine	44%	44%	44%	45%	45%
Neurologists	48%	49%	49%	50%	49%
Gynaecology	63%	62%	62%	62%	63%
Ophthalmology	66%	67%	65%	66%	67%
Otolaryngology (throat, nose and ear)	69%	68%	68%	67%	67%
Cardiology	70%	68%	66%	65%	64%
Orthopaedics	72%	72%	71%	71%	70%

Source: Statistics Netherlands
*Provisional estimate

Based on the share of FFS specialists, gynaecologists, orthopaedic surgeons, cardiologists, ophthalmologists, and throat-, nose- and ear specialists are assigned to the group of FFS specialists, while solely internists are assigned to the salaried physicians. The FFS specialists in the analyses produce approximately 53% of total output of physicians in the Netherlands. The salaried physicians (internists) produce around 9% of total output (source KIWA Prismant). So around 62% of production is included in our analysis. The FFS physicians in our sample faced tariff cuts in 2010-2011 of on average 23%. The group of internists is assigned to the group salaried physicians, although 44% is FFS. However, the FFS internists faced tariff cuts of 10% in 2010-2011, much less than the other FFS physicians. Two specialties are dropped: psychiatry and neurology. Psychiatry belonged to an alternative financing system in 2007. Therefore, the reforms do not affect the physicians in a similar way. Of the neurologists, about half is salaried. Moreover,

a large part of their production is part of the B-segment. This means hospitals might have given them an incentive to produce more in the years 2008-2011. Therefore they are not suited as a control group for the FFS physicians.

Observations indicating visits to more than one type of physician (i.e. FFS, salaried or remaining) are dropped from the analyses. Otherwise the precise number of visits to a particular type of physician could not be identified. This leads to an exclusion of patients in worse health states, as they are more likely to visit different types of physicians. The average age of the sample drops from 48 to 47 years old. This effect is stronger for salaried physicians, because this group contains only internists. So all patients visiting more than one specialty are excluded from this group. Patients visiting different specialties are not excluded from the sample as long as they visit specialists within the group of FFS physicians. The exclusion of patients in worse health states influences our results. Hennig-Schmidt shows that over serving by FFS physicians occurs only with patients in good and intermediate health states, not with patients in bad health. The changes in the payment systems will therefore mainly affect persons in good and intermediate states. Excluding patients in a bad health state might lead to more pronounced effects. Table 5 presents an overview of the selection of individuals for the sample used in the analyses.

Table 5: Selection of individuals for the sample used in the analyses

	2007	2008	2009	2010	2011	2012
Initial sample	6,698	5,961	6,119	5,718	5,072	5,780
Incomplete/inconsistent records	92	47	79	78	47	62
Visits to multiple types of physicians	693	652	741	691	624	684
Sample of analyses	5,913	5,262	5,299	4,949	4,401	5,034

Outcome variables

This study focuses on the number of physician visits. This outcome may be the result of two processes. The first process is whether a person decides to see a GP and whether the GP issues a referral to a physician. The variable 'probability visits' is a binary indicator that equals '1' if a respondent has at least one physician visit in the last 12 months and '0' otherwise. This variable corresponds to the first process. A priori, we expect that physicians themselves are hardly able to affect this binary variable and, hence, financial incentives play a minor role. The second process is the number of hospital visits when there is at least one physician contact. The variable 'conditional number visits' is a count variable that refers to this process. Physicians have the opportunity to influence this outcome and, therefore, their financial incentives are presumably more important. We use survey questions on the total number and type of visits to medical physicians in hospitals over the last 12 months for the construction of these outcome variables.

Control variables

We include demographic variables (age, sex and the share of respondents that are married or have children), education and whether respondents are working, retired or unemployed. Health status is measured by chronic condition (long-standing disease, affliction, handicap or the consequences of an accident), and the degree of difficulty in performing daily activities over the past month (not at all, hardly, a bit, quite a lot and very much). The BMI-related variables are indicators of both respondents' health status and health behaviours. Table 6 shows the outcome variable and the control variables.

Table 6: Descriptive statistics

	2007	2008	2009	2010	2011	2012
Outcome variables						
Probability visit, FFS physicians	21.1%	20.8%	22.5%	22.6%	21.4%	21.7%
Probability visit, salaried physicians	2.9%	3.1%	2.7%	3.1%	2.8%	3.4%
Conditional number visits, FFS physicians	2,411	2,643	2,388	2,692	2,455	2,400
Conditional number visits, salaried physicians	2,161	2,728	2,793	2,326	2,619	2,377
Demographic controls						
Married	60.3%	59.3%	56.8%	56.5%	56.4%	56.4%
Children	52.0%	50.1%	44.1%	44.4%	44.2%	44.8%
Male	47.4%	46.7%	47.1%	47.1%	47.2%	46.7%
Education:						
Low	35.8%	35.6%	35.5%	35.5%	34.4%	33.7%
Medium	34.3%	34.5%	34.1%	33.7%	34.6%	34.7%
High	29.9%	29.9%	30.4%	30.8%	31.0%	31.6%
Unemployed	1.6%	1.4%	2.5%	2.6%	2.7%	3.5%
Retired	12.0%	13.1%	16.5%	17.2%	18.9%	18.8%
Age (average)	44.5	45.4	47.0	47.6	48.6	48.9
Health controls						
Chronic condition	22.9%	22.0%	23.9%	25.9%	26.1%	26.8%
Weight:						
Underweight	2.4%	2.6%	2.5%	2.4%	2.5%	2.4%
Regular	54.2%	52.2%	50.6%	50.6%	50.1%	49.7%
Overweight	33.2%	33.9%	34.9%	34.2%	34.7%	34.8%
Obese	10.3%	11.3%	12.0%	12.8%	12.7%	13.1%
Impeded daily activities:						
None	66.5%	66.2%	61.3%	62.2%	61.6%	60.7%
Hardly	17.1%	16.8%	19.1%	18.0%	18.7%	18.5%
A bit	11.3%	12.2%	14.0%	13.3%	13.2%	14.5%
Quite a lot	4.5%	4.2%	4.7%	5.4%	5.4%	5.4%
Very much	0.5%	0.6%	0.9%	1.1%	1.1%	0.9%
Number observations	5,913	5,262	5,299	4,949	4,401	5,034

4.2 Model specifications

We examine two outcome variables: the probability of at least one physician visit and the conditional number of physician visits. We conduct each regression separately for specialties that mainly occupy physicians on the basis of either FFS or a fixed salary. The models for both types of specialties are estimated with nonlinear models. The comparison of the estimates of both groups is therefore solely based on significance levels.

For each outcome we estimate 4 models (Table 7 and Table 8). Models of the outcome Probability visits are estimated with binary logit models and models of the outcome Conditional

number visits with poisson count models. Model 1 includes only the year dummies and none of the individual controls. This regression aims to capture the year effects, while the individual determinants of health care utilization are disregarded. Model 2 is a regression adopting demographic controls and Model 3 adds the health controls. Finally, we exploit the panel data structure of the data and estimate a fixed effects panel data model in Model 4, the preferred model. This model contains, next to the health and demographic controls, also individual specific fixed effects. The main idea is to model health care utilization and to estimate the effects of financial incentives, while controlling for unobserved individual heterogeneity and for changes in demographic characteristics and health status. The year indicators aim to capture the remaining effects of the institutional changes and the resulting changes in financial incentives. The main advantage of this model is that it takes unobserved heterogeneity between individuals into account. Observations are dropped due to absence of variation in the outcome variable or because there is only a single observation for a respondent. Moreover, time-invariant variables, such as sex, cannot be identified and are therefore omitted. Age classes are omitted because they would only indicate the effect of a transition to a higher age class. Age is also not suitable as control variable, because of multicollinearity with the year effect. The effect of age is included in the fixed effect (through year of birth). However, the effect of becoming one year older each year is not included in the fixed effect, but in the year effect. We prefer fixed effects compared to random effects, because the observed individual characteristics, like education and weight, are presumably not independent from the unobserved individual fixed effects, like lifestyle and long-term health. As the health variables do not capture all information about the health status of respondents, and health is the main predictor of health consumption, it is important to control for unobserved heterogeneity in the analyses.

The unbiased identification of effects is dependent on the following two main assumptions. First, we assume that medical specialists did not change from salary to FFS due to changes in the remuneration system. This form of selection would bias the results. Unfortunately, we do not observe the characteristics of the physicians in the data and therefore it is impossible to investigate differences in characteristics of physicians. However, Table 4 indicates that the share of FFS physicians per specialty is relatively stable over time. The second assumption is that the difference between the year dummies for FFS and salaried physicians can be fully assigned to the studied reforms after controlling for individual determinants of health care utilization and unobserved heterogeneity. Other relevant reforms (like the change in deductibles) and the economic crisis may have had effects on health care usage, but are assumed to have had the same impact on FFS and salaried physicians.

5 Results

5.1 Probability of one or more physician visits

The first part of the analyses studies the binary indicator for at least one physician visit as outcome variable (see Table 7). Model 1, including only year effects, indicates that the probability of visiting a FFS physician at least once a year was higher in the years 2009-2012 than in 2007, although only the estimates for 2009 and 2010 are significant. The estimates for salaried physicians do not show a clear pattern. Models 2 and 3 include individual determinants for health care consumption. In this model all year effects are negative for FFS physicians. This differs from the effects in model 1 and, hence, controlling for individual characteristics affects the results: the increase in probability found in model 1 can be contributed to changes in demographics that lead to an increased probability of visiting a medical specialist. The estimates of the year effects for salaried physicians in models 2 and 3 do not show a clear pattern. All estimates are insignificant. Model 4 controls for unobserved heterogeneity by adopting individual fixed effects. The estimates of the year effects for both the FFS and salaried physicians are all insignificant. This confirms the findings of Schmitz (2013) that financial incentives do not impact the probability of going at least once a year to a physician. Presumably physicians only have limited potential to initiate first contacts with patients.

Table 7: Results probability visit

Dependent variable: probability of at least one visit in a year	**Model 1 Logit (pooled)**		**Model 2 Logit (pooled)**		**Model 3 Logit (pooled)**		**Model 4 Logit (fixed effect)**	
FFS								
Year 2007 (ref.)								
Year 2008	-0.021	(0.040)	-0.049	(0.041)	-0.050	(0.042)	-0.083	(0.063)
Year 2009	0.077*	(0.041)	-0.003	(0.043)	-0.026	(0.044)	-0.033	(0.065)
Year 2010	0.087**	(0.043)	-0.008	(0.045)	-0.041	(0.045)	-0.004	(0.066)
Year 2011	0.018	(0.046)	-0.104**	(0.048)	-0.136***	(0.048)	-0.094	(0.069)
Year 2012	0.034	(0.045)	-0.094**	(0.047)	-0.137***	(0.047)	-0.082	(0.071)
Demographic controls	no		yes		yes		yes	
Health controls	no		no		yes		yes	
Individual effects	no		no		no		yes	
Observations	30,858		30,858		30,858		12,133	
Individuals	9,840		9,840		9,840		2,722	
Pseudo R^2	0.000		0.040		0.058		0.021	
Salaried								
Year 2007 (ref.)								
Year 2008	0.053	(0.092)	0.037	(0.093)	0.057	(0.094)	0.079	(0.165)
Year 2009	-0.090	(0.103)	-0.138	(0.104)	-0.135	(0.105)	-0.091	(0.177)
Year 2010	0.070	(0.102)	0.020	(0.104)	-0.002	(0.105)	0.158	(0.172)
Year 2011	-0.039	(0.112)	-0.100	(0.115)	-0.116	(0.115)	0.008	(0.181)
Year 2012	0.160	(0.102)	0.106	(0.104)	0.075	(0.105)	0.246	(0.179)
Demographic controls	no		yes		yes		yes	
Health controls	no		no		yes		yes	
Individual effects	no		no		no		yes	
Observations	30,858		30,858		30,858		1,936	
Individuals	9,840		9,840		9,840		432	
Pseudo R^2	0.001		0.021		0.059		0.017	

Notes: * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parentheses. Standard errors in model1, 2 and 3 clustered at the individual level.

5.2 The conditional number of physician visits

The second part of the analyses focuses on the effects of financial incentives for physicians on the number of physician visits, when there has been at least one visit (see Table 8). The year estimates of model 1 show a significant increase in the conditional number of visits to FFS physicians in 2008 and 2010 (2008 only on a 10% level). The signs of the year estimates for salaried physicians are all positive and the year effects for 2008 and 2009 are significant (2008 only on a 10% level). Models 2 and 3 estimate the year effects, while also including individual demographic characteristics and health factors that affect health care utilization. The FFS estimate for 2008 becomes more significant, when including these controls. The estimate of the year effect in 2009 for visits to salaried physicians loses significance when including health controls (model 3). When taking unobserved heterogeneity into account (model 4), the year effect for FFS physicians for 2008 is significant, while the corresponding estimate for visits to salaried physicians is insignificant. This finding indicates that the increase in health care utilization in 2008 is the result of the abolition of the remuneration cap for FFS physicians in 2008. In 2009 FFS production goes down compared to 2008. This is consistent with a postponed income effect of the tariff increase in 2008, which induces FFS physicians to buy more leisure time. The production of salaried physicians increases in 2009 (only at the 10% level). The management of hospitals might have stimulated salaried physicians to work more because of the increase of the B-segment from 20% to 34%. For the hospital more production in the B-segment pays out, while in the A-segment the budget is fixed. In 2010 and 2011 production of FFS physicians increases, while the production of salaried physicians goes down. The higher production of FFS physicians thus has to be caused by the policy reforms and is consistent with a dominant income effect of the tariff cuts in 2010 and 2011. As tariff cuts were implemented gradually, the full effect was realised in 2011. Finally, the production of FFS physicians in 2012 is at the same level of 2007. This is probably the result of the re-implementation of fixed budgets. The production of salaried physicians also declines, which is probably the result of the lump sum agreements of hospitals with insurers in 2012. This indicates hospitals influence the production of salaried physicians.

Table 8: Results conditional number visits

Dependent variable: conditional number physician visits in a year	Model 1 Poisson (pooled)		Model 2 Poisson (pooled)		Model 3 Poisson (pooled)		Model 4 Poisson (fixed effect)	
FFS								
Year 2007 (ref.)								
Year 2008	0.092*	(0.049)	0.101**	(0.049)	0.100**	(0.048)	0.128**	(0.063)
Year 2009	-0.010	(0.045)	0.008	(0.046)	-0.003	(0.046)	0.029	(0.060)
Year 2010	0.110**	(0.052)	0.133**	(0.052)	0.107**	(0.052)	0.136**	(0.067)
Year 2011	0.018	(0.051)	0.056	(0.053)	0.037	(0.052)	0.143**	(0.066)
Year 2012	-0.005	(0.051)	0.034	(0.053)	0.020	(0.052)	0.048	(0.070)
Demographic controls	no		yes		yes		yes	
Health controls	no		no		yes		yes	
Individual effects	no		no		no		yes	
Observations	5,092		5,092		5,092		3,146	
Individuals	3,112		3,112		3,112		1,166	
Pseudo R^2	0.001		0.019		0.042		–	
Observations								
Year 2007 (ref.)								
Year 2008	0.233*	(0.125)	0.210*	(0.122)	0.208*	(0.120)	0.003	(0.123)
Year 2009	0.257**	(0.128)	0.209*	(0.124)	0.182	(0.121)	0.242*	(0.139)
Year 2010	0.073	(0.129)	0.060	(0.122)	-0.017	(0.120)	-0.105	(0.147)
Year 2011	0.192	(0.151)	0.153	(0.148)	0.092	(0.138)	-0.146	(0.167)
Year 2012	0.095	(0.118)	0.082	(0.118)	0.012	(0.117)	-0.366**	(0.184)
Demographic controls	no		yes		yes		yes	
Health controls	no		no		yes		yes	
Individual effects	no		no		no		yes	
Observations	789		789		789		382	
Individuals	550		550		550		143	
Pseudo R^2	0.005		0.029		0.075		–	

* p<0.1, ** p<0.05, *** p<0.01.
Standard errors in parentheses.
Standard errors in model 1, 2 and 3 clustered at the individual level. Robust standard errors in model 4.

6 Conclusion and discussions

Multiple reforms that took place in the period 2007-2012 affected the remuneration of physicians in the Netherlands. First, fixed budgets for FFS physicians were dropped in 2008, while at the same time there was an unintended substantial rise of tariffs. Then, tariff cuts for treatments took place in 2010-2011. Finally, a fixed budget was re-implemented in 2012. We expected to find effects on the conditional number of FFS physician visits, but not on the probability of at least one physician visit. The first visit is generally initiated by patients and the GPs, whereas physicians have more opportunity to affect the number of recall visits.

The study uses the LISS panel that follows respondents in the period 2007-2012 and records household characteristics, health care utilization, health status and other characteristics to study the effects of financial incentives for physicians on health care utilization. The sample is representative for the Dutch population. We use fixed effects panel data methods in the analyses. We exploit differences between medical specialties in the ratio of FFS and salaried physicians to identify the effects of the reforms.

The main results are as follows:

- The abolition of the fixed budget for FFS physicians in 2008 led to an increase in production;
- The rise in tariffs in 2008 led to a decrease of production in 2009. This is consistent with a postponed income effect of the unintended increase in tariffs in 2008, which became apparent in 2009 or at the end of 2008. Physicians bought extra leisure time with their unexpected rise in income. Production declined to the level of 2007.
- The decrease in tariffs in 2010 and 2011 led to an increase in production to the level of 2008. This is consistent with an income effect of the tariff cuts.
- The re-introduction of the remuneration cap for FFS physicians in 2012 led to a decrease in production to the level of 2007.

The decrease in production in 2009 did not offset the increase in tariffs, leading to a substantially higher income in 2008 and 2009 (see Table 2). The increase in income in 2009 compared to 2008 is probably due to time lags between the start of a DBC and the billing of a DBC. The increase in production in 2010 and 2011 neither did offset the tariff cuts, leading to a substantial income loss in 2010 and 2011. The (expected) income in 2011 is even lower than in 2007.

Former empirical findings about the effects of introducing a remuneration cap have been confirmed. It is also confirmed that the effect of tariff changes is dominated by the income effect, if the tariff changes affect a large share of the income of physicians. Physicians influence demand by increasing the number of recall visits. They do not seem to be able to influence the first visits of patients. The analysis does not confirm the presence of loss aversion: the increase in production in 2010-2011 mirrors the decrease in production in 2009 as well in the tariff change as in the change in output.

This study is subject to limitations. First, we do not observe if respondents go to a FFS physician or a salaried physician. We therefore compare the development of output of specialisms with

mainly FFS physicians with a specialism with mainly salaried physicians (internists). But also of the internists 44% works fee-for-service. So part of the internists are also subject to the reforms, but less than the group of mainly FFS physicians. Moreover the tariff increases and tariff cuts for FFS internists were far smaller than for the mainly FFS physicians.

Another limitation is that we assume that the difference in effects of the year dummies between FFS physicians and salaried physicians can be fully assigned to the studied reforms. We cannot rule out that there are demand factors, which do effect the production of FFS physicians but not the production of salaried physicians. However, the only demand factor we can think of is the fact that our model does not control for aging during the panel period. The effect of year of birth on health consumption is captured in the fixed effect, but the effect of becoming one year older cannot be distinguished from the year effect. We believe this effect to be small and not different for salaries and FFS physicians . Although elderly people have a higher health consumption in general, becoming one year older will not have a substantial effect on health care utilization.

This study is relevant in light of the increasing shares of health care costs in total expenditures all over the developed world. The main implication of the findings is that the tariff cuts will often not lead to lower volumes of care. Although tariff cuts are not offset by an equal rise in volume, and therefore lead to lower costs for medical specialists, they might lead to higher costs for hospitals. Higher production of physicians in the hospital leads to higher costs of nurses and hospital capital, possibly leading to higher overall costs. To decrease the production of physicians the income effect has to be avoided, for example by combining tariff cuts with a fixed income component (by capitation). The combination of fixed and variable income components give the best incentives to prevent as well overprovision as underprovision (Brosig-Koch et al. 2013).

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Appendix A Results probability visits

Table A1: Probability visits FFS physicians

	Model 1		Model 2		Model 3		Model 4	
	Logit	(pooled)	Logit	(pooled)	Logit	(pooled)	Logit	(fixed effect)
Year 2008	-0.021	(0.040)	-0.049	(0.041)	-0.050	(0.042)	-0.083	(0.063)
Year 2009	0.077*	(0.041)	-0.003	(0.043)	-0.026	(0.044)	-0.033	(0.065)
Year 2010	0.087**	(0.043)	-0.008	(0.045)	-0.041	(0.045)	-0.004	(0.066)
Year 2011	0.018	(0.046)	-0.104**	(0.048)	-0.136***	(0.048)	-0.094	(0.069)
Year 2012	0.034	(0.045)	-0.094**	(0.047)	-0.137***	(0.047)	-0.082	(0.071)
Demographic controls								
Married			0.142***	(0.045)	0.163***	(0.046)	0.318*	(0.173)
Children			-0.085*	(0.048)	-0.030	(0.048)	0.021	(0.139)
Male			-0.512***	(0.040)	-0.509***	(0.040)		
Education:								
medium			-0.005	(0.047)	0.023	(0.048)		
high			-0.023	(0.050)	0.064	(0.050)		
Unemployed			0.239**	(0.107)	0.185*	(0.109)	0.240	(0.178)
Retired			0.179**	(0.080)	0.187**	(0.080)	0.456***	(0.165)
Age:								
15-24			-0.161**	(0.078)	-0.030	(0.079)		
25-34			0.158**	(0.065)	0.238***	(0.066)		
45-54			0.059	(0.061)	0.025	(0.062)		
55-64			0.386***	(0.068)	0.346***	(0.068)		
65-74			0.800***	(0.099)	0.762***	(0.099)		
75-84			1.212***	(0.117)	1.096***	(0.118)		
Health controls								
Chronic condition					0.315***	(0.047)	0.342***	(0.096)
Weight:								
Underweight					-0.017	(0.130)	0.253	(0.226)
Overweight					0.156***	(0.042)	0.426***	(0.096)
Obese					0.257***	(0.060)	0.489***	(0.156)
Impeded daily activities:								
hardly					0.244***	(0.042)	0.198***	(0.062)
a bit					0.517***	(0.047)	0.561***	(0.070)
quite a lot					0.766***	(0.072)	0.944***	(0.108)
very much					0.525***	(0.161)	0.926***	(0.234)
Constant	-1.317***	(0.032)	-1.364***	(0.075)	-1.764***	(0.080)		
Number observation	30,858		30,858		30,858		12,133	
Number persons	9,840		9,840		9,840		2,722	
Pseudo R^2	0.000		0.040		0.058		0.021	

* p<0.1, ** p<0.05, *** p<0.01.
Standard errors in parentheses. Standard errors in model 1, 2 and 3 clustered at the individual level.

Table A2: Probability visits salaried physicians

	Model 1		Model 2		Model 3		Model 4	
	Logit	(pooled)	Logit	(pooled)	Logit	(pooled)	Logit	(fixed effect)
Year 2008	0.053	(0.092)	0.037	(0.093)	0.057	(0.094)	0.079	(0.165)
Year 2009	-0.090	(0.103)	-0.138	(0.104)	-0.135	(0.105)	-0.091	(0.177)
Year 2010	0.070	(0.102)	0.020	(0.104)	-0.002	(0.105)	0.158	(0.172)
Year 2011	-0.039	(0.112)	-0.100	(0.115)	-0.116	(0.115)	0.008	(0.181)
Year 2012	0.160	(0.102)	0.106	(0.104)	0.075	(0.105)	0.246	(0.179)
Demographic controls								
Married			-0.056	(0.109)	-0.028	(0.109)	0.689	(0.432)
Children			-0.214*	(0.123)	-0.123	(0.123)	-0.136	(0.474)
Male			0.139	(0.096)	0.154	(0.097)		
Education:								
medium			-0.305***	(0.118)	-0.300**	(0.118)		
high			-0.139	(0.117)	-0.104	(0.119)		
Unemployed			-0.181	(0.310)	-0.208	(0.314)	-0.883*	(0.533)
Retired			0.258*	(0.155)	0.265*	(0.156)	-0.878**	(0.352)
Age:								
15-24			-0.865***	(0.227)	-0.676***	(0.229)		
25-34			-0.496***	(0.187)	-0.356*	(0.185)		
45-54			0.056	(0.152)	-0.020	(0.152)		
55-64			0.284*	(0.169)	0.143	(0.168)		
65-74			-0.005	(0.221)	-0.160	(0.216)		
75-84			0.004	(0.254)	-0.226	(0.249)		
Health controls								
Chronic condition					1.248***	(0.110)	0.546**	(0.229)
Weight:								
Underweight					0.036	(0.295)	-0.404	(0.583)
Overweight					0.010	(0.102)	-0.062	(0.229)
Obese					0.184	(0.143)	-0.063	(0.410)
Impeded daily activities:								
hardly					0.067	(0.105)	-0.126	(0.160)
a bit					-0.066	(0.118)	-0.074	(0.187)
quite a lot					-0.133	(0.162)	-0.118	(0.261)
very much					-0.863**	(0.413)	-0.768	(0.778)
Constant	-3.502***	(0.077)	-3.280***	(0.180)	-3.790***	(0.190)		
Number observation	30,858		30,858		30,858		1,936	
Number persons	9,840		9,840		9,840		432	
Pseudo R^2	0.001		0.021		0.059		0.017	

* p<0.1, ** p<0.05, *** p<0.01.
Standard errors in parentheses. Standard errors in model 1, 2 and 3 clustered at the individual level.

Appendix B Results conditional number visits

Table B1: Conditional number of visits FFS physicians

	Model 1		Model 2		Model 3		Model 4	
	Poisson	(pooled)	Poisson	(pooled)	Poisson	(pooled)	Poisson	(fixed effect)
Year 2008	0.092*	(0.049)	0.101**	(0.049)	0.100**	(0.048)	0.128**	(0.063)
Year 2009	-0.010	(0.045)	0.008	(0.046)	-0.003	(0.046)	0.029	(0.060)
Year 2010	0.110**	(0.052)	0.133**	(0.052)	0.107**	(0.052)	0.136**	(0.067)
Year 2011	0.018	(0.051)	0.056	(0.053)	0.037	(0.052)	0.143**	(0.066)
Year 2012	-0.005	(0.051)	0.034	(0.053)	0.020	(0.052)	0.048	(0.070)
Demographic controls								
Married			0.041	(0.043)	0.050	(0.042)	-0.108	(0.222)
Children			-0.026	(0.051)	0.001	(0.050)	0.312	(0.244)
Male			-0.105***	(0.035)	-0.110***	(0.034)		
Education:								
medium			-0.117***	(0.042)	-0.088**	(0.041)		
high			-0.215***	(0.041)	-0.164***	(0.040)		
Unemployed			0.178	(0.140)	0.168	(0.139)	0.515*	(0.284)
Retired			0.069	(0.046)	0.066	(0.045)	-0.318***	(0.088)
Age:								
15-24			-0.275***	(0.074)	-0.226***	(0.072)		
25-34			0.242***	(0.074)	0.280***	(0.072)		
45-54			-0.205***	(0.063)	-0.223***	(0.061)		
55-64			-0.198***	(0.066)	-0.214***	(0.064)		
65-74			-0.253***	(0.074)	-0.252***	(0.069)		
75-84			-0.215***	(0.082)	-0.238***	(0.078)		
Health controls								
Chronic condition					0.163***	(0.036)	0.186***	(0.072)
Weight:								
Underweight					0.170	(0.120)	-0.005	(0.204)
Overweight					0.061*	(0.036)	0.047	(0.105)
Obese					0.094*	(0.053)	0.143	(0.197)
Impeded daily activities:								
hardly					0.060	(0.040)	0.064	(0.057)
a bit					0.183***	(0.041)	0.131**	(0.066)
quite a lot					0.388***	(0.056)	0.281***	(0.085)
very much					0.655***	(0.142)	0.630***	(0.167)
Constant	0.880***	(0.035)	1.083***	(0.071)	0.841***	(0.071)		
Number observation	5,092		5,092		5,092		3,146	
Number persons	3,112		3,112		3,112		1,166	
Pseudo R^2	0.001		0.019		0.042		–	

* p<0.1, ** p<0.05, *** p<0.01.
Standard errors in parentheses. Standard errors in model 1, 2 and 3 clustered at the individual level. Robust standard errors in model 4.

Table B2: Conditional number of visits salaried physicians

	Model 1		Model 2		Model 3		Model 4	
	Poisson	(pooled)	Poisson	(pooled)	Poisson	(pooled)	Poisson	(fixed effect)
Year 2008	0.233*	(0.125)	0.210*	(0.122)	0.208*	(0.120)	0.003	(0.123)
Year 2009	0.257**	(0.128)	0.209*	(0.124)	0.182	(0.121)	0.242*	(0.139)
Year 2010	0.073	(0.129)	0.060	(0.122)	-0.017	(0.120)	-0.105	(0.147)
Year 2011	0.192	(0.151)	0.153	(0.148)	0.092	(0.138)	-0.146	(0.167)
Year 2012	0.095	(0.118)	0.082	(0.118)	0.012	(0.117)	-0.366**	(0.184)
Demographic controls								
Married			-0.222	(0.158)	-0.185	(0.134)	0.112	(0.317)
Children			-0.109	(0.106)	-0.065	(0.105)	-0.218	(0.287)
Male			-0.012	(0.103)	0.006	(0.102)		
Education:								
medium			-0.252**	(0.113)	-0.174*	(0.102)		
high			-0.289***	(0.108)	-0.202**	(0.099)		
Unemployed			0.180	(0.186)	0.189	(0.123)	-0.301**	(0.150)
Retired			0.089	(0.158)	0.081	(0.144)	0.392*	(0.208)
Age:								
15-24			-0.398**	(0.193)	-0.225	(0.173)		
25-34			-0.232	(0.157)	-0.154	(0.148)		
45-54			-0.146	(0.145)	-0.170	(0.149)		
55-64			-0.212	(0.142)	-0.186	(0.150)		
65-74			-0.107	(0.161)	-0.074	(0.172)		
75-84			-0.259	(0.217)	-0.273	(0.215)		
Health controls								
Chronic condition					0.314***	(0.089)	0.656***	(0.169)
Weight:								
Underweight					0.053	(0.201)	-0.578	(0.565)
Overweight					0.124	(0.089)	-0.208**	(0.101)
Obese					0.295*	(0.160)	-0.122	(0.159)
Impeded daily activities:								
hardly					0.139	(0.114)	0.024	(0.169)
a bit					0.349***	(0.110)	0.185	(0.141)
quite a lot					0.463**	(0.191)	0.432*	(0.246)
very much					0.592**	(0.231)	1.150***	(0.319)
Constant	0.771***	(0.081)	1.249***	(0.181)	0.730***	(0.185)		
Number observation	789		789		789		382	
Number persons	550		550		550		143	
Pseudo R^2	0.005		0.029		0.075		–	

* p<0.1, ** p<0.05, *** p<0.01.
Standard errors in parentheses. Standard errors in model 1, 2 and 3 clustered at the individual level. Robust standard errors in model 4.

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