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Privatization, Competition and Primary Health Care Utilization

A study of the Swedish Patient Choice Reform

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Abstract

During the last decades, the issue of increased health care utilization and expenditures in the western world has been a highly debated topic in health economics. One potential explanation to this growth is the increased privatization and competition in the health care sector, which we have seen in many countries in the later years. In this paper, I study the impact of the Swedish Patient Choice Reform which for the first time introduced equal competition for private and public providers in the primary health care sector on health care utilization. To estimate the causal effect of the reform and hence estimate the effect of increased competition and privatization, I exploit the staggered implementation across regions over time in a difference-in-difference framework. The chosen outcome of interest is health care utilization, measured as primary health care visits to doctors and nurses. Additionally, other outcomes of the reform such as public trust, self-reported health, total costs and the doctor density have been investigated. The results of this paper show strong evidence that the Swedish Patient Choice Reform has increased the number of visits in the primary health care and consequently, also the primary health care utilization. Primarily, this increase comes from a surge in doctor visits. Moreover, the reform does not seem to have increased the total cost share of the primary sector and the public trust in the primary care has improved.

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1. Introduction

The last couple of decades as good as all developed countries have experienced a significant increase in health care consumption. (OECD, 2015) There are many theories and concerns regarding this issue but yet no consensus on what the main driving forces are. Earlier research has investigated the effects of an aging population, the spread of insurance, the growth of income, supplier-induced demand, differential productivity growth and the role of technology. When looking at the Swedish health care system in recent decades, one noticeable progress is the increased privatization, and naturally also increased competition. This has occurred mainly in the primary health care sector, which stands for about 20 percent of the total health care sector. Could this development be one additional cause for the increased health care consumption?

In this paper, I study the impact of the Swedish Patient Choice Reform which for the first time introduced equal competition for private and public providers in the primary health care sector on health care utilization. The reform implied equal right of establishment for health care providers and the possibility for all citizens to get listed at any health center they like. Increased freedom of choice and expansion of the primary health care sector were the two main objectives of the reform. The decision to induce the reform was taken on a central level, but as the primary health care in Sweden is provided at a regional level, the reform was established in different regions during a time period of 4 years, from 2007 to 2010.

To estimate the causal effect of the reform, I exploit the staggered implementation across regions over time in a difference-in-difference framework. My estimations are based on regional-level data from Sweden's 21 regions during the time period 2005 to 2012. The specific outcomes of interest are firstly my measure for health care utilization, namely the number of primary health care visits to doctors and nurses. Secondly, I have locked at outcomes that could be used to measure and evaluate the centrally intended aims of the reform. These additional outcomes of interest are thus the public trust, self-reported health, total costs and the doctor density in the primary health care sector.

The results of this paper show strong evidence that the Swedish reform has increased the number of visits in the primary health care and consequently, also the primary health care utilization. Primarily, the increase comes from a surge in doctor visits, whereas the results show that the number of doctor visits has increased with 61 visits per year per 1000 individuals. For nurse visits, no such increase could be observed. The results of this paper could potentially be explained by the fact that Sweden initially had a relatively small share of general practitioners, and that the increased availability led to a desirable increase due to an earlier unmet need. On the other hand, the results could not identify any reform effect on the general practitioner density, which could indicate that the utilization of the existing general practitioners has increased. Moreover, I have observed a significant increase in the trust for the primary health care system, together with results showing that the costs of the primary health care have been unaffected by the reform. These outcomes are positive indicators, supporting that the reform has been effective. On the contrary, the reform has been less efficient in terms of health outcomes, as the results could not show any significant increase in the self-reported health measure. In the heterogeneity analysis, there are no indications that regions with higher average income, better self-reported health or higher population density have driven the increase in PHC visits. Rather the opposite seems more likely, that regions with lower income have increased their health care utilization to a higher extent. Neither is there any significant difference in health care utilization between high and low doctor density regions, hence no signs of physician induced demand can be detected. Finally, my results are generally very similar across the two identification strategies, with and without control variables. The results of the placebo regression support the parallel trend assumption, which confirms that the reform effect can be seen as causal. My paper further contributes to the present literature, both in terms of more updated data, the inclusion of nurse visits and heterogeneity effects between regions.

The outline of this paper is as follows. Section 2 presents the background of the reform and the Swedish primary health care system (which hereafter will be noted as PHC). Thereafter, section 3 includes previous research where firstly

evaluations of the reform in question is presented and secondly general research on health care consumption and increased competition is reported. In section 4 the data and variables chosen are described and motivated. Moreover, section 5 presents the estimation strategy and the difference-in-difference model used. In section 6 all results are presented and in section 7 the robustness checks are described. Finally, a section 8 provides a general discussion of the results and section 9 some concluding remarks.

2. Previous Research

2.1. The Swedish Patient Choice Reform

Another study that investigates the Swedish Patient Choice reform is the paper "Does competition improve quality? Empirical evidence from Swedish primary health care". (Hanspers, 2013) The author explores the impacts of increased privatization and competition on the Swedish PHC quality and looks both at increased privatization in general and at the Patient Choice Reform explicitly. To quantify an estimate for PHC quality, four different measures are used; number of visits to a primary care physician per capita, number of doses of antibiotics prescribed in out-patient care per capita, patient survey experiences and avoidable hospitalizations. Moreover, the author looks at the effect of the Patient Choice Reform in different regions and separates between regions that even before the reform had a capitation system, i.e. that the budget for each provider depended on the number on enrolled patients, to those regions who had budget financing. The hypothesis would be that regions with a capitation system would be less affected by the reform compared to regions with budget financing. The results show that the Patient Choice Reform seems to be associated with more visits to a PHC physician. In regions with initial capitation, the estimate for doctor's visits represents a 2 percent increase in relation to the sample mean, however this increase is not statistically significant. The corresponding effect in regions with budget financing prior to the reform is 6 percent and this estimate is significant on the five percent level. There are several possible extensions and improvement to Hanspers' paper that will be added to my paper. The time horizon examined in Hanspers' is between 1998-2010 and as some regions

implemented the reform in 2010, the effects from these regions cannot have been observed in the estimates. It should also be noted that the estimated effects in Hanspers' paper are average region effects, which leaves out the potential case of heterogeneous treatment effects among different regions. Bearing in mind that one of the potential concerns of introducing competition and capitation is that health care will be unevenly distributed this is an important question, which therefore will be added in this paper. Additionally, I will look at the total number of PHC visits, including both nurse and doctor visits.

The working paper "Effects of Increased Competition on Quality of Primary Care in Sweden" (Dietrichson, Ellegård, & Kjellson, 2016) adds on to the paper of Hanspers and focus on the possible quality improvements due to the increased competition after the reform. Since this paper is more recent, they have been able to better estimate the effects after the implementation. The authors estimate quality of the PHC witch both objective and subjective quality measures. Their objective quality measure is the rate of hospitalizations for Ambulatory Care Sensitive Conditions (ACSC). This rate is closely related to primary care quality, as ACSC is the number of hospitalizations that could be prevented by interventions in primary care. Their subjective quality measure is based on patient surveys. The authors find that that the reform increased the number of health providers where there were many patients per provider before the reform. However, the effects on the quality of the care are modest. They find some improvements for the objective quality measures such as patients overall impression of the PHC, but no significant impacts of competition on the rate of avoidable hospitalizations. As opposed to Hanspers' paper, Dietrichson et al. do not use PHC visits as a quality measure. This motivates the aim of my paper, which is to estimate the effect of increased competition on health care utilization.

To politically evaluate the effects of the Patient Choice Reform several central assessments were conducted the years after the implementation. The report from the Swedish authority for health care analysis (Janlöv, et al., 2013, pp. 59-60) states that the reform has increased the PHC consumption overall. The biggest

part of the surge comes from the increase in doctor visits, which was about 10% between 2006-2011. When it comes to other PHC visits, e.g. nurses, the increase was only 2% during the same period. There are several weaknesses with the results from this report. Firstly, the statistics only show the absolute, total increase in PHC visits from 2006-2011 and the authors have not accounted for the different years of implementation in the different regions. Also, the estimation is done without any specific econometric model. This enables potential bias since the effect of the reform is not isolated and the increase in visits could be observed due to other events and/or trends. Therefore, the estimated increase in PHC visits is not necessary entirely a consequence of the reform. In this paper, another approach is used to estimate the effect of the Patient Choice Reform. The estimation strategy is to observe the impact of the reform in the different regions by looking at the differences between the regions that implemented the reform earlier to those who implemented it later.

In another report conducted by SNS, Studieförbundet Näringsliv och Samhälle (Glenngård Häger, 2015, pp. 14-15), several studies from different Landsting have been summarized to analyze the general results of the Patient Choice Reform. The report states that there has been an overall increase in PHC visits and that all groups of society have experienced this increase. There is no evidence of that some groups have enjoyed an increased consumption pattern at the expense of other groups. On the other hand, the number of visits per person for the overall population has increased more than for groups of people with special health care needs. Another important outcome to investigate is the Patient Choice Reform's cost effectiveness. According to the SNS-report (Glenngård Häger, 2015), the PHC cost share has not increased after the reform, despite that the PHC doctor visits as a share of all doctor visits in the health care system has increased. This could be viewed as a sign that the productivity in the PHC sector has increased as well.

The Swedish Medical Association did also conduct a report after the reform. (Sveriges Läkarförbund, 2014) In accordance with the SNS-report they emphasise the signs of increased productivity in the PHC sector as an important

benefit from the reform. They also see a change in the PHC incidence between different geographical areas. Before the reform, the PHC had a higher prevalence in the northern parts of Sweden and in less populated areas. After the reform, the PHC has expanded more in the bigger cities than in less populated parts of the country, i.e. the effects have been more operative in densely populated areas. (Sveriges Läkarförbund, 2014)

2.2. Health Care Consumption and Increased Competition

Theoretically, there are several potential mechanisms that can cause increased health care consumption as a response to increased privatization and competition. In the paper "More physicians: improved availability or induced demand?" (Carlsen & Grytten, 1998) , the authors look at Norwegian PHC data and discuss potential effects that higher competition, measured as higher physician: population ratio, may have on health care consumption. They focus on two specific effects. Firstly, the availability effect, which implies that improved availability generates lower waiting and travelling costs as well as greater consumer choice, which consequently increases health care utilization. Secondly, there is the so-called supplier-induced demand, which is a phenomenon that arise when there exists information asymmetry between the patient and the physician. When the competition among physicians increase, physicians would possibly have incentives to suggest additional "unnecessary" treatments for their patients, to remain on the same level of work load and maintain their income. Further, the paper aims to estimate which of the effects, the availability or the inducement effect, that is more dominant. To do this, the authors are looking at the relationship between population: physician ratio and per capita health care utilization. The underlying mechanism used to observe which effect that is present, is that supplier-inducement will cause a negative correlation between population: physician ratio and per capita utilization in high physician density areas but not in low physician density areas. The opposite scenario will on the contrary indicate that there is an availability effect present, and there will be a negative relationship between population: physician ratio and per capita utilization in areas with low physician density areas but not in high physician density areas. Moreover, the authors use an instrumental variable approach to

deal with potential bias from the population: physician ratio variable that is assumed to be endogenous. The results indicate that there is no evidence for a supplier-inducement effect in the Norwegian PHC system. Another Norwegian paper that adds on to these results is "Competition and supplier induced demand in a health care system with fixed fees" (Sörensen & Grytten, 1999). They further investigate increased competition induced demand. They examine several potential implications that would indicate that supplier induced demand exists. In resemblance with the other paper, the results show that doctors in high physician density areas did not increase their number of treatments provided to compensate for increased demand. Moreover, the authors found that doctors' revenue and profits declined with increased physician density.

Another way to measure the effect of increased competition on general practitioner's behavior is the number of referrals to speciality and secondary care. Usually, there are political intentions to expand the less costly primary care, to reduce the cost share of the secondary care and use the primary care as a "gate keeper". The paper "Competition, gatekeeping, and health care access" (Godager, Tor, & Ma, 2014) investigates how physicians' referrals of patients to specialty care respond to increased competition in the physician market. The authors use data from a Norwegian survey to test whether competition among general practitioners will lead to more or less referrals to the secondary care. Similarly to the Swedish PHC system, health centers in Norway are paid by both capitation, i.e. a payment from the state depending on how many who are enrolled at the health center, and by co-payment from the patient per visit. The authors predict two opposing effects when the competition increases. Firstly, doctors could become more service minded and concerned about their patients and thereby refer patients to secondary care more often to be sure they are fully examined. Secondly, they could refer patients to secondary care less often and provide patients with their own treatments, to stay on the same work load as competition may reduce the number of patients. Due to the results of the article, competition has negligible or small positive effects on referrals overall. This could be interpreted as a sign that these two effects offset each other to that extent that no effect is detected, or alternatively, the doctors' behavior does not change when

competition increases. In summary, the results do not support the policy claim that increasing the number of primary care physicians relieves pressure from the secondary care.

The results from the articles referred to here do not show any clear evidence that physician behavior have been affected by increased competition. Since these papers are based on the Norwegian PHC, it could be a hint that the results would be similar in Sweden, since both countries have similar health care systems and welfare systems. However, there are also notable differences between the Swedish and the Norwegian PHC system, i.e. that the share of general practitioners are significantly lower in Sweden. This emphasizes the importance of that additional research is being undertaken, covering the Swedish PHC market as well.

3. Background

In 2009, the Swedish parliament accepted the Patient Choice Reform (*Vårdval i primärvården*). The aim of the reform was primarily to increase the availability and freedom of choice for the citizens. The second objective was to strengthen the role of the PHC, to relieve some of the pressure from the secondary care. Sweden has, compared to other European and Scandinavian countries, a relatively low proportion of general practitioners working in the primary care. Of the total body of physicians in Sweden 17% are general practitioners, compared to Denmark with 22%, Finland 34% and Norway 20%. (Janlöv, et al., 2013, pp. 56-59)

The Patient Choice Reform implied freedom of establishment and government funding for all primary care providers that could fulfill the specific requirements. In connection to the reform preparations these specific requirements were agreed on as well. A definition of the primary health care's *elementary obligations* were decided on, which in summary includes: reception activities, standby responsibility, home visits, individual prevention, collaboration with other care providers, service and quality assurance. There are also specific conditions that need to be fulfilled, such as that each provider should have a 'general medicine profile' meaning that approximately half of all doctors and nurses should be specialised in general medicine. All providers do also have a responsibility to

engage in educational activities and accept students to ensure future personnel sustenance. Secondly, the reform made it possible for citizens to select a health center of their own choice, compared to before when people were obliged to accept the one closest to where they lived. Another intention with the reform was to strengthen the position of the individual in relation to their health care provider, and therefore the fees given to each health center depend on how many who chooses to be listed there, a so called capitation system. Moreover, the fees are equal to all providers independent on if they are private or public. (Socialstyrelsen, 2010, pp. 6-15) In 2007, around 25 percent of all PHC providers were private, compared to after the reform in 2016 when more than 40 percent were private. (Carlgren, 2018) In absolute terms, the number of private health centers increased from 288 to 512, with corresponds to a percentage increase of 78 percent. (Glenngård Häger, 2015, p. 40)

PHC is provided by each region but their responsibilities vary slightly, e.g. when it comes to maternity- and child care, rehabilitation services, home nursing and chiropody. (Socialstyrelsen, 2010, p. 12) Sweden consists of 21 regions called regions or Landsting. Gotland is by definition a kommun but is here included in the 21 regions since it has the same health care responsibilities as a Region or Landsting. All regions had to impose the Patient Choice Reform in 2010, January 1st. However, some regions did enforce the reform even earlier and some later than was actually allowed. Table 1 depicts the specific introduction date for each region.

Table 1. Patient Choice Reform Introduction Dates

2007	1/1: Halland
2008	1/1: Stockholm, Västmanland
2009	1/3: Kronoberg
	1/5: Skåne
	1/7: Uppsala
	1/9: Östergötland
	1/10: Västra Götaland
2010	1/1: Blekinge, Gävleborg, Dalarna, Jämtland, Västernorrland, Norrbotten, Örebro, Sörmland, Västerbotten, Kalmar
	23/3: Gotland
	3/5: Värmland
	1/6: Jönköping

(Socialstyrelsen, 2010, p. 11)

4. Data

In this section, all variables and the underlying data will be described and motivated. I have used aggregated data at a regional level from 2005 to 2012. A more detailed description of the data sources for all the variables are found in Appendix 1.

4.1. Dependent variables

The main focus of this paper is to determine if health care utilization has increased as a result of the reform. In order to estimate this potential effect, I have chosen to look at doctor and nurse visits in the PHC, which in this case will be my estimate for PHC utilization. Consequently, three outcome variables have been identified; *doctor visits* per 1000 individuals, *nurse visits* per 1000 individuals and *total visits* per 1000 individuals. The last variable *total visits* is the sum of the doctor and nurse visits. The PHC data on doctor and nurse visits come from Kommun- och Landstingsdatabasen (Kommun- och Landstingsdatabasen, 2017). All data is reported from each of Sweden's 21 regions where the documentation of all PHC visits is based on medical records, which rule out potential bias from self-reporting. The variable for doctor visits represents the dataset "Doctor visits primary care, numbers/1000 individuals"

and the variable for nurse visits corresponds to the data set "Other visits than doctor visits primary care (exclusive of maternity clinics and child health care center), numbers/1000 individuals". The reason for choosing a data set that excludes maternity clinics and child health care center is that these health care services were not included in the Patient Choice Reform in all regions. Other categories of PHC services that look different in several regions are rehabilitation, home nursing and chiropody. Since there was no data available that could separate between these categories of PHC, the data set contains some observations that de facto were unaffected by the reform, such as home nursing visits in regions where this service was not included in the reform. There are also potential observations missing on visits to e.g. maternity clinics in regions where such clinics were included in the reform. However, since this consists of such a small proportion of the total data, this minor measurement error could be overlooked.

In addition to the reform's effect on PHC visits, there are other potential effects that could be of interest to investigate. The main objectives of the reform were, as earlier mentioned, to increase the availability and freedom of choice for the citizens as well as strengthen the role of the PHC. To estimate if the reform has contributed to any improvements in these areas, I have chosen to evaluate the additional outcome variables *trust in the PHC* and *self-reported health*. The variable *trust in the PHC* is measured as the share of the population who has reported that they have high or very high trust in the PHC. Another way to measure the profits of the reform is in terms of health status. Therefore, the variable *self-reported health,* is chosen as an additional outcome of the reform. The health variable is measured as the share of the population who has reported that they view their health condition as "good" or "very good". If my estimation strategy could detect a significant increase in these outcome variables, this would indicate that the reform has had a positive effect on the public's trust in the PHC and health status, which naturally would signal that the reform has been successful. Moreover, the SNS-report (Glenngård Häger, 2015) declares that the reform has not increased the costs of the PHC. In order to control the accuracy of

this statement, I will additionally include the outcome variable *PHC costs,* which is the costs for the PHC (excluding medical products) in SEK per individual for each region. Lastly, the outcome variable *doctor density* is included in the specification. This variable is measured as the number of general practitioners per 100 000 individuals. Since the number of PHC centers has increased after the reform, this could mean that the doctor density has increased as well. The reform effect on doctor density is also of interest in terms of induced demand. Following the theoretical reasoning of Carlsen & Grytten, we could suspect that if health care utilization increases more in high doctor density areas, it could indicate that physician induced demand is present. On the other hand, if health care utilization increases more in low doctor density areas, it could indicate the presence of an availability effect.

4.2. Control Variables

To control for potential confounders, a couple of control variables will be added to the estimation model. Confounders can be described as variables that could affect the dependent variables in such ways that it could be confused with the effect of the forcing variable, which in this case is the Patient Choice Reform. Since I use a difference in difference model with time and region fixed effects, variables and characteristics that are constant over time and between regions will be removed. However, there could still be the case that a specific region could experience some kind of local shock in terms of e.g. income or population characteristics. Therefore, the following control variables will be controlled for; *income, population density*, *unemployment rate* and *demographic working share*. The variable *income* represents the average income from employment, the *population density* variable denotes inhabitants per square meter and the *unemployment rate* variable is calculated for the population between 15-74 years. The variable *demographic working share* is a share where the sum of people between 0-19 years and people older than 65 years is divided with the number of people between 20-64 years. In general terms is can be viewed as a share between the non-working and the working population, so a lower number indicates that relatively more people are in working-age.

5. Estimation Strategy

To analyse the effect of the Patient Choice Reform, the following difference in difference model is used:

$$y_{rt} = \delta Reform_{rt} + \gamma X_{rt} + \alpha_r + \mu_t + \varepsilon_{rt} \quad (1)$$

y_{rt} represents the dependent variable and will correspond to the chosen outcome variables described in the previous section. The subscript r denotes the region and the subscript t denotes the year. δ explains the effect of the reform and is the coefficient of interest. $Reform_{rt}$ is the reform dummy that takes the value 0 the years before the reform was induced and the value 1 from the year the reform was induced, for each region r and year t. X_{rt} is a vector of control variables where γ describes the marginal effect of the control variables. α_r is a set of region fixed effects that captures general differences between the regions, like time constant differences in the regions' PHC system. μ_t is a set of year fixed effects that take the general time trends into account, such as increased spending on health care over time. ε_{rt} is the error term.

Throughout the tables, I report heteroscedasticity-robust standard errors. I also experimented with clustering standard errors at the regional level, but the resulting clustered errors were bigger than the heteroscedasticity-robust standard errors.

6. Results

6.1. Descriptive Statistics

In Table 2, the summary statistics for all variables are described. All variables except *Trust in PHC* and *PHC Costs* have 168 observations since some yearly observations from the region of Gotland were missing for these data series.

Table 2. Summary statistics

	N	Mean	Std. Div.	Min	Max
Dependent Variables					
Doctor visits /1000 ind.	168	1,381.64	183.58	1,042.00	1,997.20
Nurse visits/1000 ind.	168	2,281.50	554.24	1,060.20	3,584.90
Total visits/1000 ind.	168	3,663.14	587.22	2,265.30	5,009.40
Trust in PHC	163	58.80	5.77	49.00	75.00
Doctor Density	168	62.03	7.02	48.26	83.92
PHC Costs	160	3,866.84	608.99	2,615.00	5,657.00
Good Self-Reported Health	168	70.47	2.72	62.00	77.00
Control Variables					
Population density	168	45.18	63.96	2.50	325.90
Average Income, tkr	168	159.35	13.52	126.30	211.10
Demographic Working Share	168	0.74	0.04	0.62	0.80
Unemployment	168	7.67	1.44	4.10	11.00

6.2. Main Results

In Table 3, we see the main results on how the Patient Choice Reform has affected the number of PHC visits to doctor, nurses and in total. For each variable there are two columns, one without and one with the chosen control variables. According to the results, all the three outcome variables appear insensitive to the control variables since the results only show minor increases when these are included.

Table 3. Main Results PHC Visits

	(1) Doctor	(2) Doctor + controls	(3) Nurse	(4) Nurse + controls	(5) Total	(6) Total + controls
Reform	60.52***	60.62***	59.49	60.14	120.0*	120.8**
	(20.74)	(19.96)	(60.01)	(60.15)	(62.90)	(60.65)
Population Density		5.87***		11.03**		16.90***
		(2.11)		(5.06)		(4.81)
Average Income		1.44		5.62		7.05
		(3.56)		(14.63)		(14.57)
Demographic Working Share		644.3		147.3		791.7
		(1,01)		(3,341)		(3,381)
Unemployment		-16.21		-2.631		-18.85
		(9.791)		(35.08)		(35.68)
Observations	168	168	168	168	168	168
R-squared	0.90	0.91	0.86	0.86	0.86	0.87

Region and year fixed effects are included in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The earlier research performed for the evaluation report of the reform indicated that the implementation had a positive effect on PHC visits in general, that doctor visits increased with 10% and that visits to other than doctors increased with 2% from 2006-2011. (Janlöv, et al., 2013) The results from my study are in line with this earlier research, but there are some exceptions.

The doctor visits show the most significant results. When looking at the result where the control variables are added, both the standard error is smaller, and the R-squared value is improved. This result shows that the reform on average did increase the doctor visits per 1000 inhabitants with 60,6 visits. This estimate is significant on the one percent level and is therefore highly reliable. Compared to earlier research, that estimated a total 10% increase in doctor visits between 2006-2011, does my result only indicate a percentage increase of 4,4%, calculating the increase for each region from the year they implemented the reform.

The results of the nurse visits (visits to other than doctors) did show a positive but not significant increase with 59,5 visits on average per 1000 inhabitants. The

percentage increase based on this this increase was then 2,8%, but since the estimate is not significant this increase is not certain.

In total, did the reform increase the PHC visits per 1000 inhabitants with 120,8 visits, which is sum of the increase in doctor and nurse visits. In percentage terms, this represents an increase in total PHC visits with 3,4 percent. The result with control variables shows a smaller standard error and an improved R-squared value, and the result is significant on the 5-percent level. This result suggests that the reform has had a positive effect on the overall PHC utilization.

The only control variable that seems to influence the number of PHC visits in this sample is the population density variable. This is in line with previous evaluations made, showing that the PHC expanded more in bigger cities than in less populated parts of the country, i.e. the effects were more prominent in densely populated areas. (Sveriges Läkarförbund, 2014) As mentioned in the earlier research there is also no evidence that specific groups have enjoyed the benefits of the reform at the expense of others, e.g. that high income earners would increase their health care consumption more than low income earners. This is also in line with my results that show no sign that average income affects number of PHC visits. Unemployment level and demographic sustenance share do not either appear to have any influence on PHC consumption.

6.3. Additional Reform Effects Results

In table 4, the results of the additional reform effect are shown. To evaluate the effect of the reform in other terms than pure health care utilization, these results are of central interest.

Table 4. Results Additional Reform Effects

	(1) Trust in PHC	(2) Trust in PHC + controls	(3) PHC Cost	(4) PHC Cost + controls	(5) Doctor Density	(6) Doctor Density + controls	(7) Self-Reported Health	(8) Self-Reported Health + controls
Reform	2.05***	1.97***	53.11	50.26	-0.09	-0.14	0.10	0.05
	(0.49)	(0.51)	(57.58)	(60.27)	(0.96)	(0.97)	(0.40)	(0.42)
Pop Density		0.13***		0.75		-0.02		0.02
		(0.04)		(4.75)		(0.07)		(0.02)
Average Income		-0.26**		-0.30		0.14		-0.18**
		(0.120)		(13.49)		(0.21)		(0.09)
Demographic Working Share		-42.69		-1,42		-30.21		-7.43
		(37.44)		(2,43)		(47.07)		(23.42)
Unemployment		-0.33		33.80		-0.46		-0.00
		(0.26)		(26.61)		(0.41)		(0.20)
Observations	163	163	160	160	168	168	168	168
R-squared	0.90	0.91	0.94	0.94	0.87	0.87	0.84	0.84

Region and time fixed effects are included in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Due to the results in Table 4, we see that the reform has had a significant positive effect on the trust in the PHC, meaning that the share of the population who has reported that they have a "high" or "very high" trust in the PHC has expanded. This could be viewed as a sign that the population is more content with the PHC after the reform and that the goal of increased availability and freedom of choice for the citizens has been achieved to some extent. When looking at the control variables, population density does appear to have a positive effect on the share of people with high trust in the PHC. Additionally, higher average income seems to affect the trust in PHC negatively, which is an effect that was not seen in Table 3 for the PHC visits. Looking at the health variable, the self-reported health, there is no indication that the reform has had a positive effect on

health. Moreover, the results show no sign of a significant increase in the PHC costs, which also is in line with the earlier research demonstrating that the reform has been cost effective and not increased the cost share of the PHC. This is another indicator showing that the reform has been well implemented. Another objective of reform was to strengthen the roll of the PHC, partly because Sweden has a relatively small PHC sector compared to e.g. the other Scandinavian countries. One indicator of this is that only 17% of the total body of physicians in Sweden are general practitioners, i.e. doctor working in the PHC. (Janlöv, et al., 2013) However, the results in Table 4 do not show any sign that the reform has increased the doctor density, i.e. the share of general practitioners has not changed significantly.

6.4. Heterogeneous Treatment Effects

The estimated results in the previous section represent average treatment effects. In order to examine whether different regions with dissimilar characteristics did respond differently to the reform, this section examines heterogeneous treatment effects looking at certain characteristics in the regions concerned. To detect heterogeneous treatment effects, the following model was used:

$$y_{rt} = \beta_0 + \beta_1 Reform_{rt} + \beta_2 Reform_{rt} X_{rt} + \beta_3 X_{rt} + \varepsilon_{rt} \qquad (2)$$

The expression is similar to the main formula (1) where $Reform_{rt}$ is the reform dummy for region *r* in year *t*. However, the modification in expression (2) is that it includes an interaction term where X_{rt} represents a certain characteristic for region *r* at time *t,* e.g. doctor density. If the region has a doctor density *lower* than the national average at the time *before* the reform was induced, X_{rt} takes the value 1 and the value 0 if higher than the national average. It is of vast importance that the observed characteristic is measured *before* the reform is introduced. If the characteristic instead would be measured *after* the reform was introduced, we end up with the bad control problem since e.g. a change in doctor density also could be an outcome of the reform. Nevertheless, following the procedure described above, we can observe the parameters β_1 and β_2, where β_1 captures the effect of the reform for regions with doctor density above average

and where β_2 captures the additional effect for regions with doctor density below average. β_1 plus β_2 describes the total effect of the reform for regions with doctor density below average.

β_1 and β_2 are consequently the parameters of interest and are thus reported in Table 5 for six different region characteristics. As β_2 measures the differential impact of the reform for the below-average group for characteristic X_{rt}, in comparison to β_1, a statistically significant β_2 would be the main indication that there are heterogeneous treatments effects present. What we can see from the results is that there are several highly significant values indicating that there are heterogeneous treatments effects present in the sample.

Table 5. Heterogenous Treatment Effects

	(1) Doctor	(2) Nurse	(3) PHC Costs	(4) Trust in PHC	(5) Doctor Density	(6) Health
Income						
β_1	30.60	202.90**	118.30*	1.39**	-1.70	0.50
	(24.97)	(81.74)	(62.05)	(0.63)	(1.23)	(0.47)
β_2	57.47**	-273.4***	-130.90**	1.12	2.98**	-0.85**
	(28.46)	(96.40)	(53.87)	(0.83)	(1.15)	(0.40)
R-squared	0.91	0.87	0.95	0.91	0.88	0.85
Population Density						
β_1	85.76***	155.60**	272.00***	2.78***	-0.79	0.49
	(20.82)	(69.06)	(67.79)	(0.75)	(1.16)	(0.46)
β_2	-37.60	-142.80*	-335.60***	-1.22	0.98	-0.65*
	(27.54)	(75.15)	(72.67)	(0.84)	(1.28)	(0.37)
R-squared	0.91	0.86	0.95	0.91	0.87	0.84
Self-Reported Health						
β_1	68.30***	88.82	72.62	2.42***	-0.52	-0.24
	(20.13)	(67.95)	(63.06)	(0.56)	(1.00)	(0.46)
β_2	-20.31	-75.81	-62.38	-1.24*	1.01	0.77**
	(29.03)	(86.25)	(62.97)	(0.68)	(1.16)	(0.38)
R-squared	0.91	0.86	0.94	0.91	0.87	0.85
PHC Costs						
β_1	78.02***	-183.2**	-11.45	0.97	-0.24	0.70
	(23.07)	(77.74)	(71.63)	(0.72)	(1.11)	(0.47)
β_2	-28.25	395.0***	97.62*	1.58**	0.17	-1.05***
	(23.85)	(77.05)	(58.19)	(0.679)	(1.02)	(0.39)
R-squared	0.91	0.89	0.95	0.91	0.87	0.85
Trust in PHC						
β_1	15.72	163.50**	66.20	0.81	0.85	0.27
	(24.94)	(74.93)	(70.59)	(0.72)	(1.18)	(0.47)
β_2	76.44***	-176.00**	-27.33	1.99***	-1.67	-0.38
	(21.64)	(77.86)	(60.37)	(0.74)	(1.02)	(0.41)
R-squared	0.92	0.87	0.94	0.92	0.87	0.84
Doctor Density						
β_1	74.27***	57.79	131.50**	1.96***	-1.06	0.32
	(20.72)	(70.14)	(65.23)	(0.61)	(1.09)	(0.45)
β_2	-26.59	4.58	-167.40***	0.01	1.79*	-0.52
	(20.28)	(77.50)	(56.46)	(0.68)	(0.99)	(0.37)
R-squared	0.91	0.86	0.95	0.91	0.87	0.84
Observations	168	168	160	163	168	168

Region and time fixed effects are included in all specifications

Control variables are included in all specifications

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As described in Section 2, the report from Studieförbundet Näringsliv och Samhälle (Glenngård Häger, 2015), claims there is no evidence that some groups have enjoyed an increased consumption pattern at the expense of other groups. However, they also found that the number of visits per person for the overall population has increased more than for groups of people with special health care needs. As they look at individual data and not on a regional level, this could differ in my study. Having in mind that low income groups empirically are found to have a more elastic demand for health care (Nilsson & Paul, 2018), we could still suspect heterogeneous treatment effects among different income groups, or in this case among regions with different average income. Looking at the results in Table 5, for *Income* in column 1 and 2, doctor visits have increased more in regions with an income below the national average whereas nurse visits have decreased. Notably, β_2 is significant for both doctor and nurse visits. This could be interpreted as that in low income regions, people have exchanged their visits to nurses with doctor visits and also slightly increased these visits. It can also be said that there is no support for the hypothesis that high income regions might have driven the total increase in PHC visits. Continuing looking at column 1 and 2 and the characteristic *self-reported health*, there are no significant effects on PHC visits for regions with self-reported health below average. Hence, there are no indications that regions with better self-reported health have driven the increased health care consumption at the expense of regions with lower self-reported health. To continue on the self-reported health effects, the results in column 6 indicate that regions with income below average have decreased their estimate on self-reported health. Additionally, regions with self-reported health below average have increased their health variable more than regions with a health measure above average before the reform. Even if the results in column 6 reports some significant effects on health outcomes, these coefficients are small and conclusions on health effects should therefore be drawn with caution.

Due to the report from the Swedish Medical Association (Sveriges Läkarförbund, 2014) the PHC has expanded more in the bigger cities than in less populated parts of the country, i.e. the effects have been more operative in densely populated areas. If we compare this to my results, there is no clear indication

that doctor visits have increased more in regions with population density above average. Only for nurse visits, the result indicates that the increase has been bigger in more densely populated areas. However, since the increase in nurse visits turned out to be statistically insignificant, we could still assume that the more densely populated areas have not been driving the health care utilization increase.

When it comes to the results on doctor density, heterogeneous treatment effects on health care utilization among high and low doctor density regions could indicate that physician induced demand is present. The results in Table 5 show that there is a highly significant increase in doctor visits in regions with doctor density above average. However, the β_2 for nurse and doctor visits is not statistically significant, which means that we cannot prove that regions with doctor density below average have increased their PHC visits to a lower extent compared to the regions with doctor density above average. It should also be noted that even if we could detect a strong positive correlation between doctor density and doctor visits[1] in high doctor density regions and a significantly lower correlation in low density regions, it would not be a proof for physician induced demand, but rather a signal that physician induced demand could be present. Naturally, there are other explanations to such a result, e.g. an initial unmet need for health care in low doctor density areas. Nevertheless, the fact that no heterogeneous treatment effects could be proved between high and low doctor density regions, gives us no indications that the reform has caused physician induced demand. Continuing of the doctor density results, column 5 shows that doctor density has increased slightly more in regions with lower doctor density before the reform. This result contradicts the results from the Swedish Medical Association report. However, the estimated effect of β_2 is relatively low and only significant on the 10 percent level. When it comes to the cost effectiveness of the reform, the SNS-report (Glenngård Häger, 2015) claims that the cost share of the PHC has not increased after the reform. As can be seen in column 3, regions with costs above average before the reform, has decreased costs and regions with costs

[1] In Carlsen & Grytten (1998), this is described as a negative relationship between population:physician ratio and health care utilization.

below average has increased costs. This result indicates that the reform may not have been cost effective in all regions and that the unchanged total cost share of the PHC could be due to that the costs have increased in some places and decreased in some regions. Additionally, in column 4 we see that regions with trust below average before the reform have increased their trust more than regions that already had a high trust.

7. Robustness

7.1. Placebo Regression

One of the key assumptions in this difference in difference model is the existence of parallel trends. This means that the outcome variables develop in the same way over time and despite that they may be on different levels they follow a parallel change. To control if this statement is valid in this sample, 2 placebo regressions are run, one where a hypothetical reform is moved 5 years back in time and one where it is placed 4 years before the real reform was induced. A minor manipulation of the introduction dates has been made so that Halland is grouped together with Stockholm and Västmanland. This means that there are three introduction groups in the placebo reform, compared to the real reform introduction scheme where there were four, since Halland introduced the reform alone in 2007 and then the other regions followed in 2008, 2009 and 2010. See Appendix 2 for a full description. I have chosen to only include the main outcome variables with the PHC visits in the placebo regressions. This is firstly because these are my main variables of interest and secondly because the data on the additional reform effects *PHC Costs, Trust in PHC, Self-reported Health* and *Doctor Density* were not dated as long back in time, which did not make it possible do run placebo regressions on these variables.

In Table 6 we can see that none of the hypothetical reform dates has a significant effect and the coefficients are mixed negative and positive. This supports the hypothesis of parallel trends and correspondingly it strengthens the robustness of the main results. The placebo regressions show that significant effects of the real reform are not random and that comparable effects cannot be detected the years before the actual reform was introduced.

Table 6. Placebo Reform

	(1) t-5	(2) t-4
Doctor Visits	-38.96	40.23
	(25.16)	(25.39)
	[0.88]	[0.88]
Nurse Visits	15.11	48.04
	(62.74)	(69.61)
	[0.92]	[0.92]
Total Visits	-23.85	88.27
	(71.14)	(74.21)
	[0.92]	[0.92]
Observations	105	105

Robust standard errors in parentheses
R-squared in square brackets
*** p<0.01, ** p<0.05, * p<0.1

7.2. Control Variables

When performing a difference in difference analysis, control variables are included to control for potential confounders, i.e. variables that affect specific regions differently causing outcomes that can be interpreted as an effect of the treatment examined, in this case the Patient Choice Reform. In the presence of confounding variables, the difference in difference estimates would change if these confounders are controlled for. In Table 3 and 4, we see that our parameters of interest, i.e. the effect of the reform, do not change interpretation or level of significance when the control variables are added. The control variables do only improve the estimates both in terms of error term and R-squared values. This is a positive result, indicating that my estimates are robust.

8. Discussion

In resemblance to the earlier evaluation made for the Patient Choice Reform, I found that the reform has had a positive effect on the health care utilization in the primary health care sector. However, my estimates are not as definite since I only noted a highly significant increase for the doctor visits and not for the nurse visits. According to the evaluation from Vårdanalys (Janlöv, et al., 2013) did the number of doctor visits increase with 10 percent after the reform. Recalculating this increase based on my results saying that the reform has lead to an increase of 60,6 doctor visits per 1000 individuals, the percentage increase is only 4,4

percent. Hence, the earlier estimated effect of the reform is slightly overestimated. Since I have looked at the isolated effect of the reform and not the total increase this is a reasonable result. Nevertheless, the estimated total increase of 120,8 PHC visits per year per 1000 inhabitants is significant on the five percent level, which is good indicator that the reform had a positive effect over all. The percentage increase in total PHC visits based on my estimations is 3,4 percent.

Comparing my results to Hanspers paper from 2013, she estimated an increse in doctor visits of 2 percent for regions with a capitation system before the reform and 6 percent for regions with budget financing before the reform. My result with a total increase of 4,4 percent for all regions is therefore quite in line with this earlier research. My additional contribution and improvement to Hansper's estimations are thus that I have been able to use more updated data and capture the effects for the regions who implemented the reform in 2010, together with estimates of the reform effect on nurse visits as well as heterogenous treatment analysis.

The reason for the highly significant increase in doctor visits could most likely be explained by the fact that Sweden initially had a relatively low level of doctor visits and a low percentage of general practitioners. Thus, the increase may have been much needed due to an earlier unmet need. I suspect that this is a more likely explanation to the increase in doctor visits, rather than the hypothesis of induced demand. In my heterogeneity analysis, I find no significant difference in the reform response on health care utilization in low versus high doctor density regions. Hence, my results find no evidence for physician induced demand. Moreover, the results of the heterogeneity analysis show no indications that regions with higher average income, better self-reported health and higher population density have driven the increase in PHC visits. Rather, the results suggest that regions with lower average income have increased their primary health care visits to a higher extent.

The motive behind the reform was to increase availability and increase the role of the primary care. According to the evaluations made after the implementation,

the reform was regarded as successful due to the fact that there was an estimated increase in total visits, without any increased costs for the primary care. My results showed no sign of increased PHC costs which supports this statement. However, my results did not detect any increase in general physician density. Consequently, the reform has not helped expanding the PHC in these terms and potentially there are other actions needed in order to increase the number of doctors working in the PHC sector. In terms of general health improvements, the results could not show any significant increase in the self-reported health measure. What on the contrary must be seen as a desirable effect of the reform is the increased share of the population who has a high trust in the PHC sector. This could be viewed as a sign that people in general are happy with the reform and appreciate their increased opportunities to choose their own PHC provider.

9. Conclusion

The validity of my results is highly supported by the robustness checks made, which indicates that my results can be viewed as causal. I have extended the earlier research made on the Patient Choice Reform, both in terms of more updated data, the inclusion of nurse visits and heterogeneity effects between regions.

After analysing the Swedish Patient Choice Reform, I found strong evidence for an increase in health care utilization in the PHC sector. These results are in line with earlier research, but I have been able to show that the increase in PHC visits is primarily due to a significant surge in doctor visits. This increase is most likely the consequence of an earlier unmet need of doctor visits, due to Sweden's initially relatively small PHC sector.

Altogether, increased privatization and competition in the PHC sector do most likely have a positive effect on health care utilization. On the contrary, if we look at the bigger picture it is most likely not a major factor of the total increase in health care consumption. At least not when looking at the increased utilization in the Swedish PHC sector, that only stands for 20 percent of the total health care costs.

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Appendix 1. Data Summary				
Variable	**Data Label**	**Description**	**Data Code**	**Source**
Doctor Visits	Läkarbesök primärvård, antal/1000 inv.	Doctor Visits Primary Care, visits/1000 inhabitants	N71807	SKL and SCB, retrieved from Kolada
Nurse Visits	Andra besök än läkarbesök primärvård (exkl mvc/bvc), antal/1000 inv.	Other than Doctor Visits (excl. MVC, BVC), visits/1000 inhabitants	N71810	SKL and SCB, retrieved from Kolada
Demographic Working Share	Demografisk försörjningskvot, län	A share where the sum of people between 0-19 and people older than 65 is divided with the number of people between 20-64.	N60937	SCB, retrieved from Kolada
Self Reported Good Health	Invånare 16-84 år med bra självskattat hälsotillstånd landsting, andel (%)	The share of the population who answered "good" or "very good" at the question "How do you evaluate your general health status?"		Folkhälso-myndigheten
High Trust in the PHC	Invånare med stort förtroende för vården vid vårdcentral, andel (%)	The share of the population who has "high" or "very high" trust in the PHC	U71405	Vårdbarometern, retrieved from Kolada
PHC Costs	Kostnad för primärvård (exkl. läkemedel), kr/inv	Cost for PHC (excl. medical products), SEK/inhabitant	N71000	SCB, retrieved from Kolada
Unemployment	Befolkningen 15-74 år (AKU), procent efter region, arbetskraftstillhörighet, kön och år	Unemployment rate for the population between 15-74 years.		SCB
Income	Sammanräknad förvärvsinkomst, medelinkomst	Average income from employment		SCB
Population Density	Invånare per kvadratkilometer efter region, kön och år	Inhabitant per square kilometer		SCB
Doctor Density	Antal allmänläkare per 100 000 invånare	Number of general practitioners per 100 000 inhabitants.		Nationella planerings-stödets (NPS) register, Socialstyrelsen

Appendix 2. Placebo Reform Introduction Years

Placebo t-5	Placebo t-4	
2003	2004	Halland, Stockholm, Västmanland
2004	2005	Kronoberg, Skåne, Uppsala, Östergötland, Västra Götaland
2005	2006	Blekinge, Gävleborg, Dalarna, Jämtland, Västernorrland, Norrbotten, Örebro, Sörmland, Västerbotten, Kalmar, Gotland, Värmland, Jönköping