Stockholm School of Economics 5350 – Thesis in Economics

DOES INCREASED ACCESS TO PRIMARY CARE REDUCE CONSUMPTION OF SPECIALTY CARE?

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Master Thesis

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Abstract

This study examines the relationship between primary care visits and consumption of inpatient care. There are two hypotheses regarding the impact of primary care on specialty care: the substitution hypothesis and the complementation hypothesis. Using health care data for the population over the age of 65 in Stockholm County, Sweden, this study tests whether primary care has a substitutive effect on inpatient days, cost of inpatient care, emergent inpatient days, emergency room visits, and on avoidable inpatient days. This study also tests whether primary care has a complimentary effect on planned inpatient care. The main findings are that health center visits have a substitutive effect on inpatient days, and that primary care has no complimentary effect on planned inpatient days. The results also indicate that the substitution effect works though the intensive margin rather than the extensive margin, which is consistent with the theory as the substitution hypothesis is thought to be strongest for chronically ill people.

Keywords: Primary Care, Specialty Care, Inpatient Care, Substitution hypothesis, Complementation hypothesis, Incentives for Primary Care Providers

JEL classification: I10, I11, I12, I18, C21, C23

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"I had, naturally, also wished that the considerable expansion made possible by the patient choice reform, with 40 new health centers in just a few years – that is a 25 % increase, that this also had reduced the pressure on the emergency departments, and unfortunately we cannot see that"

Filippa Reinfeldt, County Commissioner of Health Services, Stockholm County

I. INTRODUCTION

Sweden, like many other major developed countries, faces rising health care cost due to changes in the demography and technological progress. The demographical trends mean that the fraction of elderly increases, which increases health care cost. Technological progress is thought to drive up health care cost by making treatments more effectively, which in turn drives demand (Folland, et al., 2013). As shown in figure 1 the fraction of people that is 65 years or older are projected to rise from 19.3% in 2012 to 23.9% in 2040. At the same time the fraction of people between age 20 and 64 are projected to drop from 58.1% to 53.7%[1]. Figure 2 shows that health care cost have risen substantially the last decade. The demographical and technological trends will all else equal, put pressure on the health care system to save costs. One potential source of savings is prevention of expensive specialist care, and here the primary care system should play an important role as the first line of health care most people faces. The literature suggests that a strong primary care system reduces cost compared to a system based on more specialist care (Starfield & Shi, 2002; Starfield, 1994). However there are mixed evidence for whether increased access to primary care would actually decrease consumption of specialty care. For countries such as Sweden, that already has a strong primary care system in place this is a research question that has important implications. If increased access to primary care can reduce consumption of specialty care at a sufficient magnitude society might achieve substantial cost savings. Therefore the purpose of this paper is to investigate whether increased access to primary care, defined as visits per person, have a substitutive effect on the consumption of specialty care in general, and on inpatient care in particular. More specifically the substitution hypothesis of primary care will be tested for the population over the age of 65 in Stockholm County, in the setting of a single payer system with free competition among primary care providers.

The outline of this paper will proceed as follows. In section II a brief description of the Swedish health care system and reforms aiming to increase access to primary care is presented. In section III the theoretical mechanism through which primary care may have either a substitutive or a complementary effect is described. Section IV presents an overview on the literature on this subject. In section V the primary health care in Stockholm County is described. In particular the economic incentives for primary care providers and the implications thereof are discussed. The econometrical strategy is outlined in section VI. Section VII presents the results, and Section VIII discusses the robustness of these. Finally some suggestions for future research are presented in section IX along with the policy implications.

[1] Source: Projections from Statistics Sweden (SCB)

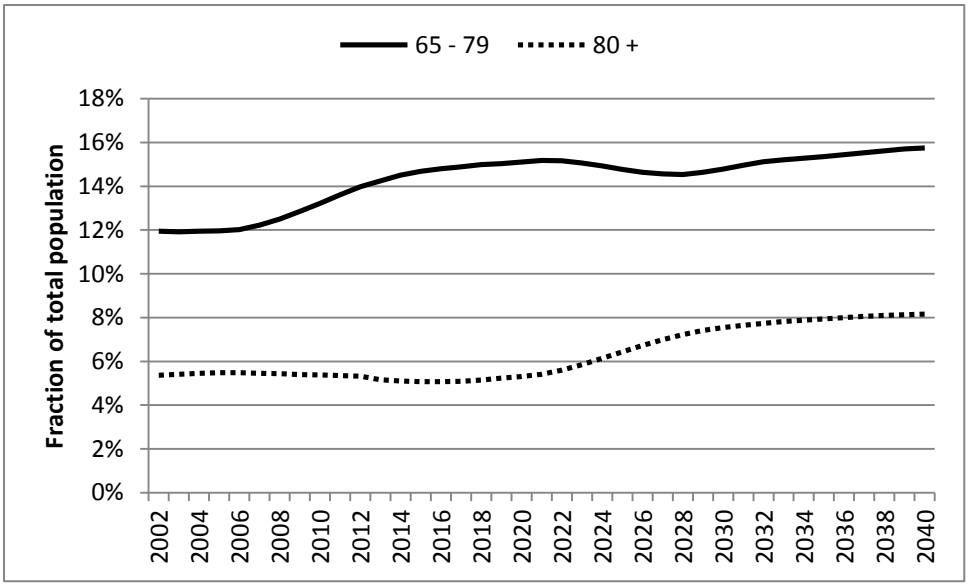

Figure 1: Fraction of the total Swedish population that is elderly. The figure shows projections from 2013 and forward. Source: Statistics Sweden (SCB)

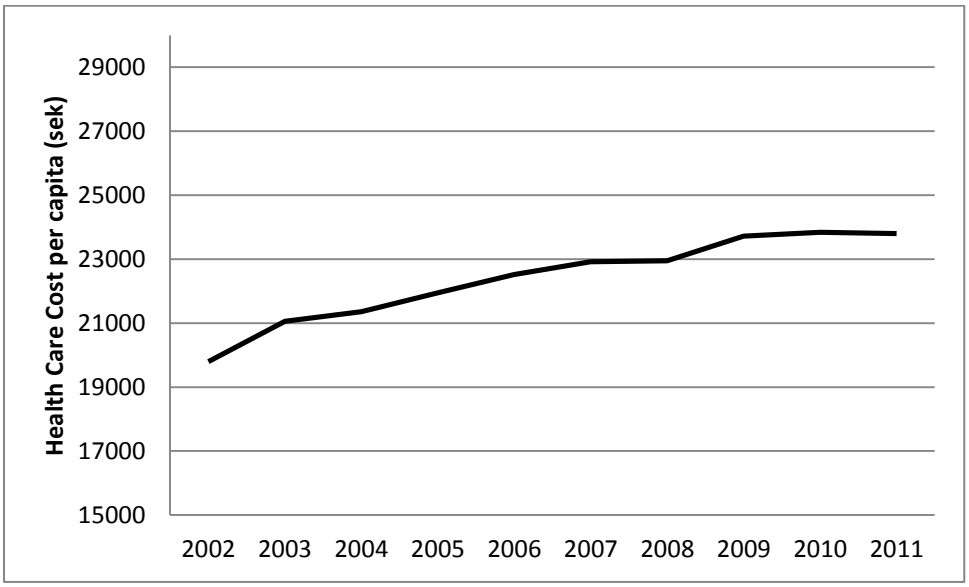

Figure 2: Total health care cost per capita In Sweden. Adjusted for inflation (base year 2011). Data from the Municipality and County Database (Kolada).

II. BACKGROUND – HEALTH CARE IN SWEDEN

Health care in Sweden is organized and funded by two levels of local government. The 21 counties are responsible for all inpatient and most outpatient care, including primary health care. The 290 municipalities are responsible for elderly care, and health care provided by nurses within the framework of elderly care. Health care in Sweden can be divided into two main types: primary care which is defined as health care provided by a General Practitioner (GP), and specialty care which is provided by a specialist. These two types of health care can then be divided into two types of health care: Inpatient care where the patient stays overnight, and outpatient care where the patient does not stay overnight[2].

Table I	**Primary care**	**Specialty care**
Outpatient care	Family doctor/health center, basic home care, maternal care, rehabilitation by non-specialist etc.	Any specialty care inside or outside a hospital that requires no overnight stay, including visits to the emergency rooms that is not followed by hospitalization.
Inpatient care	Overnight stays at local health centers (mostly occurring in rural areas of Sweden)	Any specialty care that requires the patient to stay at the hospital overnight

In the literature as well as in the public debate primary care is often understood to mean primary outpatient care. In particular, primary care is usually defined as the health care provided by family doctors and local health centers. It is in this strictest sense I henceforth will use the term primary care. Since primary inpatient care does not occur at all in Stockholm County I will refer to specialized inpatient care simply as inpatient care.

The primary health care system in Sweden and Stockholm County has undergone large changes towards more patient choice. Before 2007-2010 health centers were typically run by the counties, and where private health centers existed they typically had separate agreements with the counties. In 2009 the Swedish parliament passed a law that required the counties to adopt a system of patient choice in primary care no later than 2010. The basic principles of the law are that patients are allowed to choose their own primary care provider, and that any new primary care provider that meets some requirements is allowed to compete for patients on equal terms. The counties have to compensate private health centers in the same way they compensate county-run health centers, but other than that the counties are free to design their own patient

[2] Source: The County Associations (Landstingsförbundets) publication "Nationella termer med Definitioner och Regelverk inom hälso- och sjukvårdsstatistiken"

choice system and adopt different set of rules for how health centers are compensated. Some counties, including Stockholm County in 2008, introduced their own system of patient choice already before they were required to do so by law.

The focus in Stockholm County was to "strengthen the position of the patient" by increasing the accessibility of the primary health care, and to encourage "diversity" among health care providers[3]. In order to achieve this Stockholm County adopted a compensation scheme were 60% of the compensation per patient were based on the number of visits, in stark contrast to most other counties in Sweden and Stockholm County before 2008, were most of the compensation were in the form of capitation. I will provide a more detailed description of the compensation scheme for the primary care in Stockholm County in section V.

If accessibility is measured as the number of visits to health centers the reform seems to have been quite successful[4]. Figure 3 shows that the number of visits has increased in Stockholm and that the increase is higher than in the Kingdom as a whole. As figure 4 shows the cost for primary care has also been under control since the introduction of the reform in 2008.

The increased access to primary health care were expected to relief the specialty care, but as figure 3 shows there is no clear trend in this direction. This seems inconsistent with the hypothesis that increased access to primary care decrease consumption of specialty care. There are however multiple reasons for why the consumption of specialty care may have increased such as an aging population and technological progress, so simply comparing the consumption of specialty care before and after the reform is not sufficient for drawing any conclusion about whether increased access to primary care decreases consumption of specialty care. Furthermore, as will be explained in section III, primary care might have a preventive effect on certain types of specialty care, while having a complementary effect on other types of specialty care.

[3] For description of the purpose and expectations of the reform see County Councils Suggestion 2007:03 (Förslag 2007:03)

[4] This interpretation of the term access is not obvious. Access can also be thought of in terms of for example waiting times, physical distance to a health center, or opening hours. Increased access to primary care should however all else equal increase the number of visits. Furthermore this is how access has been defined by Stockholm County (see the County Councils Suggestion 2007:03) and in line with how the term generally has been used in the public debate.

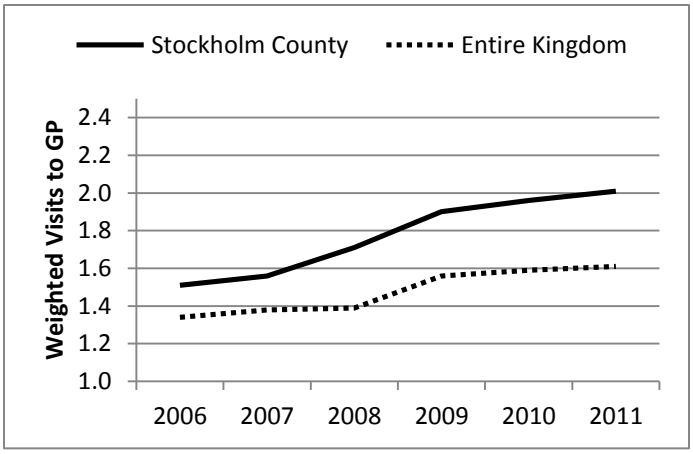

Figure 3: Weighted visits to GP per person and year. Weights: homevisits = 2, health center = 1, phone contact = 1/3, non-doctor visit = 0.4. Data from the Municipality and County Database (Kolada).

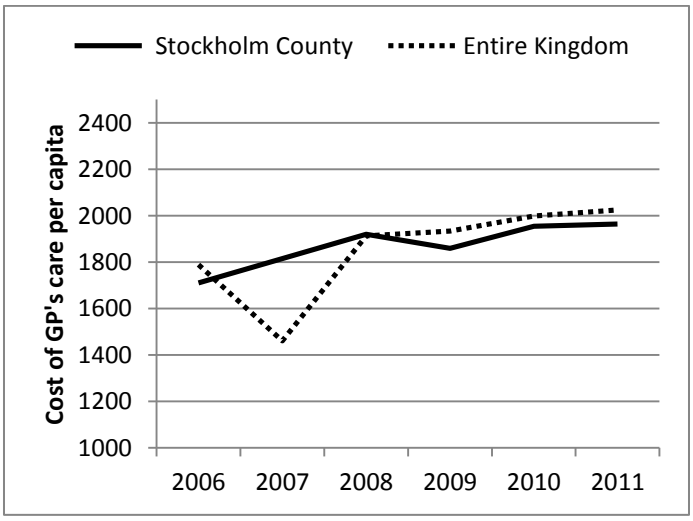

Figure 4: Cost of GP's Care per person, adjusted for inflation in the health care sector (Base year 2011). Data from the Municipality and County Database (Kolada) and Statistics Sweden (SCB).

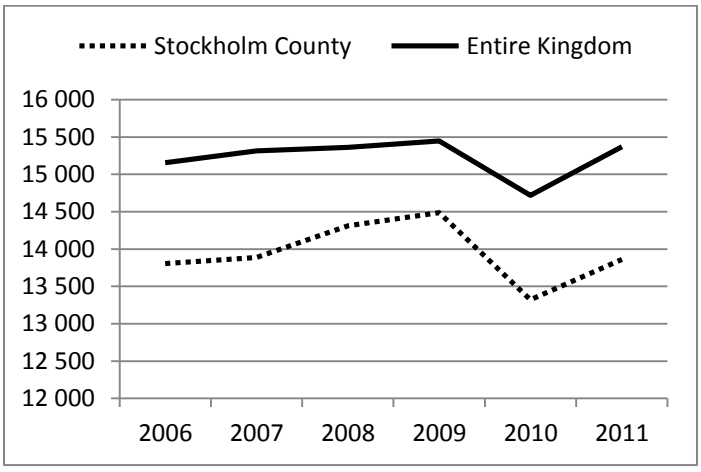

Figure 5: Visits to somatic specialty care per 100 000 persons. Data from the Municipality and County Database (Kolada)

III. PRIMARY CARE IN THEORY

There are two hypotheses regarding the impact of primary care on specialty care: the substitution hypothesis and the complementation hypothesis.

There are several theoretical reasons why primary care should have a substitutive effect on specialty care. The first mechanism is that primary care through prevention and early detection of illnesses that can be treated in the primary care setting can avert the need for specialty outpatient care and inpatient care (Starfield, 1994; Fortney, et al., 2005). This substitution mechanism is likely to have both long term and short term effects. Prevention of hospitalization for asthma by early treatment of exacerbations is an example of the former, and prevention of stroke by treatment of hypertension is an example of the latter (Fortney, et al., 2005). The second mechanism is the prevention or delay of the need for specialty care by the management of chronic health conditions. An example is control of blood sugar to avert kidney failure in patients with diabetes mellitus (Starfield, 1994; Fortney, et al., 2005). This substitution mechanism is likely stronger for patients with chronic illness and worse health status, although it only applies to disorders that can be handled effectively in the primary care setting (Fortney, et al., 2005). The third substitution mechanism is gatekeeping, which means that visits to specialty care requires a referral from the primary care provider. If the primary care receives financial incentives to keep referral rates down, this should reduce visits to specialty care (Fortney, et al., 2005). Gatekeeping might be an important factor for why health care systems with a strong primary care level that requires referrals for specialty care visits, have lower utilization of specialty care than health care systems with a weaker primary care that does not require referrals for specialty care. It is however hard to see why the presence of gatekeeping would give rise to a substitutive effect between primary care and specialty care in a system that already requires referrals for specialty care.

There are also several theoretical reasons why primary care could be complimentary to specialty care. The first complimentary mechanism is the utilization of specialty services that are truly complimentary to primary care such as diagnostic laboratory tests (Fortney, et al., 2005). The second complimentary mechanism is the detection of illness that cannot be treated in the primary care settings. An example is the detection of cancer (Fortney, et al., 2005). This mechanism is likely more important for patients who have not seen a doctor for a long time and hence have a greater number of undetected illnesses. The third complimentary effect is the identification of acute episodes of chronic disorders that the primary care provider believes

requires specialty treatment. This mechanism is mostly relevant for disorders with symptoms that fluctuate in severity over time. An example is the identification of major depressive disorder (Fortney, et al., 2005).

There is no theoretical reason why the substitution hypothesis would be more important than the complimentary or for why the opposite would be true. Rather, this in an empirical question. It is important to point out that the substitution hypothesis and the complimentary hypothesis is not two competing hypothesis, they could both be true at the same time. They also make predictions regarding different types of specialized care. The substitution hypothesis predicts that better access to primary care have negative effect on specialty care for disorders that can be effectively treated in the primary care setting. The complimentary hypothesis predicts that primary care visits have a positive effect on planned visits for disorders that cannot be treated in the primary care setting. Hence it is possible to test not only the total effect from substitution and complementation but also whether there is support for each one of the hypothesis.

IV. PREVIOUS LITERATURE

Previous studies that examined the relationship between primary and specialty care have mainly used three methods. First and closest to the experimental ideal, there are experimental or quasi-experimental studies were a certain treatment, like free access to primary care, is provided to a treatment group, and no treatment is given to a control group. Secondly there is cross sectional OLS, with either aggregated data or individual level data. Thirdly one study perform 2sls, using distance to health center as an instrument for primary care access.

Weinberger et al. (1996) and his colleagues conducted an experimental study at nine Veterans Affair Medical Centers (VA's) in the U.S. Veterans were eligible for the study if they had a diagnosis of diabetes mellitus, chronic obstructive pulmonary disease, or congestive heart failures, but were excluded if they were already receiving continuous primary care, if they resided in a nursing home, or if they were hospitalized due to cancer. The veterans were randomly assigned to either a control group or an intervention group, in which case they received continuous care from a team of primary care physicians and nurses. The study found that patients in the intervention group had significantly higher utilization of hospital care measured as re-hospitalizations, although they were more satisfied with their care than the control group. Results from the RAND Health Insurance Experiment, in which participants were randomly assigned to receive different health benefits, are similar. One group of participants received free outpatient care, while another group faced a $ 150 dollar deductible fee. The group with free outpatient care had a non-significant higher number of hospital admissions (Phelps, 1992).

These results are however contradicted by a quasi-experimental study by Rubenstein et al. (1996). This study evaluated the impact of the reorganization of a Veterans Affairs Medical Center towards more primary care. By surveying the patients before and after the reform, they found that the reform which increased access to primary care also had a negative significant effect on both inpatient and outpatient specialty care. A Dutch study investigate whether a reform of the GP's payment system that, amongst many other changes created incentives to hire primary care nurses, affected the hospital referral rates for patients with diabetes. The study found that having a primary care nurse significantly reduced the hospital referral rate, when comorbidity and socio-economic factors were controlled for (Van Dijk, et al., 2010).

Evidence from studies using OLS is also mixed. Bindman et al. (1995) computed primary care access and hospital utilization for 250 zip code clusters in California, using both survey data and hospital discharge data. They found that for people with five chronic health conditions access to

primary health care had a significant negative effect on hospital utilization, even when the prevalence of conditions and physicians practice style as well as socio economic factors were controlled for. Another study, conducted by Falik et al. (2001), used data of Medicaid claims for almost 50 000 patients in five different states and compared patients who received more than 50 % of their outpatient care from Federally Qualified Health Centers (FQHC) to patients who received most of their outpatient care from other sources. FQHC's provide preventive and primary care to low income people. The study found that the group that had a regular primary care provider in a FQHC had significantly lower hospitalization rates. Gill and Mainus (1998) studied the relationship between primary care continuity and hospitalizations, using Medicaid data from Delaware. They found that a higher continuity was significantly negatively correlated with hospitalization rates for any conditions, when demographical factors were controlled for. These results are contradicted by several studies. Ricketts et al. (2001) used aggregated data for small areas in North Carolina. They found that primary care access, when income was controlled for, had no effect on hospitalization rates. Petersen et al. (1998) studied the effect of having a regular doctor on non-urgent emergency visits. Patients at five hospitals in the northeastern U.S that had chest pain, abdominal pain, or asthma were studied. Data about having regular doctor and socio-economic factors were obtained from a survey, while hospital data were obtained from medical records. When socio-economic factors and morbidity were controlled for there was no significant relationship between having a regular doctor and the number of non-urgent emergency visits.

A cross country comparison is in a broader sense consistent with the substitution hypothesis. Starfield and Shy (2002) compared the health care system in 13 OECD-countries. The primary care system in each country was ranked according to its strength, and each country was given a Primary care score. The primary care score took into account accessibility, continuity and community orientation as well as the ratio of generalists to specialists and cost sharing of primary care. A simple correlation analysis showed that a high primary care score was associated with lower total health expenditures. A more comprehensive study, by Starfield et al. (2009), points in the same direction. This study used individual level data obtained from insurance claim records. The main findings were that: patients that visited many different specialists had higher total cost; patients that visited many different generalists had higher total cost, and that patients who visited many different generalists visited many different specialist. Morbidity, and number of primary care visits was controlled for in all cases. These results suggest that having a regular contact with a general practitioner rather than seeking care from many different specialists reduces overall costs. Indeed this is consistent with the gatekeeping hypothesis. Although these two studies make a strong case for a strong system of primary care, rather than use of specialists, they do not answer the question of whether increased access to

primary care in a system that already has a strong primary care system with a gatekeeping function can substitute specialty care.

A weakness with all studies that use OLS to estimate the relationship between primary and specialty care is that they suffers from an obvious omitted variable bias. People with worse health status tend to consume more primary as well as specialty care, and health status can only be imperfectly controlled for by. Morbidity, defined as a set of diagnosis, age and smoking habits are common variables used to estimate health status, but they may not capture all of the variation in health status. Hence there may be a positive bias in OLS estimates, making it harder to find support for the substitution hypothesis. A possible solution to the omitted variable bias is to use instrumental variable regression (TSLS) instead of OLS. There is, to the best of my knowledge, only one paper that uses TSLS to address the question of substitution between primary and specialty care. This is a paper by Fortney et al. (2005) where data for veterans using VA health services was used. As an instrument they used Euclidian distance to health center – reasoning that the costs associated with a visit to a health center increases with distance and hence that people living far away from a health center should do fewer visits. Indeed, distance to health center was significantly negatively correlated with health center. The result from the TSLS estimate suggested that primary care visits was significantly negative associated with specialty medical encounters, but had no effect on inpatient costs. A major weakness in this study was however that distance to health center was a weak instrument, making the TSLS estimate biased in the direction of the OLS estimate.

As we just have seen, the literature reports contradictory findings. Moreover most studies are conducted on American data, and results from these studies are not obviously generalizable to a single payer system that already has a rather extensive system of primary care, such as the Swedish. Furthermore, the preventive effect of primary care may depend on the incentives under which the primary care provider operates. There is a rich literature suggesting that physician indeed do respond to financial incentives. One example is that physicians provides more services when they are compensated under a fee for service scheme than when they are given capitation, a fixed payment per patient (Quast, et al., 2008). Another example is that patients whose physician has an incentive to control costs are more likely to be admitted to lower priced hospitals, all else equal (Ho & Pakes, 2011). Additionally there is empirical support for the hypothesis that physicians who fail to meet a certain target income adjust their practice prices and qualities (Rizzo & Zeckhauser, 2003). These examples highlight the importance to understand the economic incentives under which primary care providers operates.

Within the field of health economics a very frequent issue related to how physicians respond to incentives is Supplier Induced Demand (SID). The idea behind supplier induced demand is that health care providers can use their information advantage to increase demand for health services to a level above that a fully informed patient would prefer, in order to increase their profits. A basic model of supplier induced demand assumes that the physician derives utility from income and leisure, and disutility from inducing demand. Assuming that the marginal disutility of inducements increases with the quantity of inducement, and that marginal utility of leisure decreases with the quantity of leisure, physicians with low incomes would be more tempted to induce demand than physicians with high income – all else equal. The evidence for supplier induced demand is mixed. The most common way to test the SID hypothesis is to examine the effect of the physician to population ratio on health care consumption – the idea being that a higher physician density increases competition which in turn decreases profits for physicians, which they counter by inducing demand for health services. The empirical evidence for SID is mixed, while studies on aggregated data have found a positive relationship between physician density and health care consumption, studies on micro data show conflicting results (Sørensen & Grytten, 1999)

While examining whether SID exists in the primary care market in itself is interesting, the purpose of this paper is to examine the effect of more primary care consumption on specialty consumption in a publicly funded health care system, regardless of whether the extra primary care consumption is induced or not. From the perspective of a social planner that cares about health outcomes and costs, what should matter is the effect of more primary care visits – not who initiated the visits. If we accept the premise that society should maximize health outcomes, it does not matter if suppliers induce demand for a service that an individual with perfect information would have preferred not to buy, as long as society's valuation of the marginal health benefit exceeds the cost for the service.

Supplier induced demand may however impact the average effect primary care visits have on specialty care. If primary care providers induce visits that are not worth their cost in terms of health benefits, the average effect of primary care visits on specialty care will be lower. The Swedish Health care system, as most other single payer system, is characterized by rationing. In a system with rationing the scope for supplier induced demand should be limited, provided that the rationing is strict enough. Hence, potentially increasing access to primary care might have a stronger effect on specialty Care in a single payer system with rationing such as the Swedish, than in a system without rationing.

V. PRIMARY CARE IN STOCKHOLM COUNTY

As mentioned before there are two basic characteristics of the primary health care system in Stockholm County. Firstly market entry is relatively free, subject only to authorization from the County. Secondly inhabitants in the county are free to enlist at any health center within the county. Health centers are allowed to refuse enlisting people who already are enlisted at another health center, if they consider their list to be full. They must however provide a waiting list for those wishing to enlist. Health centers are not allowed to refuse unlisted patients, regardless of whether their list is full or not. These restrictions are important since they prevent cream-skimming, i.e. that health centers only enlist patients with good health status. There are no restrictions on how many patients a health center may enlist.

Table II: Primary care Compensation and patient fees

Capitation (Yearly)	
0-5 years	734
6 - 64 years	616
65+	1588
Extra Capitation for patients with home care	3000
Compensation per visit (including patient fees)	
Physician	479
- extra for home visit	500
Nurse	200
- extra for home visit	50
Nurse Assistant	100
- extra for home visit	50
Phone recipe	80
Patient fees	
Physician	200
Other profession	100
Home care visits	Free
Fee celling	1100

Table III: Compensation celling (Yearly)

	Full compensation	33% reduction in compensation	Only patients fees
Physician visits per enlisted patient	< 1.9	>= 1.9 , < 4	>= 4
Nurse visits per enlisted patient (Home care visits not counted)	<0.7	>=0.7,< 0.9	>= 0.9
Visits within home care made by Nurse and assistant nurse	< 6	>= 6	

The basic features of the compensation to primary care health centers are descried in Table II and Table III and IV[5]. The health center receives an age-dependent capitation, for each patient enlisting at the health center. But most of the compensation to the health center is in the form of pay per visit, as described in Table II. As table III describes there is a compensation celling, which is related to the number of visits per enlisted patient. Patients who are deemed to be in need of long-term home care are registered as home care patients, and the health care centers receive an extra capitation for these patients. The health center is responsible for assessing the need for home care and registering patients as

[5] As of Jan 2011. The compensation scheme was slightly revised in Jan 2013. For an exact description of the compensation system in place 2011 and 2012 see the county's rule book for primary care providers: "Regelbok för husläkarveksamhet med basal hemsjukvård 2011"

home care patients. Apart from capitation and pay per visit the health centers are compensated for some specific actions, such as pharmaceutical reviews and visits by asylum seekers. There is also a performance based compensation scheme for health centers, briefly described in table IV, but the maximum bonus/fee is only 2% of the total payment to a health center. Most of the goals are related to specific actions or processes, and none are related to the inpatient care consumption of the enlisted patients. As seen in table IV health centers are partly compensated based on the coverage ratio. Furthermore health centers have full or shared cost responsibility for a set of specialty outpatient care services, creating some incentives for gate keeping.

TABLE IV

Goals for the performance-based compensation
Percentage of diabetes patients registered in the National Diabetes Register
Percentage of patients with identified unhealthy habits that has been offered an action
Percentage of different patient groups where BMI has been registered
Percentage of patients 75 + that has been offered a health talk
Various ratios and adherence to regulations for safe drug prescriptions
Coverage ratio (Percentage of all physican visits at health center for enlisted patients/All physican outpatient visit for the enlisted patients)
Percentage of telephone calls answered within approved time

There are some important theoretical implications from this incentive structure. First, consider the number of physician visits per enlisted patient at a health center. Estimates of the production costs of a physician visit in Stockholm County are to best of my knowledge not available, but there are some estimates from Dalarna County[6]. These estimates put the production cost for a 25 minutes long visit in the range 800 – 1100 SEK. Hence the compensation tied to a physician visit, does not cover the production cost for a typical physician visit. Let's consider a health center with a listed population above age 65 that only provides physician visits. Assume that all health centers have the same production cost for a visit, and that health centers compete in quantity of visits. A health center would then supply visits to meet demand as long as the average profit per visit is above or equal to zero. The zero profit condition implies that:

[6] See the report" Patientrelaterad redovisning av verksamhet och kostnader (KPP) inom primärvård" from the National Board of Health and Welfare (Socialstyrelsen)

$$Capitation + \ Mean_n(MR_n) * n - \ MC * n = 0$$

$$where: n = the\ number\ of\ \ visits\ per\ patient, and\ MR_n = \begin{cases} 479\ if\ n < 1.9 \\ 316\ if\ 1.9\ \leq n\ < 4 \\ 200\ if\ 4\ \leq n \end{cases}$$

As long as the demand for visits is below the level implied by the zero profit condition, health center will produce the demanded number of visits and make a positive profit. If however the demand for visit is higher than the level implied by the zero profit condition, health centers will simply supply the number of visits given by the zero profit condition and make zero profit. Hence, assuming a cost per visit of about 800, a health center would supply 4 visits per enlisted patient per year as long as the demand for visits is higher than 4. Now, consider two local health markets, were the population in one of the market area has poorer socio economic status and higher morbidity. As long as the demand for visits is above 4, health centers in both markets will supply 4 visits. The deprived area deprived areas' higher demand for visits will hence not be accommodated. However, the deprived areas' higher demand can at least partly be accommodated by home care visits, as physicians in the deprived area can register a larger fraction of the population as home market patients. Hence one would expect that morbidity and socio economic status home care visits in different areas are more strongly correlated with home care visits than with ordinary visits.

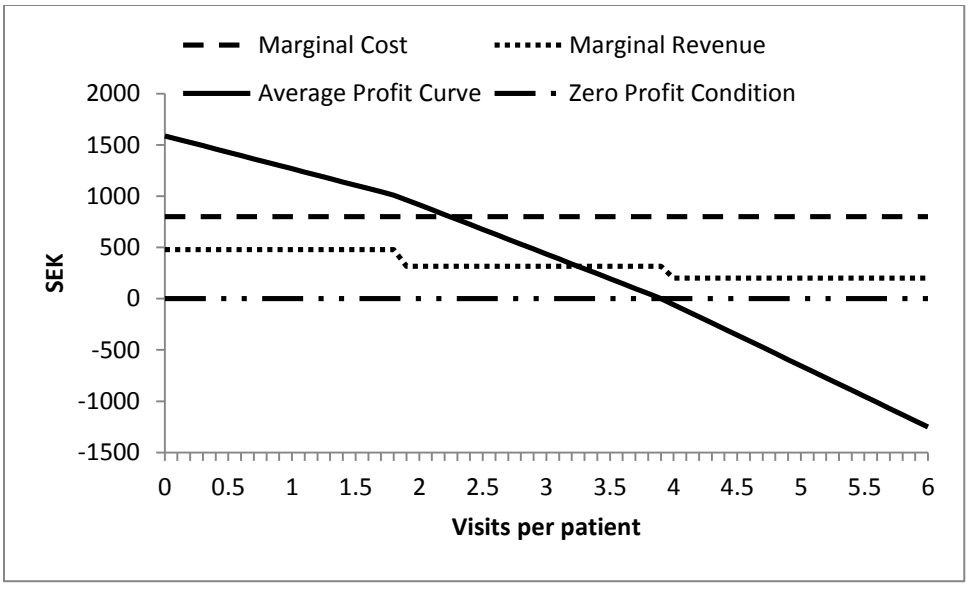

Figure 6: The Zero profit condition implies that the Average profit per visit = 0

Secondly, there are no direct incentives for a health center to focus on treatments that prevent inpatient care, over other types of visits. Thirdly, there are strong incentives to increase productivity. A health center that can decrease the cost of a physician visit can increase its supply of visits and hence its market share. Furthermore, as the pay per visit is unrelated to the length of the visit, health centers have an incentive to provide shorter visits. Fourthly, health centers have incentives to accommodate demand for visits from relatively healthy individuals as long, as they demand less than 4 visits per year, on the expense on sicker patients who demand more than 4 visits per year. To see this, consider a benevolent health center who wishes to maximize the health of its patients. Ideally, the health center would like to distribute visits to where the marginal productivity of a health visit is highest. However, a healthy patient who demand say 3 visits will still be a net profit to a health center. Hence, given the choice between accommodating the healthy patients demand for 3 visits or lose the patient to another health center, a benevolent health center will choose the former and use the net profit to supply visits to patients with more need – even if the marginal productivity of a visit to a more unhealthy individual is higher than that to our healthy individual. In contrast a patient who consumes more than 4 visits per year is a net cost, and the health center has therefore no incentive to try to keep the patient listed by providing more visits than the health center deems optimal. This conclusion does however not hold for patients with home care.

A survey of Unit Directors for Health Centers in Stockholm County is consistent with the picture of the effects of the compensation system outlined above. As Figure 7 shows most directors agree to the statement that the compensation scheme favors short visit, and few thinks that the compensation system encourages the health centers to focus on patients with high care need or to act preventive.

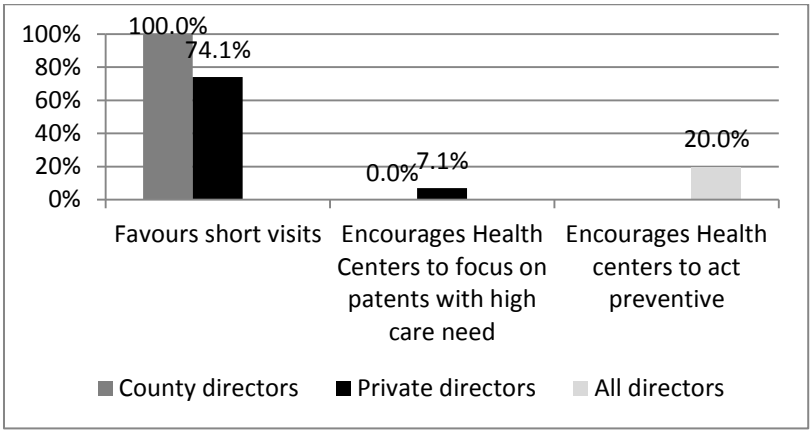

Figure 7: The percentage of Health Center Directors In Stockholm County (2012) that agrees with statements about the primary care compensation scheme. Source: SALAR (SKL)[7]

[7] See the report ”Vårdval i Jämförelse – Jämförelse av uppdrag, ersättningsprinciper och kostnadsansvar”

Let´s go back to the research question of this paper; whether primary care consumption has a substitutive effect on specialty care consumption. I have shown that the incentive structure encourages health centers to do short visits, so it is possible that the increase in the number of visits was achieved by making more and shorter visits instead of fewer and longer visits. I have also shown that there are incentives to accommodate unnecessary visits to healthy individuals. This inefficiency might counteract the substitution effect. The fact that there are no incentives to try to prevent inpatient care might also counteract the substitution effect

VI. EMPIRCAL STRATEGY

As mentioned in section II, the substitution and complementation hypothesis can be tested separately. First, however, I test the total effect of primary care on specialty care by formulating the following two hypothesizes:

H1: More primary care visits decreases total consumption of inpatient days

H2: More primary care visits decreases the total cost of inpatient care

In order to test the substitution hypothesis I want to focus on subsets of specialty care that from a theoretical standpoint are more likely to be prevented by primary care, and less likely to be complimentary to primary care. I have identified three subsets of specialty care that fulfill these criteria's. The first type is all emergent inpatient care. As we have seen before primary care is thought to have a preventive impact through early detection or monitoring of chronic health conditions. This should reduce the probability that a certain health condition cause an emergent need for specialty care. Furthermore, there are no theoretical reasons for why more primary care should cause more unplanned inpatient care – if a new condition is discovered it would result in planned inpatient care. For similar reasons emergency room visits is the second kind of care used to test the substitution hypothesis[8]. Additionally it is possible that greater access to primary care in form of for example shorter waiting time, decreases the need to visit an emergency room for lesser serious conditions. The third type of specialty care I use to test the substitution hypothesis is *avoidable inpatient care*. *Avoidable inpatient care* is a list of a set of inpatient diagnosis that, if treated properly in the primary care level should not have caused any need of inpatient care at all. The list of diagnosis is based on medical expertise and is provided by The National Board of Health and Welfare (Socialstyrelsen)[9]. Hence I specify the following three hypotheses to test the substitution hypothesis:

H3: More primary care visits decreases consumption of emergent inpatient days

H4: More primary care visits decreases the number of emergency room visits

H5: More primary care visits decreases consumption of avoidable inpatient days

[8] Not all emergency room visits are formally specialty care, since the classification depends on the specialty of the physician. Here I will anyway treat all emergency room visits as specialty care, as they occur at a hospital and if the condition is serious enough will turn into inpatient care.
[9] See the report "Beskrivning av indikatorer" from the National Board of Health and Welfare (Socialistyrelsen).

Since primary care is thought to be complimentary through the discovery of new conditions that has to be treated by specialty care, which should increase planned inpatient care visits, I specify the following hypothesis to test the complementation hypothesis:

H6: More primary care visits increases consumption of planned inpatient days

In order to test these hypotheses I estimate equations of the following type:

$$Specialty\ Care_k = \beta_0 + \beta_1 Primary\ Care_k + \beta_x \boldsymbol{X} + \beta_y \boldsymbol{Y} + \varepsilon$$

where k is the cohort , X is a vector of socioeconomic and demographical variables, Y is a vector of variables controlling for morbidity, Specialty Care is any of the different types of specialty care measurement specified above, and Primary Care is a measurement of primary care consumption. The socio-economic and demographical variables in the vector X are; Income for people over the age of 65 in the municipality, Fraction of people born abroad in the municipality, Fraction of women in the cohort, and age group of the cohort. The variables in the vector Y are the share of the population in the cohort that has a certain set of diagnosis that is considered to be an indication of heavy care need. There are 8 such diagnosis groups; Cancer, Stroke, Joint disease, Osteoarthritis, Heart failure, Hip fracture, Other psychoses, and Schizophrenia. The list of diagnosis indicating heavy care need is defined by a State Public Inquiry (SOU 2003:88) and is used by the Swedish government to distribute funds to different counties according to the health conditions of the populations in the different counties. During the period Jan 2011 – Sep 2012 13.7% of all individuals above the age of 65 in Stockholm County had at least one heavy care need diagnosis, and this group consumed 59.9% of all inpatient days in for individuals older than 65 in the county, and were responsible for 58% of the total cost of inpatient care for individuals older than 65 in the county. The measurement of specialty care is expressed as specialty consumption per 1000 inhabitants and month. There are two types of primary care that is used to test the different hypothesis. Firstly, the number of visits to health centers per 1000 inhabitants and month. Secondly, the number of home visits done by the health center or any other provider by home care per 1000 inhabitants and month. Together these two subsets make up what is henceforth referred to as primary care. When counting the number of visits I have included both visits to a physician and visits to a nurse. Phone contacts or recipes were not included. Apart from the number of visits, I also test if the fraction of a cohort that has visited primary care has an effect on specialty care consumption. This is important as primary care might have an effect on specialty care either on the extensive or on the intensive margin. An increase in access to primary care on the intensive margin would mean more visits to those who already have visited the primary care, and an increase in access to primary care on the extensive margin would mean that a larger fraction of the population visit primary care. Since the

substitutive effect likely is stronger for chronically ill people, the substitution effect is likely stronger on the intensive margin. The complimentary hypothesis is likely stronger on the extensive margin as it is thought to be stronger for patients that rarely visit a physician. For a complete list of all dependent and independent variables and their exact definitions see tables 1 and 19 in the appendix respectively.

Controlling for socio economic and demographical variable, as well as for the heavy care need variables might not be sufficient to get rid of the omitted variable bias caused by health status. There are many potential omitted variables that can be thought to affect health status and hence both primary and specialty care consumption, including smoking habits, eating habits, exercise etc. It is of vital importance to think of the direction of the bias here, the presence of differences in health status not controlled for gives rise to a positive bias between primary and specialty care, as more sick people consume more of both kinds of care. With regard to my hypothesis concerning the substitutive effect it means that a negative significant coefficient for β_1 would be a strong indication in favor of the substitution hypothesis. A positive significant effect would however be harder to interpret, as it could be either a complimentary effect or the presence of omitted variable bias that gives rise to such a result.

One way to try to single out the omitted variable bias from the substitutive effect is by applying a panel data approach with lagged coefficients for primary care. The reasoning here is that health status varies over time, and that a period with more illness will cause more of both primary and specialty care visits. If this is the case there would be a positive correlation between specialty care and primary care in period t. As we have seen in the theoretical discussion primary care is thought to have a long term substitutive effect, so it might be possible to find evidence for the substitution hypothesis by testing if the lagged effect of primary care on specialty care is negative. Hence the following types of equations are estimated:

$$Specialty\ Care_{k,t} = \beta_0 + \beta_{1,t} Primary\ Care_{k,t} + \ldots + \beta_{1,t-i} Primary\ Care_{k,t-i} + \beta_x \boldsymbol{X} + \beta_y \boldsymbol{Y} + \alpha_k + \lambda_t + \varepsilon$$

where t is the month, i is the number of lags, α_k is the entity fixed effect, and λ_t is the time fixed effect.

Medical data were obtained from Stockholm County (The VAL-database). The medical data consists of two datasets, one for inpatient care and one for outpatient care. These data sets consist of all health care events for everyone above the age of 65 in Stockholm County during the period Jan 2011 – Sep 2012. These data sets are based on electronic medical records, and contains information about the type of visit, number of days hospitalized, cost, and diagnosis for

the inpatient data. For a full list of the variables in the two data sets, see Table 18 in the appendix. The data set also contains a decrypted id number. Unfortunately the decryption keys used in the two data sets were different, and hence it has not been possible to match individuals directly between the data sets. Both datasets however contains information about which five-year age group the patient belonged to at the time of the visit. There is also information about which municipality or city district (if within Stockholm municipality) the patient lived at the time of the visit. Hence it was possible to match groups of individuals into cohorts, depending on their age and place of living. The matching was done according to the following principle: In each dataset, each individual were allocated to one age cohort, according to the age group they were in the first time they occurred in the data set. Similarly, individuals were allocated to one municipality/district group corresponding to the location where they lived the first time they occurred in the data set. Since there were very few individuals in the oldest age groups everyone above the age of 90 was merged into a single group, leaving me with 6 different age groups. The data were then aggregated in two different ways. First the data for each age group in a certain municipality/district, henceforth simply referred to as cohort, was aggregated for the entire period. Secondly data for each cohort was aggregated for each month. The different cohorts could then be matched with population and socioeconomic data, from Statistics Sweden, and Statistics Stockholm. There were 38 municipalities/districts, leaving me with 228 cohorts in total[10]. For a full list of all the variables used in the regressions see Table 1 in the appendix.

Since emergency room visits are classified as outpatient care, *H4* can be tested using individual level data. For this purpose the outpatient data was aggregated both to the individual level, and the individual per month level. Table V summarizes the different data sets used to test my hypothesis.

TABLE V

Data aggregated as:	**One observation is**	**Testing Hypothesis:**
Cohort level: Cross section	One cohort (n= 228)	*H1-H6*
Cohort level: Panel data	One cohort one month (n = 4,788)	*H1-H6*
Individual level: Cross section	One individual (n = 313,111)	*H4*
Individual level: Panel data	One individual one month (n = 6,573,231)	*H4*

There are some econometrical issues that deserve special attention. First, since the unit of analysis is cohorts, a standard OLS procedure would imply giving an improper weight to small cohorts, which may increase the standard error substantially and give outliers an improper

[10] All data from Norrtälje municipality were dropped. The reason for this is that Norrtälje has its own primary care system, and does not fully report primary care data to the county's medical records.

influence over the parameter estimates. For this reason I use Weighted least Square (WLS). As the data for the cohorts are averages for groups of individuals, I have used the number of individuals in each cohort as weights. The population figures used are from the end of 2010. Secondly, it is reasonable to assume that standard errors are serially correlated for a given entity, and hence I have used standard errors clustered on the municipalities/districts. Thirdly, since in some specification I estimate a large number of coefficients for primary care it is of vital importance to test the joint hypothesis that all coefficients are equal to zero in order to avoid type I errors. Fourthly, many of the dependent variables are likely to suffer from (imperfect) multicollinearity, which likely will increase standard errors. The presence of multicollinearity should induce carefulness when interpreting individual coefficients, such as the coefficient for a particular set of diagnosis.

The most pressing econometrical concern is however that of causation. While my econometrical specifications using WLS and OLS are designed to test whether the substitution hypothesis are consistent with the data, the coefficients for primary care can hardly be interpreted as the true causal effect of primary care on specialty care due to the potential presence of omitted variable bias from health status.

VII. RESULTS

H1: More primary care visits decreases total consumption of inpatient days.

As seen in Table 2 the coefficient for Primary care visits are not significant. When separating between health center visits and home visits and including all covariates (specification 7) the coefficient for health center visits is negative and statistically significant, and the coefficients for health center visits and home visits are jointly significant. In specification 8 we see that the coefficients for the percentage that has visited health center/had home visits are jointly significant, and that the coefficient for the percentage that has had home visits is positive and significant. Hence specification 8 is the preferred one, and here we see that the coefficient for health center visits is negative and statistically significant. The effect of health center visits is also economically significant; one extra health center visit would lead to a reduction of inpatient days with about 0.18. This suggests that *H1* is true - health center visits reduce consumption of inpatient days. The strong and positive coefficient for the percentage that has had home visits is not surprising given that the decision to provide home care to a patient is made by doctors after assessment of the patient's health status and need for home care. Hence, this could not be interpreted as evidence for the complimentary hypothesis. Table 3 shows the result from the panel data regressions. In specification 5 the coefficients for health center visits and home visits are not jointly significant, but, as seen in specification 6, both the coefficients for health center and home visits, and the percentage that visited a health center or had a home visit is jointly significant. In specification 6 the 3 period lagged coefficient is negative and significant, and has the same magnitude as the coefficient for health center visits in the cross section results. This suggests that health center visits have a preventive effect on inpatient days on a three months horizon. The fact that the coefficient for the percentage that had home visit in period t has strong significant effect on inpatient days in period t is again not surprising for the reason explained above. More surprising is perhaps that the coefficient for the percentage that visited health center period t-3 is significant and positive. This could mean either that health care visits have a complimentary effect on the extensive margin, or simply that periods with much sickness result in that a large fraction of a cohort visit health centers in that period and more inpatient days three periods later. The fact that I have not been able to control for cohort specific variation in health status over time, suggest that there might still be a substantial bias from health status and hence that the most cautions interpretation is the latter. To sum up, the result from these regressions suggest that health center visits have a substitutive effect on inpatient days on the intensive margin, but not on the extensive margin.

H2: More primary care visits decreases the total cost of inpatient care

Table 4 presents the result for the cross section analysis. When including all the covariates (specifications 3-4 & 7 -8) none of the coefficients for primary care are significant. The panel data yields similar results, as seen in Table 5. The coefficients for home and health center visits are jointly insignificant, and while the coefficients for the percentage that has visited health center or has had home visit is jointly significant, only the coefficient for the percentage that has home visit in period t is significant and positive. Overall there is no evidence in favor of *H2*.

H3: More primary care visits decreases consumption of emergent inpatient days

Looking at the cross section results seen in table 6 there are no evidence in favor of a substitutive effect. All the coefficients for primary care are insignificant when including all the covariates. The panel data results, shown in table 7, do not change that conclusion, some of the coefficients for the percentage that visited health center are significant, but have a positive sign. As discussed in section VI it is hard to see why more health center visits would lead to more emergent inpatient care, so a reasonable interpretation is that the positive correlations is caused by bias from health status.

H4: More primary care visits decreases the number of emergency room visits

The cross section results, seen in table 8, gives no support for the substitution hypothesis, as none of the coefficients for primary care is significant. The conclusion does not change when looking at the panel data results in table 9. Here some of the coefficients for primary care are significant, but they are a positive. The picture changes when looking at the individual level results. The cross section results when including all primary care variables (specification 3, table 10), shows that the effect of making at least one health center or home visit is positive, but also that the effect of making additional visits are negative. When including all the primary care variables in the individual panel data setting (table 11) an interesting time pattern appear. While health center visits in period t is positive and significant, health center visits in period t – 1 & t-2 are negative and significant. The same pattern goes for the coefficients for whether the individual has had home visit; the coefficient for period t is positive and the coefficients for period's t-4 – t-4 is negative and significant. This is consistent with the reasoning in section IV. The positive intra-temporal correlation could reflect that worse health status increase both primary care visits and emergency room visits the same period, and the negative inter-temporal correlation could reflect the fact that primary care have a long term preventive effect. However, in economic terms the negative inter-temporal correlation is extremely small, while the positive intra-temporal is substantial. Potentially though, the negative effect is underestimated since I

have not been able to include a proper set of control variables such as morbidity and socio-economic factors but merely controlled for municipality fixed effect, time fixed effects, and age group dummies[11].

H5: More primary care visits decreases consumption of avoidable inpatient days

Table 12 shows the result from the cross section data. The coefficients for primary care are all insignificant when including all the covariates. It is however worth noticing that the coefficient for health center visits have the right sign and are rather big in economic terms, a health center visit would decrease avoidable inpatient days with about 0.8. The panel data result in table 13 gives some support to the substitution hypothesis. The coefficients for health center and home visits are jointly significant, while the coefficients for the percentage that visited health center or had home visit are not jointly significant. Specification 5 is thus to prefer over specification 6. In specification 5, the coefficient for health center visits period t-2 is negative and significant. In economic terms the effect is however negligible, one would need to supply an extra 20 health center visits in order to prevent one avoidable inpatient day.

H6: More primary care visits increases consumption of planned inpatient days

As seen in Table 14 and 15 there are no evidence for the complementation hypothesis. None of the coefficients for primary care are significant when including all the covariates. As the bias most likely goes in the positive direction, this indicates that primary care does not have a complementary effect on planned inpatient days.

The most striking finding is that health center visit has a negative effect on inpatient days. Given this negative and significant relationship between health center visits and inpatient days it is a bit surprising that health center visits does not have a negative significant effect on emergent inpatient days, and only a small negative effect on avoidable inpatient days - In Section VI I hypothesized that the substitutive effect would be strongest for avoidable and emergent inpatient days. Another important finding is that more inpatient days do not have a complimentary effect on inpatient days. A possible explanation for the above mentioned results is that health center visits improves peoples health status, and that the improved health status decrease consumption of both planned and emergent inpatient days albeit not enough to produce significant results when testing the effect on planned and emergent inpatient days separately. The fact that health center visits have an effect on the intensive margin rather than

[11] The attentive reader will have noticed that the reason for the lack of controls for morbidity is that all diagnosis data available to me is that from the inpatient data set, while the data about emergency care and primary care are from the outpatient data set, and that these data sets cannot be matched on an individual level.

the extensive margin is consistent with the theory, in section III I stated that the substitutive effect is likely strongest for chronically ill people.

In many specifications the percentage of a cohort that has visited a health center has a positive significant effect on inpatient days. This could either simply be a result of remaining omitted variable bias from health status, but it could also indicate that primary care has a complimentary effect on the extensive margin. Such interpretation would not be inconsistent with the theory, as the complimentary effect is thought to be largest for people who rarely visit a doctor. The complimentary hypothesis is however severely weakened by the fact that primary care does not have any effect on planned inpatient days, neither on the extensive nor on the intensive margin.

VIII. ROBUSTNES OF THE RESULTS

I have already discussed the threat to internal validity posed by not fully controlling for health status. However I find a negative relationship between health centers visit and inpatient days, and between health center visits and avoidable inpatient days, which goes in the opposite direction of the bias. But there might be other potential omitted variable biases that explain the negative relationship between primary and inpatient care. In particular one might think that the level of care obtained from the municipality (i.e. retirement homes and assistant living) could explain the negative relationship. Elderly people living in a retirement home might obtain a substantial amount of care at the retirement home, hence reducing the need of primary care. For a given health status, living in a retirement home might also decrease the need of inpatient care. Potential mechanisms here could be better nutrition, monitoring of medication and lesser risk of falling. However, as seen in table 16 controlling for the fraction of the cohort who lives in retirement homes, and the number of doctor visits in retirement homes does not change the results that health center visits have a negative effect on inpatient days, and both the coefficients for the fraction living in retirement homes and the number of doctors visit in retirement homes are insignificant. Hence the negative relationship between health center visits and inpatient days cannot be explained by differences in the degree of care obtained from the municipalities. There are of course other potentially omitted variables that could cause bias. For example health awareness might be correlated with making many visits to a health center, but also with living a more healthy life which could reduce the need of inpatient cares. Health aware people could for example have better nutrition, and do more exercise, while also visiting a health center more often for a given health status. I would however argue that this explanation is unlikely, because controlling for income and municipality fixed effect (in the panel setting) should reduce most of this bias. This is because health awareness is likely to correlate strongly with income, and municipality fixed effects control for everything that is fixed within a municipality and affect inpatient days.

A problematic issue regarding the data is that the age variable contained in the data set is achieved age, rather than year of birth. Any individual that during the period 2011-01 to 2012-09 has achieved the age of 65, and made at least one inpatient or outpatient visit, will hence be included in the dataset. Note here what happens to an individual turning 65 in say mars 2012, and who make two visits to health centers; one in February 2012 and one in April 2012. Only the April visit will be included in the dataset. Hence the number of individuals that occur in the age group 65-69 will increase over time. As I have used population figures from the end of 2010 I will hence underestimate the number of individuals in this particular cohort. This affects the denominator in both the measurement of primary and specialist for the cohorts of age 65 - 69

care and hence not the estimated relationship between primary and specialist care. However the coefficients for the age dummies will be affected as the measurements of specialty care are overestimated for the age group 65 – 69. Furthermore the weighting of observations in the WLS estimations is based on the population figures from the end of 2010, giving an improper low weight to cohorts with age 65 – 69. To test whether this affect the results, I would ideally have used population figures from Sep 2012, but such data were not available for all districts. Instead, I use the total number of visitors to outpatient care as a proxy for the number of individuals in the cohorts. It turns out that fully 98.4 % of the individuals of age 70 and older has made at least one outpatient visit during the period[12]. Hence the number of individuals that has visited outpatient care might be used as a proxy for the number of individuals in each age group. Re-estimating the different specifications using outpatient visitors as population figures yields very similar result. Table 17 shows that the coefficients for the effect of health center visits on inpatient days are very similar to that in table 2 were population data from end 2010 has been used.

One advantage of this study is that it utilizes data from everyone above 65 in Stockholm County. With respect to this population there is hence no sample section bias. The results from this paper cannot however be generalized to the entire population in Stockholm County. As discussed in the theoretical section the substitution effect is likely stronger for chronically ill people, and elderly people are disproportionally chronically ill. Neither can the results be directly generalized to other elderly in other counties within Sweden. There two main reasons for this. First, the number of visits to general practitioner is already substantially higher in Stockholm County than in other counties and the marginal effect may be different at other levels of visits per capita. Secondly, I have argued that the incentives matter for the health centers distribution and supply of care. In a county with stronger incentives to focus on the chronically ill or less incentives to produce many short visits, the effect of a visit may be substantially higher than in Stockholm County.

[12] This number might seem surprisingly high, but is partly due to the fact that every single phone contact is registered as an outpatient health event.

IX. DISCUSSION

This paper has two main findings:

1. Health center visits have a substitutive effect on the consumption of inpatient days, and on avoidable inpatient days.
2. Primary care has no complimentary effect on planned inpatient days.

In the introduction we saw that consumption of specialty care has not gone done, despite an almost 30 % increase in the number of visits to general physicians. It is however not impossible to reconcile this fact with finding 1. As this paper has shown, the substitutive effect works through the intensive margin. If the increase in primary care access in Stockholm County largely occurred at the extensive margin this could explain why specialty care consumption has not decreased. Furthermore any decrease in inpatient days due to improved primary care access could at least partly have been offset by changes in other factors, such as an aging population or supply related factors.

The main limitation of this study is that I am unable to estimate the true causal effect of primary care on inpatient days, as the extent of the bias is unknown. There are however possibilities for future research to receive estimates far closer to the true causal effect than this study has provided, given that sufficient data is available. I see two main research strategies to get more reliable estimates. The first strategy would involve instrument variable regressions using distance to health center as an instrument for the number of visits to health centers. This would require more detailed data, utilizing information about which "base area" (that is a group of neighborhoods), the individual lives in, that are available in Stockholm County's data system[13]. If distance to health center has a significant and strong effect on health centers, it could then be used as an instrument and hence solving the omitted variable bias problem. The second approach would utilize the fact that Norrtälje Municipality, which has its own primary care system, did not introduce a patient choice system in 2008, but waited to 2010. A difference in difference estimator could therefore be used, comparing the difference in the trend between individuals in Norrtälje and the rest of the County. Given that the assumption of a common trend before the reform is met, a difference in difference estimation could be interpreted as the true causal effect.

If setting the econometrical issues aside and assuming that the estimated coefficient for visits to health center can be interpret as a causal effect, there are some policy implications. First, health center has an effect on the intensive rather than the extensive margin. This implies that health

[13] At the onset of this thesis the Author hoped to receive such data for two municipalities.

centers should focus on the sickest patients, rather than on providing visits to people with higher health status. This is however not how the current incentives encourage health centers to behave. As described in section IV health centers have incentives to accommodate demand from perfectly healthy individuals, as long as they demand fewer visits than is implied by the zero profit condition. A very simple solution to this problem would be to differentiate the capitation according to health status, so that health centers would receive a higher capitation for people with certain care heavy diagnosis or other factors that are more care demanding. Indeed such a differentiated system is used in many other counties in Sweden. Secondly, applying the substitution effect estimates for health center on cost data for 2011 implies that cost savings can be achieved by expanding access to health center further. Assuming that the cost of the average inpatient day that is prevented by primary care is equal to the median of the cost for an inpatient day, and given that the estimated coefficient for the effect of health center visits on inpatient day (-0.18), a health center visit would on average save 1516 SEK in inpatient cost. This is well above the estimates for the production cost of a health center visit. The magnitude of the potential savings are however not enormous, a 10 % increase in the number of health centers visits for seniors would a lead to 94 million SEK in yearly net savings (that is a mere 45 SEK per inhabitant in Stockholm county), given a production cost of a health visit of 1000 SEK and again assuming that the average cost of a prevented inpatient day is equal to the median cost of an inpatient day. Of course, a larger increase in the supply of health visits, would achieve larger savings, but it is likely the case that the marginal saving decreases as the supply of health center visits increase.

TABLE VI: SOME COST DATA

Cost Estimates (2011)	
Physician visit (health center)	800 – 1100[14]
Inpatient day (mean)	13275
Inpatient day (median)	8920
Avoidable Inpatient day (mean)	11256
Avoidable Inpatient day (median)	7593
Quantities (age 65+, 2011)	
Inpatient days	882659
Avoidable Inpatient days	117677
Health center visits	1552379

As this paper is not fully able to control for health status, the estimated effect of health center visits on inpatient days might be underestimated. If this is the case, the potential savings might

[14] See the report ”Patientrelaterad redovisning av verksamhet och kostnader (KPP) inom primärvård” from The National Board of Health and Welfare and SKL.

be larger. As described in the institutional discussion in section V, the incentives for primary care providers does not encourage health centers to act preventive. If primary care providers were given stronger incentives to act preventive, the substitution effect might become stronger. This would also increase the potential cost savings that could be achieved by increasing access to primary care. Furthermore, improved access to primary care might also prevent or delay the need to move to a retirement home, and may in general have beneficial effects on peoples' health status. So even though the estimated cost savings are limited, they provide a good argument for further research to try to establish the true causal effect along the lines outlined above. Estimating the true magnitude of the substitution between primary and specialty care is not only an academic question of interest, it's also has the potential to achieve cost savings, while simultaneously improving the quality of life for senior citizens.

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APPENDIX

TABLE 1. VARIABELS AND DEFINITIONS

Variable	Definition
Primary care visits	Number of visits to health center and home visits per 1000 inhabitants and month
% has done primary care visit	Percentage of the cohort that has visited a health center or has had a home visit (during the entire period in the cross section setting, and during month t in the panel data setting)
Health center visits	Number of visits to health center per 1000 inhabitants and month
Home visits	Number of home visits per 1000 inhabitants and month
% has visited health center	Percentage of the cohort that has visited a health center (during the entire period in the cross section setting, and during month t in the panel data setting)
% has had home visit	Percentage of the cohort that has had a home visit (during the entire period in the cross section setting, and during month t in the panel data setting)
% Women	Percentage women in the cohort
Income, thousand SEK	Income for the population 95 and above in the district
% born abroad	Percentage of the population in the district born abroad
Age 70-74	Dummy, 1 if in this age group, else 0
Age 75-79	Dummy, 1 if in this age group, else 0
Age 80-84	Dummy, 1 if in this age group, else 0
Age 85-89	Dummy, 1 if in this age group, else 0
Age 90 +	Dummy, 1 if in this age group, else 0
% with Cancer	Percentage of the cohort that during the time span of this study was diagnosed with malignant tumor (cancer)
% with Stroke	Percentage of the cohort that during the time span of this study was diagnosed with stroke
% with Joint disease	Percentage of the cohort that during the time span of this study was diagnosed with inflammatory joint disease
% with Osteoarthritis	Percentage of the cohort that during the time span of this study was diagnosed with osteoarthritis
% with Heart failure	Percentage of the cohort that during the time span of this study was diagnosed with heart failure
% Hip fracture	Percentage of the cohort that during the time span of this study was diagnosed with hip fracture
% Other Psychoses	Percentage of the cohort that during the time span of this study was diagnosed with any other psychoses than Schizophrenia
% Schizophrenia	Percentage of the cohort that during the time span of this study was diagnosed with Schizophrenia
% In Retirement Home	Percentage of the cohort that lives in a Retirement Home
Physician visits in Ret. Home	Number of Physician visits in Retirement Home per 1000 inhabitants and month
Inpatient days	Number of inpatient days per 1000 inhabitants and month
Cost	Cost of inpatient days per 1000 inhabitants and month

Emergent Inpatient days	Number of Emergent inpatient days per 1000 inhabitants and month
Emergency room visits	Number of Emergency room visits per 1000 inhabitants and month
Avoidable Inpatient days	Number of Avoidable Inpatient days per 1000 inhabitants and month
Planned Inpatient days	Number of Planned inpatient days per 1000 inhabitants and month

Note: For the data analyzes using individual level data visits are simply defined as visit per person.

TABLE 2: TESTING H1 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days
Primary care visits	0.244**	0.0379*	0.0240	0.0238				
	(0.0145)	(0.0182)	(0.0147)	(0.0145)				
% has done primary care visit				0.488				
				(0.596)				
Health center visits					-0.0362	-0.128	-0.138*	-0.177**
					(0.0454)	(0.0642)	(0.0567)	(0.0577)
Home visits					0.261**	0.0395*	0.0259	0.0171
					(0.0162)	(0.0182)	(0.0151)	(0.0142)
% has visited health center								0.706
								(0.596)
% has had home visit								3.354**
								(0.744)
% Women		2.707*	3.653**	3.833**		1.962	2.886**	2.000
		(1.010)	(0.854)	(0.898)		(1.046)	(0.989)	(1.060)
Income, thousand SEK		-0.336**	-0.210**	-0.205**		-0.331**	-0.209**	-0.177**
		(0.0972)	(0.0704)	(0.0753)		(0.0721)	(0.0491)	(0.0569)
% born abroad		0.609*	0.415	0.405		0.592*	0.412	0.279
		(0.239)	(0.217)	(0.210)		(0.269)	(0.240)	(0.192)
Age 70-74		29.94**	-0.522	7.441		39.45**	9.191	3.623
		(4.296)	(6.939)	(13.10)		(4.501)	(6.767)	(14.67)
Age 75-79		88.35**	14.21	21.98		114.5**	40.33*	34.16
		(9.086)	(14.95)	(18.17)		(11.44)	(16.64)	(21.99)
Age 80-84		158.3**	34.83	42.88		194.9**	72.27*	43.80
		(19.89)	(27.39)	(29.76)		(21.27)	(27.83)	(34.05)
Age 85-89		266.9**	82.41*	92.17*		293.9**	111.8**	53.23
		(21.85)	(35.03)	(37.98)		(22.31)	(32.75)	(45.21)
Age 90 +		373.4**	91.43	106.3*		372.7**	96.86*	33.11
		(24.04)	(46.33)	(51.12)		(22.28)	(40.07)	(49.81)
% with Cancer			9.876**	9.731**			9.506*	8.386*
			(3.472)	(3.434)			(3.616)	(3.504)
% with Stroke			6.311	6.221			7.114*	6.592*
			(3.280)	(3.278)			(3.292)	(3.085)
% with Joint disease			5.242	5.010			7.797	-1.149
			(9.398)	(9.371)			(9.297)	(9.010)
% with Osteoarthritis			12.58**	11.61**			12.39**	7.576
			(3.778)	(3.876)			(3.835)	(3.804)
% with Heart failure			14.61**	14.58**			14.01**	14.25**
			(3.468)	(3.478)			(3.238)	(3.179)
% Hip fracture			12.18**	12.22**			11.37**	10.51**
			(3.701)	(3.667)			(3.698)	(3.355)
% Other Psychoses			19.86*	19.87*			21.14*	18.65*
			(9.362)	(9.436)			(9.014)	(9.072)
% Schizophrenia			52.16	52.58			54.57	44.27
			(33.16)	(33.98)			(29.74)	(28.28)
Constant	11.40	29.64	-140.3*	-199.5*	121.8**	127.0	-42.46	-62.91
	(9.580)	(54.20)	(51.77)	(91.04)	(19.95)	(67.49)	(72.18)	(93.17)
Observations	228	228	228	228	228	228	228	228
R-squared	0.790	0.956	0.968	0.969	0.818	0.959	0.971	0.974
F, Visits	0	0.0444	0.111	0.110	0	0.0199	0.0162	0.00523
F, % had visit/visited				0.418				8.70e-05
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 3: TESTING H1 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days
Primary care visits (t)	0.0410*	-0.00961	-0.0220			
	(0.0181)	(0.0308)	(0.0294)			
Primary care visits (t-1)	-0.0214	-0.0144	-0.00864			
	(0.0181)	(0.0286)	(0.0277)			
Primary care visits (t-2)	0.0215	0.0211	0.0293			
	(0.0142)	(0.0197)	(0.0210)			
Primary care visits (t-3)	-0.00309	0.00228	-0.00912			
	(0.0150)	(0.0222)	(0.0265)			
Primary care visits (t-4)	-0.00426	0.0303	0.0263			
	(0.0193)	(0.0265)	(0.0283)			
Health center visits (t)				0.0865**	-0.0524	-0.0956
				(0.0229)	(0.0575)	(0.0815)
Health center visits (t-1)				-0.0166	-0.0174	-0.0177
				(0.0183)	(0.0489)	(0.0619)
Health center visits (t-2)				-0.0117	-0.0266	-0.0144
				(0.0235)	(0.0427)	(0.0731)
Health center visits (t-3)				-0.0282	-0.00237	-0.160*
				(0.0220)	(0.0347)	(0.0711)
Health center visits (t-4)				-0.0389	0.124*	0.0516
				(0.0246)	(0.0488)	(0.0704)
Home visits (t)				0.00973	-0.00433	-0.0271
				(0.0313)	(0.0314)	(0.0302)
Home visits (t-1)				-0.0323	-0.0195	-0.0233
				(0.0329)	(0.0313)	(0.0297)
Home visits (t-2)				0.0483	0.0337	0.0253
				(0.0248)	(0.0239)	(0.0269)
Home visits (t-3)				0.00808	0.00650	0.0119
				(0.0255)	(0.0251)	(0.0223)
Home visits (t-4)				0.000288	0.0128	0.0190
				(0.0284)	(0.0290)	(0.0254)
% had Primary care visits (t)			0.418			
			(0.883)			
% had Primary care visits (t-1)			0.335			
			(1.151)			
% had Primary care visits (t-2)			-1.245			
			(0.790)			
% had Primary care visits (t-3)			2.054			
			(1.080)			
% had Primary care visits (t-4)			2.084*			
			(0.983)			
% Visited health center (t)						0.742
						(1.443)
% Visited health center (t-1)						-0.0924
						(1.581)
% Visited health center (t-2)						-0.592
						(1.498)
% Visited health center (t-3)						3.925*
						(1.570)
% Visited health center (t-4)						1.468
						(1.689)
% had home visit (t)						7.612*
						(3.429)
% had home visit (t-1)						3.194
						(3.358)
% had home visit (t-2)						0.767
						(3.579)
% had home visit (t-3)						-1.600
						(4.915)
% had home visit (t-4)						-2.403
						(3.671)
% Women	2.718**	-0.118	-0.209	2.504**	-0.119	-1.080
	(0.693)	(0.922)	(0.906)	(0.776)	(0.936)	(1.008)
Income, thousand SEK	-0.169*	0.195*	0.335**	-0.167**	0.187	0.220*
	(0.0621)	(0.0729)	(0.0928)	(0.0558)	(0.0963)	(0.102)
% born abroad	0.146	1.075**	1.633**	0.146	1.050*	1.087*
	(0.168)	(0.337)	(0.424)	(0.166)	(0.456)	(0.442)
Age 70-74	1.752	4.620	-3.449	5.338	3.719	4.345
	(6.614)	(7.120)	(6.994)	(6.538)	(7.774)	(7.119)
Age 75-79	15.79	31.80*	10.64	24.13	31.19	27.16
	(13.81)	(14.93)	(14.98)	(13.86)	(17.14)	(15.41)
Age 80-84	27.81	63.37*	34.29	39.21	63.35*	42.52
	(24.89)	(25.39)	(25.09)	(23.44)	(27.22)	(26.42)
Age 85-89	66.47	118.0**	93.15*	75.08*	117.8**	71.52
	(32.85)	(34.42)	(34.68)	(30.71)	(34.62)	(40.79)
Age 90 +	81.95	159.9**	159.2**	82.97	159.5**	111.9*
	(44.24)	(45.84)	(45.36)	(42.00)	(47.81)	(54.35)
% with Cancer	8.590*	6.214	6.002	8.544*	6.184	5.267
	(3.398)	(3.457)	(3.234)	(3.410)	(3.458)	(3.432)
% with Stroke	5.938	5.947	5.756	6.188	5.888	6.505
	(3.296)	(3.427)	(3.443)	(3.334)	(3.508)	(3.395)
% with Joint disease	2.983	3.391	1.682	4.359	3.288	3.071
	(9.880)	(10.36)	(9.980)	(9.531)	(9.967)	(10.15)
% with Osteoarthritis	6.673	8.993*	7.842	6.265	9.271*	5.870
	(3.960)	(4.424)	(4.658)	(3.909)	(4.364)	(3.997)
% with Heart failure	14.59**	14.88**	14.70**	14.30**	14.88**	13.14**
	(3.039)	(3.009)	(3.040)	(2.860)	(2.959)	(2.532)
% Hip fracture	14.31**	11.50**	11.31**	14.14**	11.53**	11.59**
	(4.366)	(4.138)	(4.145)	(4.348)	(4.141)	(4.144)
% Other Psychoses	23.21*	11.82	8.525	23.26*	11.95	11.91
	(9.461)	(10.28)	(10.61)	(9.390)	(10.79)	(11.05)
% Schizophrenia	39.85	3.267	0.670	41.17	3.332	8.120
	(29.27)	(38.25)	(41.36)	(28.25)	(38.11)	(38.67)
Constant	-89.95	-35.58	-145.9*	-63.75	-23.32	-9.765
	(45.53)	(37.91)	(57.95)	(56.15)	(71.40)	(69.90)
Observations	3,876	3,876	3,876	3,876	3,876	3,876
R-squared	0.746	0.759	0.762	0.747	0.760	0.764
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	Yes	Yes
F, Visits	0.0360	0.252	0.384	0.00689	0.154	0.0108
F, % had visit/visited			0.00484			4.10e-06
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 4: TESTING H2 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost
Primary care visits	1,311**	175.7	112.6	112.5				
	(80.58)	(98.84)	(92.57)	(93.13)				
% has done primary care visit				262.7				
				(5,615)				
Health center visits					508.2*	-173.1	-183.3	-158.7
					(242.7)	(435.0)	(404.4)	(491.2)
Home visits					1,359**	179.0	116.1	84.32
					(87.17)	(98.17)	(92.42)	(90.76)
% has visited health center								-1,685
								(5,466)
% has had home visit								11,062
								(6,872)
% Women		4,453	7,544	7,641		2,891	6,145	1,910
		(6,363)	(5,945)	(6,883)		(6,766)	(6,613)	(6,382)
Income, thousand SEK		-2,205**	-1,643**	-1,641**		-2,194**	-1,641**	-1,563**
		(473.6)	(469.8)	(493.8)		(445.3)	(469.6)	(521.1)
% born abroad		-733.0	-1,599	-1,604		-768.6	-1,604	-1,990
		(2,229)	(2,090)	(2,113)		(2,196)	(2,056)	(2,204)
Age 70-74		286,392**	128,547**	132,836		306,315**	146,258**	54,278
		(28,419)	(46,320)	(88,165)		(36,908)	(47,871)	(81,727)
Age 75-79		683,885**	320,771**	324,960**		738,623**	368,409**	261,670*
		(56,466)	(94,267)	(104,231)		(88,437)	(107,411)	(126,869)
Age 80-84		1.068e+06**	481,680**	486,016**		1.144e+06**	549,933**	357,000
		(123,769)	(158,994)	(162,022)		(157,952)	(171,103)	(192,127)
Age 85-89		1.666e+06**	831,356**	836,610**		1.723e+06**	884,898**	581,213*
		(136,963)	(223,131)	(213,893)		(159,834)	(220,233)	(259,942)
Age 90 +		2.220e+06**	977,693**	985,705**		2.219e+06**	987,586**	638,174
		(166,395)	(310,553)	(294,615)		(165,284)	(306,447)	(329,662)
% with Cancer			81,005**	80,927**			80,331**	77,714**
			(23,698)	(24,205)			(23,732)	(24,281)
% with Stroke			19,144	19,096			20,609	19,140
			(25,157)	(24,852)			(25,492)	(24,748)
% with Joint disease			13,357	13,232			18,016	-10,447
			(64,092)	(63,839)			(64,529)	(62,777)
% with Osteoarthritis			71,573*	71,053*			71,232*	62,543
			(33,771)	(31,805)			(33,727)	(31,930)
% with Heart failure			59,355*	59,335*			58,248*	59,350*
			(24,596)	(24,709)			(24,599)	(24,765)
% Hip fracture			69,735	69,758			68,266	65,028
			(34,440)	(34,646)			(34,415)	(33,743)
% Other Psychoses			119,995	120,003			122,334	113,314
			(63,914)	(64,120)			(63,864)	(60,030)
% Schizophrenia			188,235	188,460			192,620	150,417
			(176,774)	(178,418)			(170,164)	(164,917)
Constant	572,108**	1.330e+06**	508,177	476,290	888,466**	1.535e+06**	686,618	1.042e+06
	(58,133)	(314,265)	(339,257)	(881,947)	(109,710)	(416,331)	(443,068)	(720,377)
Observations	228	228	228	228	228	228	228	228
R-squared	0.780	0.937	0.948	0.948	0.788	0.937	0.948	0.949
F, Visits	0	0.0837	0.231	0.235	0	0.146	0.335	0.535
F, % had visit/visited				0.963				0.0709
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 5: TESTING H2 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Cost	Cost	Cost	Cost	Cost	Cost
Primary care visits (t)	529.7**	-79.15	-150.3			
	(101.4)	(146.4)	(160.9)			
Primary care visits (t-1)	94.36	115.4	113.3			
	(101.2)	(164.6)	(174.5)			
Primary care visits (t-2)	86.83	-110.9	-17.44			
	(108.9)	(121.8)	(132.7)			
Primary care visits (t-3)	-50.58	119.6	30.12			
	(92.25)	(151.1)	(159.8)			
Primary care visits (t-4)	-475.7**	61.50	27.84			
	(93.39)	(121.1)	(126.0)			
Health center visits (t)				1,296**	-260.2	-628.9
				(155.4)	(244.1)	(426.5)
Health center visits (t-1)				569.4**	228.3	-45.46
				(185.5)	(324.6)	(328.9)
Health center visits (t-2)				88.46	-411.2	-76.71
				(203.7)	(297.3)	(468.0)
Health center visits (t-3)				-194.7	386.3	-550.5
				(183.2)	(312.8)	(567.0)
Health center visits (t-4)				-928.6**	708.6*	-126.1
				(156.5)	(335.0)	(481.8)
Home visits (t)				218.8	-67.19	-195.3
				(162.5)	(160.9)	(168.7)
Home visits (t-1)				-163.1	82.69	30.58
				(174.9)	(173.9)	(189.2)
Home visits (t-2)				172.4	-8.271	20.58
				(149.0)	(145.8)	(155.3)
Home visits (t-3)				110.7	91.43	29.45
				(128.3)	(147.7)	(161.7)
Home visits (t-4)				-182.4	-11.27	84.11
				(117.1)	(128.5)	(131.5)
% had Primary care visits (t)			-298.2			
			(6,123)			
% had Primary care visits (t-1)			8,707			
			(7,429)			
% had Primary care visits (t-2)			-13,444*			
			(5,390)			
% had Primary care visits (t-3)			16,193*			
			(6,371)			
% had Primary care visits (t-4)			15,769*			
			(7,711)			
% Visited health center (t)						6,634
						(8,955)
% Visited health center (t-1)						6,675
						(8,999)
% Visited health center (t-2)						-10,638
						(8,189)
% Visited health center (t-3)						22,020
						(10,964)
% Visited health center (t-4)						20,464
						(11,752)
% had home visit (t)						42,582*
						(20,590)
% had home visit (t-1)						31,071
						(23,042)
% had home visit (t-2)						-30,512
						(19,064)
% had home visit (t-3)						32,247
						(24,789)
% had home visit (t-4)						-39,173
						(22,636)
% Women	7,175	2,545	1,860	10,341	3,383	-485.8
	(5,576)	(6,518)	(6,092)	(5,714)	(6,516)	(6,226)
Income, thousand SEK	-1,649**	-790.4	246.0	-1,669**	-371.1	-53.83
	(448.2)	(525.9)	(523.0)	(471.7)	(577.9)	(604.6)
% born abroad	-1,753	8,904**	13,018**	-1,755	10,643**	11,353**
	(2,019)	(2,177)	(2,177)	(2,127)	(2,440)	(2,468)
Age 70-74	143,209**	96,078*	35,848	119,265**	60,226	67,595
	(44,474)	(45,600)	(42,318)	(39,057)	(40,191)	(43,945)
Age 75-79	313,663**	270,020**	112,880	230,654**	188,520*	175,001
	(88,809)	(97,814)	(90,947)	(82,323)	(87,024)	(92,215)
Age 80-84	449,323**	444,216**	228,271	328,006*	344,386*	263,248
	(150,131)	(158,810)	(147,000)	(141,789)	(145,805)	(161,770)
Age 85-89	806,329**	777,149**	591,272*	707,125**	722,658**	535,993
	(204,445)	(234,588)	(226,396)	(201,150)	(226,784)	(267,358)
Age 90 +	1.073e+06**	961,801**	953,346**	1.038e+06**	1.015e+06**	863,522*
	(293,625)	(354,051)	(332,159)	(303,666)	(360,734)	(395,542)
% with Cancer	93,415**	79,882**	78,196**	95,879**	80,085**	75,224**
	(25,785)	(24,806)	(22,683)	(26,255)	(23,993)	(22,473)
% with Stroke	24,297	47,638*	46,299*	22,168	44,672	48,132*
	(23,354)	(21,959)	(22,777)	(24,480)	(22,688)	(22,644)
% with Joint disease	-8,418	-12,128	-24,684	-11,325	-24,315	-26,446
	(62,480)	(58,402)	(57,279)	(61,135)	(59,520)	(57,931)
% with Osteoarthritis	44,104	90,199**	81,800*	40,693	92,786**	72,456*
	(33,911)	(32,628)	(34,130)	(34,337)	(33,425)	(32,163)
% with Heart failure	47,796*	56,753*	55,521*	49,568*	58,961**	49,516*
	(21,697)	(20,921)	(20,927)	(22,161)	(21,204)	(20,177)
% Hip fracture	66,299*	67,912*	66,632*	71,309*	67,810*	68,705*
	(31,780)	(30,455)	(28,622)	(31,342)	(29,979)	(27,911)
% Other Psychoses	126,428	61,850	37,637	117,842	51,360	48,747
	(67,988)	(69,282)	(62,921)	(69,211)	(70,133)	(61,904)
% Schizophrenia	148,530	-83,795	-102,014	150,508	-92,654	-81,317
	(182,141)	(246,941)	(267,328)	(199,903)	(258,106)	(254,513)
Constant	508,881	540,604*	-255,090	111,685	224,490	73,813
	(325,030)	(261,766)	(333,292)	(380,909)	(323,333)	(359,084)
Observations	3,873	3,873	3,873	3,873	3,873	3,873
R-squared	0.653	0.710	0.714	0.659	0.711	0.716
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	Yes	Yes
F, Visits	5.73e-08	0.657	0.962	0	0.174	0.478
F, % had visit/visited			3.15e-05			0.000500
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 6: TESTING H3 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days
Primary care visits	0.154**	-0.00570	-0.00996	-0.00978				
	(0.0122)	(0.0108)	(0.0112)	(0.0111)				
% has done primary care visit				-0.474				
				(0.951)				
Health center visits					-0.0102	-0.0739	-0.0745	-0.0702
					(0.0347)	(0.0509)	(0.0490)	(0.0571)
Home visits					0.164**	-0.00505	-0.00921	-0.0117
					(0.0137)	(0.0109)	(0.0113)	(0.0117)
% has visited health center								-0.196
								(0.751)
% has had home visit								0.861
								(1.232)
% Women		-0.0207	0.145	-0.0297		-0.326	-0.160	-0.510
		(0.954)	(1.077)	(1.333)		(1.059)	(1.195)	(1.135)
Income, thousand SEK		-0.276**	-0.225**	-0.230**		-0.274**	-0.224**	-0.219**
		(0.0848)	(0.0807)	(0.0797)		(0.0782)	(0.0756)	(0.0768)
% born abroad		-0.108	-0.180	-0.170		-0.115	-0.181	-0.210
		(0.357)	(0.344)	(0.357)		(0.350)	(0.338)	(0.378)
Age 70-74		25.49**	23.27**	15.53		29.39**	27.14**	18.79
		(3.210)	(7.385)	(14.98)		(4.913)	(8.338)	(11.24)
Age 75-79		77.84**	66.86**	59.30**		88.54**	77.25**	67.55**
		(7.430)	(17.34)	(18.80)		(12.46)	(20.07)	(20.04)
Age 80-84		150.7**	125.8**	118.0**		165.7**	140.7**	124.1**
		(15.96)	(31.16)	(31.30)		(22.81)	(34.58)	(33.39)
Age 85-89		239.9**	198.6**	189.1**		251.0**	210.3**	184.9**
		(19.90)	(48.50)	(49.74)		(24.81)	(50.04)	(49.60)
Age 90 +		329.0**	262.5**	248.0**		328.7**	264.7**	235.2**
		(25.68)	(66.73)	(70.35)		(25.37)	(66.99)	(64.86)
% with Cancer			4.065	4.206			3.918	3.732
			(2.802)	(3.034)			(2.843)	(3.058)
% with Stroke			-1.540	-1.453			-1.220	-1.330
			(5.808)	(5.827)			(5.739)	(5.670)
% with Joint disease			0.985	1.210			2.002	-0.195
			(10.44)	(10.31)			(10.55)	(9.645)
% with Osteoarthritis			-3.502	-2.564			-3.576	-4.136
			(4.680)	(3.723)			(4.690)	(4.049)
% with Heart failure			6.441	6.479			6.199	6.290
			(3.732)	(3.716)			(3.640)	(3.606)
% Hip fracture			1.190	1.150			0.869	0.611
			(6.758)	(6.841)			(6.872)	(6.878)
% Other Psychoses			6.347	6.333			6.858	6.143
			(9.690)	(9.675)			(9.774)	(9.926)
% Schizophrenia			42.53	42.13			43.49	40.07
			(25.64)	(25.25)			(23.85)	(23.20)
Constant	1.955	141.8**	99.80	157.3	66.76**	181.7*	138.7	173.3
	(7.615)	(48.53)	(56.73)	(154.1)	(14.55)	(67.10)	(74.92)	(115.9)
Observations	228	228	228	228	228	228	228	228
R-squared	0.709	0.920	0.924	0.925	0.731	0.921	0.925	0.926
F, Visits	0	0.600	0.380	0.384	0	0.352	0.282	0.318
F, % had visit/visited				0.621				0.498
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 7: TESTING H3 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days	Emergent inpatient days
Primary care visits (t)	0.0166	-0.0200	-0.0235			
	(0.0107)	(0.0146)	(0.0159)			
Primary care visits (t-1)	0.00261	0.0184	0.0231			
	(0.00897)	(0.0130)	(0.0142)			
Primary care visits (t-2)	0.00811	0.00915	0.0159			
	(0.00993)	(0.0140)	(0.0143)			
Primary care visits (t-3)	-0.00718	-0.00906	-0.0175			
	(0.0106)	(0.0134)	(0.0147)			
Primary care visits (t-4)	-0.0214*	0.00318	-0.00116			
	(0.00800)	(0.0107)	(0.0110)			
Health center visits (t)				0.0414**	-0.0446	-0.0420
				(0.0137)	(0.0268)	(0.0448)
Health center visits (t-1)				-0.0141	-0.00385	0.0124
				(0.0122)	(0.0250)	(0.0312)
Health center visits (t-2)				-0.0117	-0.0209	0.00738
				(0.0142)	(0.0285)	(0.0487)
Health center visits (t-3)				-0.0131	-0.0110	-0.110
				(0.0167)	(0.0270)	(0.0559)
Health center visits (t-4)				-0.00745	0.121**	0.0959*
				(0.0159)	(0.0335)	(0.0360)
Home visits (t)				-0.00370	-0.0200	-0.0318
				(0.0160)	(0.0171)	(0.0174)
Home visits (t-1)				0.0119	0.0216	0.0165
				(0.0169)	(0.0162)	(0.0165)
Home visits (t-2)				0.0294	0.0174	0.0142
				(0.0171)	(0.0168)	(0.0164)
Home visits (t-3)				-0.00306	-0.00387	-0.00546
				(0.0151)	(0.0151)	(0.0158)
Home visits (t-4)				-0.0363**	-0.0151	0.000437
				(0.0126)	(0.0105)	(0.0123)
% had Primary care visits (t)			-0.338			
			(0.622)			
% had Primary care visits (t-1)			-0.345			
			(0.749)			
% had Primary care visits (t-2)			-1.072			
			(0.649)			
% had Primary care visits (t-3)			1.442**			
			(0.486)			
% had Primary care visits (t-4)			1.452			
			(0.733)			
% Visited health center (t)						-0.186
						(0.855)
% Visited health center (t-1)						-0.442
						(0.850)
% Visited health center (t-2)						-0.913
						(1.015)
% Visited health center (t-3)						2.596*
						(0.979)
% Visited health center (t-4)						0.561
						(0.932)
% had home visit (t)						4.512*
						(2.038)
% had home visit (t-1)						2.010
						(2.454)
% had home visit (t-2)						0.672
						(1.897)
% had home visit (t-3)						1.072
						(2.088)
% had home visit (t-4)						-6.303**
						(2.060)
% Women	-0.0763	-1.550	-1.592	-0.0764	-1.485	-1.696
	(1.070)	(0.920)	(0.915)	(1.151)	(0.920)	(0.912)
Income, thousand SEK	-0.214**	0.0205	0.0627	-0.215**	0.0478	0.0586
	(0.0786)	(0.0633)	(0.0790)	(0.0785)	(0.0748)	(0.0754)
% born abroad	-0.128	2.004**	2.159**	-0.128	2.119**	2.142**
	(0.335)	(0.316)	(0.373)	(0.334)	(0.359)	(0.355)
Age 70-74	22.97**	16.98*	13.56*	23.25**	13.69*	13.67*
	(7.300)	(6.403)	(6.576)	(7.381)	(6.116)	(6.418)
Age 75-79	63.84**	56.90**	49.41**	64.53**	50.29**	49.01**
	(16.92)	(14.46)	(15.70)	(17.18)	(13.99)	(14.99)
Age 80-84	117.1**	106.7**	96.92**	118.1**	99.09**	93.25**
	(30.58)	(24.71)	(25.68)	(30.75)	(23.97)	(26.44)
Age 85-89	186.3**	171.8**	163.1**	187.2**	167.5**	156.4**
	(47.60)	(38.44)	(38.37)	(47.27)	(37.48)	(41.00)
Age 90 +	255.3**	240.6**	239.1**	255.4**	244.4**	236.2**
	(66.59)	(55.08)	(54.04)	(66.53)	(55.81)	(58.52)
% with Cancer	4.760	6.186	6.133	4.777	6.193	5.969
	(2.816)	(3.140)	(3.077)	(2.800)	(3.063)	(3.013)
% with Stroke	-1.909	2.613	2.539	-1.843	2.358	2.401
	(5.762)	(4.079)	(4.076)	(5.794)	(4.169)	(4.079)
% with Joint disease	0.146	2.361	1.840	0.248	1.365	0.731
	(10.82)	(9.929)	(9.832)	(10.89)	(10.10)	(10.09)
% with Osteoarthritis	-4.759	-4.289	-4.622	-4.786	-3.917	-4.783
	(4.809)	(4.929)	(4.723)	(4.838)	(4.888)	(4.583)
% with Heart failure	6.150	6.582	6.525	6.146	6.743	6.338
	(3.945)	(3.872)	(3.853)	(3.926)	(3.878)	(3.850)
% Hip fracture	1.489	1.516	1.455	1.464	1.534	1.650
	(6.847)	(5.829)	(5.757)	(6.871)	(5.810)	(5.683)
% Other Psychoses	6.224	-8.801	-9.756	6.140	-9.506	-9.712
	(9.558)	(13.34)	(13.30)	(9.603)	(13.54)	(12.88)
% Schizophrenia	37.77	1.301	0.788	38.14	0.613	1.128
	(26.64)	(38.62)	(38.95)	(26.49)	(38.81)	(39.18)
Constant	105.7	90.17*	62.24	107.1	71.56	71.99
	(57.94)	(36.73)	(54.90)	(66.91)	(48.79)	(42.79)
Observations	3,876	3,876	3,876	3,876	3,876	3,876
R-squared	0.742	0.775	0.776	0.743	0.776	0.778
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	No	Yes
F, Visits	0.128	0.584	0.420	0.00871	0.0279	0.0122
F, % had visit/visited			0.00598			0.000691
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 8: TESTING H4 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits
Primary care visits	0.0241**	0.000263	-0.000183	-0.000243				
	(0.00172)	(0.00208)	(0.00195)	(0.00192)				
% has done primary care visit				0.159				
				(0.103)				
Health center visits					0.0294**	0.0139	0.0124	0.0100
					(0.00552)	(0.0118)	(0.0122)	(0.0157)
Home visits					0.0238**	0.000133	-0.000330	-0.000420
					(0.00175)	(0.00208)	(0.00199)	(0.00197)
% has visited health center								0.0584
								(0.142)
% has had home visit								0.0475
								(0.180)
% Women		0.826**	0.770**	0.828**		0.887**	0.829**	0.833**
		(0.163)	(0.156)	(0.168)		(0.161)	(0.160)	(0.167)
Income, thousand SEK		-0.0328*	-0.0268	-0.0252		-0.0332*	-0.0268*	-0.0260
		(0.0135)	(0.0136)	(0.0141)		(0.0131)	(0.0131)	(0.0134)
% born abroad		0.138*	0.140	0.137		0.140*	0.141	0.138
		(0.0642)	(0.0697)	(0.0706)		(0.0680)	(0.0725)	(0.0721)
Age 70-74		0.644	-0.149	2.446		-0.133	-0.903	-0.0951
		(0.721)	(1.090)	(1.941)		(0.859)	(1.239)	(3.194)
Age 75-79		9.054**	6.090*	8.625**		6.921**	4.061	5.015
		(1.537)	(2.247)	(2.560)		(2.017)	(2.546)	(4.210)
Age 80-84		18.02**	12.74**	15.37**		15.03**	9.838*	10.63
		(3.087)	(3.868)	(4.177)		(3.514)	(3.760)	(5.892)
Age 85-89		25.22**	16.64*	19.82**		23.00**	14.36*	14.86*
		(4.199)	(6.355)	(6.638)		(4.004)	(5.378)	(7.293)
Age 90 +		16.77**	4.836	9.684		16.82**	4.415	5.189
		(5.468)	(9.656)	(10.01)		(5.378)	(8.955)	(9.749)
% with Cancer			0.869	0.821			0.898	0.869
			(0.484)	(0.478)			(0.522)	(0.524)
% with Stroke			0.356	0.327			0.294	0.284
			(0.429)	(0.436)			(0.439)	(0.443)
% with Joint disease			2.040	1.965			1.842	1.703
			(1.278)	(1.278)			(1.264)	(1.271)
% with Osteoarthritis			-0.0322	-0.347			-0.0177	-0.172
			(0.886)	(0.826)			(0.919)	(0.925)
% with Heart failure			0.260	0.247			0.307	0.307
			(0.474)	(0.478)			(0.496)	(0.495)
% Hip fracture			1.021	1.035			1.084	1.077
			(0.805)	(0.793)			(0.768)	(0.777)
% Other Psychoses			3.798*	3.802*			3.698*	3.672*
			(1.585)	(1.580)			(1.537)	(1.589)
% Schizophrenia			7.655	7.792			7.468	7.422
			(4.882)	(4.972)			(4.782)	(4.859)
Constant	24.20**	-2.847	-8.146	-27.44	22.10**	-10.80	-15.74	-21.13
	(1.267)	(8.207)	(7.976)	(17.33)	(2.438)	(11.38)	(12.27)	(17.49)
Observations	228	228	228	228	228	228	228	228
R-squared	0.748	0.906	0.915	0.916	0.749	0.907	0.916	0.916
F, Visits	0	0.900	0.926	0.900	0	0.506	0.589	0.797
F, % had visit/visited				0.131				0.893
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 9: TESTING H4 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits	Emergency room visits
Primary care visits (t)	0.00803**	0.00503*	0.000997			
	(0.00190)	(0.00223)	(0.00234)			
Primary care visits (t-1)	-0.00134	0.000455	0.00311			
	(0.00141)	(0.00209)	(0.00222)			
Primary care visits (t-2)	0.00406*	-0.00176	-0.00205			
	(0.00155)	(0.00182)	(0.00173)			
Primary care visits (t-3)	-0.00129	0.00213	-0.000753			
	(0.00145)	(0.00247)	(0.00235)			
Primary care visits (t-4)	-0.00743**	-0.00451*	-0.00401			
	(0.00178)	(0.00213)	(0.00224)			
Health center visits (t)				0.0179**	0.0188**	0.00862
				(0.00346)	(0.00381)	(0.00624)
Health center visits (t-1)				-0.00239	-0.00791	-0.0140
				(0.00275)	(0.00499)	(0.00835)
Health center visits (t-2)				0.0134**	0.00527	0.000582
				(0.00249)	(0.00454)	(0.00565)
Health center visits (t-3)				0.00445	0.0235**	0.00295
				(0.00275)	(0.00608)	(0.00731)
Health center visits (t-4)				-0.00135	0.0116*	-0.00429
				(0.00258)	(0.00508)	(0.00761)
Home visits (t)				0.00433	0.000693	-0.00219
				(0.00303)	(0.00273)	(0.00280)
Home visits (t-1)				0.00467*	0.00600*	0.00562*
				(0.00227)	(0.00223)	(0.00235)
Home visits (t-2)				7.02e-05	-0.00235	-0.00250
				(0.00229)	(0.00204)	(0.00217)
Home visits (t-3)				-0.00216	-0.00145	-0.000690
				(0.00239)	(0.00251)	(0.00268)
Home visits (t-4)				-0.00584*	-0.00298	-0.00214
				(0.00240)	(0.00216)	(0.00237)
% had Primary care visits (t)			0.288**			
			(0.103)			
% had Primary care visits (t-1)			-0.0175			
			(0.1000)			
% had Primary care visits (t-2)			0.00965			
			(0.0968)			
% had Primary care visits (t-3)			0.540**			
			(0.117)			
% had Primary care visits (t-4)			0.286**			
			(0.102)			
% Visited health center (t)						0.194
						(0.157)
% Visited health center (t-1)						0.145
						(0.155)
% Visited health center (t-2)						0.0851
						(0.107)
% Visited health center (t-3)						0.493**
						(0.123)
% Visited health center (t-4)						0.368*
						(0.144)
% had home visit (t)						0.921**
						(0.303)
% had home visit (t-1)						0.386
						(0.346)
% had home visit (t-2)						-0.288
						(0.302)
% had home visit (t-3)						-0.239
						(0.367)
% had home visit (t-4)						-0.282
						(0.308)
% Women	0.721**	0.290	0.265	0.877**	0.365**	0.333*
	(0.157)	(0.148)	(0.143)	(0.149)	(0.117)	(0.145)
Income, thousand SEK	-0.0222	0.00818	0.0516**	-0.0233	0.0483**	0.0589**
	(0.0135)	(0.0112)	(0.0129)	(0.0134)	(0.0107)	(0.0113)
% born abroad	0.143*	0.367**	0.542**	0.143	0.531**	0.561**
	(0.0671)	(0.0469)	(0.0485)	(0.0738)	(0.0474)	(0.0463)
Age 70-74	-0.864	-1.450	-3.674**	-2.709*	-4.198**	-3.870**
	(1.092)	(0.899)	(0.925)	(1.206)	(0.928)	(0.986)
Age 75-79	4.381	4.254*	-1.949	-0.523	-2.648	-2.534
	(2.227)	(1.913)	(1.647)	(2.198)	(1.743)	(1.756)
Age 80-84	10.22**	11.81**	3.171	3.364	3.043	2.702
	(3.760)	(3.240)	(2.689)	(3.370)	(2.756)	(2.988)
Age 85-89	13.17*	15.77**	8.476	7.844	11.08**	9.863*
	(6.264)	(5.246)	(4.239)	(5.201)	(3.805)	(4.592)
Age 90 +	1.179	5.723	5.891	0.0154	10.64	11.21
	(9.642)	(8.282)	(6.641)	(8.564)	(6.272)	(7.016)
% with Cancer	0.839	0.591	0.527	0.921	0.630	0.542
	(0.483)	(0.422)	(0.378)	(0.560)	(0.403)	(0.389)
% with Stroke	0.321	0.887*	0.831*	0.198	0.656	0.720
	(0.407)	(0.344)	(0.370)	(0.436)	(0.360)	(0.359)
% with Joint disease	2.434	3.158**	2.639*	1.880	2.137*	2.115
	(1.248)	(1.138)	(1.145)	(1.118)	(1.009)	(1.073)
% with Osteoarthritis	-0.268	0.761	0.405	-0.194	0.867	0.442
	(0.846)	(0.704)	(0.764)	(0.925)	(0.752)	(0.770)
% with Heart failure	0.249	0.569	0.508	0.399	0.758*	0.584
	(0.486)	(0.325)	(0.376)	(0.544)	(0.354)	(0.367)
% Hip fracture	1.092	0.894	0.840	1.262	0.869	0.901
	(0.768)	(0.640)	(0.521)	(0.728)	(0.535)	(0.499)
% Other Psychoses	3.839*	2.866	1.843	3.594*	1.887	1.748
	(1.554)	(1.448)	(1.237)	(1.436)	(1.185)	(1.176)
% Schizophrenia	8.524	6.777	5.835	8.163	5.920	5.639
	(4.789)	(4.196)	(4.599)	(4.896)	(4.830)	(4.952)
Constant	-6.776	2.309	-33.43**	-25.58*	-32.42**	-42.28**
	(7.680)	(5.501)	(5.650)	(10.39)	(6.231)	(6.189)
Observations	3,876	3,876	3,876	3,876	3,876	3,876
R-squared	0.705	0.756	0.774	0.714	0.770	0.776
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	Yes	Yes
F, Visits	0.000156	0.110	0.0501	5.97e-06	7.06e-08	0.0778
F, % had visit/visited			1.31e-08			6.38e-06
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 10: TESTING H4 (CROSS SECTION – INDIVIDUAL LEVEL DATA, OLS)

	(1)	(2)	(3)
VARIABLES	Emergency room visits	Emergency room visits	Emergency room visits
Home visits	0.00367**		-0.00269**
	(0.000191)		(0.000152)
Health center visits	0.0314**		-0.0138**
	(0.000812)		(0.00110)
Has had home visit		0.0151**	0.0181**
		(0.000872)	(0.000974)
Has visited health center		0.0335**	0.0404**
		(0.000827)	(0.00126)
Constant	0.526**	0.245**	0.240**
	(0.0106)	(0.0158)	(0.0162)
Observations	313,011	313,011	313,011
R-squared	0.092	0.227	0.236
Sample	Cross-section	Cross-section	Cross-section
Age dummies	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes
F, Visits	0	0	0
F, had visit			0
Robust standard errors in			
**** p<0.01, * p<0.05**			

TABLE 11: TESTING H4 (PANEL – INDIVIDUAL LEVEL DATA, OLS)

	(1)	(2)	(3)
VARIABLES	Emergency room visits	Emergency room visits	Emergency room visits
Home visits (t)	0.00187**		-0.00160**
	(0.000308)		(0.000292)
Home visits (t-1)	0.00149**		0.00152**
	(0.000250)		(0.000250)
Home visits (t-2)	-3.87e-05		0.000145
	(0.000190)		(0.000198)
Home visits (t-3)	9.74e-05		0.000165
	(0.000144)		(0.000154)
Home visits (t-4)	9.26e-05		0.000118
	(0.000166)		(0.000164)
Health center visits (t)	0.0241**		0.0200**
	(0.000959)		(0.000952)
Health center visits (t-1)	0.00131**		-0.00147**
	(0.000254)		(0.000360)
Health center visits (t-2)	0.000633**		-0.00103**
	(0.000183)		(0.000285)
Health center visits (t-3)	0.00128**		0.000182
	(0.000168)		(0.000253)
Health center visits (t-4)	0.00147**		0.000325
	(0.000211)		(0.000312)
Has had home visit (t)		0.142**	0.144**
		(0.00458)	(0.00480)
Has had home visit (t-1)		-0.00819**	-0.0126**
		(0.00220)	(0.00234)
Has had home visit (t-2)		-0.0105**	-0.0119**
		(0.00157)	(0.00161)
Has had home visit (t-3)		-0.00507**	-0.00594**
		(0.00136)	(0.00149)
Has had home visit (t-4)		-0.00821**	-0.00886**
		(0.00179)	(0.00164)
Has visited health center (t)		0.0405**	0.0100**
		(0.00151)	(0.00104)
Has visited health center (t-1)		0.00907**	0.00814**
		(0.000506)	(0.000680)
Has visited health center (t-2)		0.00505**	0.00488**
		(0.000340)	(0.000555)
Has visited health center (t-3)		0.00417**	0.00268**
		(0.000332)	(0.000484)
Has visited health center (t-4)		0.00365**	0.00201**
		(0.000383)	(0.000562)
Constant	0.0264**	0.0223**	0.0234**
	(0.000774)	(0.000844)	(0.000812)
Observations	5,556,722	5,556,722	5,556,722
R-squared	0.018	0.023	0.026
Age dummies	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes
F, Visits	0	0	0
F, had visit			0
Robust standard errors in parentheses			
**** p<0.01, * p<0.05**			

TABLE 12: TESTING H5 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days
Primary care visits	1.014**	0.194	0.141	0.142				
	(0.0665)	(0.129)	(0.100)	(0.102)				
% has done primary care visit				-2.212				
				(4.406)				
Health center visits					-0.505*	-0.720	-0.750	-0.791
					(0.198)	(0.443)	(0.480)	(0.444)
Home visits					1.106**	0.203	0.152	0.124
					(0.0756)	(0.131)	(0.104)	(0.109)
% has visited health center								0.149
								(5.326)
% has had home visit								9.978
								(5.485)
% Women		8.114	13.80**	12.98**		4.020	9.585	6.309
		(5.161)	(3.965)	(4.548)		(5.576)	(5.201)	(6.917)
Income, thousand SEK		-2.258**	-1.596**	-1.617**		-2.231**	-1.590**	-1.508**
		(0.453)	(0.516)	(0.533)		(0.394)	(0.474)	(0.468)
% born abroad		-0.157	-0.935	-0.890		-0.250	-0.950	-1.321
		(1.532)	(1.559)	(1.525)		(1.655)	(1.693)	(1.672)
Age 70-74		98.94**	7.581	-28.53		151.2**	60.95	8.561
		(32.35)	(46.61)	(85.60)		(25.63)	(46.60)	(101.2)
Age 75-79		243.9**	-11.41	-46.68		387.4**	132.1	71.74
		(68.45)	(111.7)	(118.1)		(79.53)	(136.4)	(130.9)
Age 80-84		621.1**	152.6	116.1		822.2**	358.3	225.4
		(134.0)	(212.7)	(201.2)		(155.3)	(254.1)	(205.2)
Age 85-89		1,077**	292.9	248.7		1,226**	454.3	226.3
		(155.7)	(295.2)	(273.8)		(164.3)	(328.0)	(271.6)
Age 90 +		1,617**	349.2	281.8		1,613**	379.0	121.7
		(183.1)	(376.1)	(348.0)		(179.0)	(383.4)	(348.4)
% with Cancer			-15.85	-15.19			-17.88	-20.69
			(18.49)	(18.56)			(18.35)	(18.71)
% with Stroke			15.02	15.43			19.44	18.01
			(18.84)	(19.05)			(19.23)	(19.33)
% with Joint disease			25.19	26.24			39.23	13.12
			(64.48)	(65.24)			(65.29)	(61.48)
% with Osteoarthritis			23.27	27.64			22.24	11.42
			(22.85)	(24.93)			(23.48)	(26.91)
% with Heart failure			83.16**	83.34**			79.83**	80.70**
			(27.92)	(27.81)			(28.33)	(27.68)
% Hip fracture			37.11	36.92			32.68	29.93
			(24.82)	(25.12)			(25.36)	(24.84)
% Other Psychoses			64.45	64.38			71.49	63.69
			(65.88)	(65.75)			(67.98)	(68.63)
% Schizophrenia			97.65	95.75			110.9	76.22
			(190.6)	(187.8)			(187.7)	(171.4)
Constant	-267.8**	254.9	-371.2	-102.8	331.0**	790.0	166.5	311.5
	(46.05)	(286.2)	(309.7)	(728.8)	(84.50)	(431.1)	(518.5)	(962.2)
Observations	228	228	228	228	228	228	228	228
R-squared	0.740	0.907	0.917	0.917	0.784	0.910	0.921	0.922
F, Visits	0	0.142	0.167	0.170	0	0.0985	0.134	0.121
F, % had visit/visited				0.619				0.125
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 13: TESTING H5 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days	Avoidable inpatient days
Primary care visits (t)	0.00183	0.00244	-0.000425			
	(0.00564)	(0.00729)	(0.00768)			
Primary care visits (t-1)	-0.00893	-0.00732	-0.00806			
	(0.00504)	(0.00744)	(0.00832)			
Primary care visits (t-2)	0.0114*	-0.00349	0.00494			
	(0.00468)	(0.0100)	(0.00937)			
Primary care visits (t-3)	0.00626	0.0117	0.00726			
	(0.00430)	(0.00674)	(0.00774)			
Primary care visits (t-4)	-0.00239	0.00344	0.00225			
	(0.00500)	(0.00777)	(0.00774)			
Health center visits (t)				-0.00137	0.00558	-0.0112
				(0.00863)	(0.0147)	(0.0236)
Health center visits (t-1)				0.00127	0.00415	-0.00171
				(0.00713)	(0.0136)	(0.0230)
Health center visits (t-2)				0.00702	-0.0468*	-0.0358
				(0.00557)	(0.0181)	(0.0227)
Health center visits (t-3)				-0.00293	0.00355	-0.0414
				(0.00635)	(0.0151)	(0.0311)
Health center visits (t-4)				-0.00756	0.0224	0.0143
				(0.00593)	(0.0170)	(0.0277)
Home visits (t)				0.00533	0.00135	0.00270
				(0.00896)	(0.00870)	(0.00971)
Home visits (t-1)				-0.0197*	-0.0125	-0.0178*
				(0.00808)	(0.00867)	(0.00872)
Home visits (t-2)				0.0128	0.00797	0.0101
				(0.00867)	(0.00977)	(0.00896)
Home visits (t-3)				0.0126	0.0126	0.0119
				(0.00746)	(0.00789)	(0.00861)
Home visits (t-4)				-0.00258	-0.00248	-0.00181
				(0.00735)	(0.00777)	(0.00890)
% had Primary care visits (t)			0.148			
			(0.315)			
% had Primary care visits (t-1)			0.293			
			(0.312)			
% had Primary care visits (t-2)			-1.221**			
			(0.407)			
% had Primary care visits (t-3)			0.628			
			(0.356)			
% had Primary care visits (t-4)			0.278			
			(0.343)			
% Visited health center (t)						0.367
						(0.445)
% Visited health center (t-1)						0.137
						(0.493)
% Visited health center (t-2)						-0.360
						(0.452)
% Visited health center (t-3)						1.145
						(0.609)
% Visited health center (t-4)						0.165
						(0.502)
% had home visit (t)						-0.735
						(1.238)
% had home visit (t-1)						2.494
						(1.617)
% had home visit (t-2)						-1.699
						(1.697)
% had home visit (t-3)						0.994
						(1.414)
% had home visit (t-4)						-0.580
						(1.769)
% Women	0.283	-0.0972	-0.0969	0.219	-0.114	-0.141
	(0.215)	(0.395)	(0.398)	(0.237)	(0.395)	(0.437)
Income, thousand SEK	-0.0491**	-0.0218	-0.0173	-0.0487**	-0.0368	-0.0245
	(0.0146)	(0.0238)	(0.0285)	(0.0142)	(0.0267)	(0.0310)
% born abroad	-0.111*	0.0213	0.0388	-0.111*	-0.0382	-0.00367
	(0.0440)	(0.112)	(0.132)	(0.0448)	(0.126)	(0.134)
Age 70-74	0.461	1.353	1.027	1.313	2.271	2.657
	(2.202)	(2.403)	(2.190)	(2.036)	(2.232)	(2.242)
Age 75-79	-0.196	3.404	2.671	1.910	5.828	6.035
	(5.003)	(5.773)	(5.297)	(4.725)	(5.551)	(5.348)
Age 80-84	3.729	11.98	11.06	6.618	15.14	15.12
	(9.553)	(10.61)	(10.08)	(9.254)	(10.56)	(10.04)
Age 85-89	12.29	24.60	23.76	14.48	26.34	25.53
	(14.54)	(16.83)	(16.28)	(14.35)	(16.77)	(15.79)
Age 90 +	15.47	33.16	32.99	15.83	31.45	32.55
	(19.70)	(23.25)	(23.09)	(19.63)	(23.49)	(22.21)
% with Cancer	-0.646	-1.321	-1.330	-0.678	-1.338	-1.422
	(0.842)	(0.926)	(0.925)	(0.836)	(0.934)	(0.935)
% with Stroke	1.000	0.391	0.387	1.048	0.478	0.567
	(0.898)	(0.993)	(0.995)	(0.906)	(1.005)	(1.019)
% with Joint disease	0.00940	0.446	0.398	0.283	0.787	0.798
	(2.879)	(2.844)	(2.840)	(2.840)	(2.831)	(2.902)
% with Osteoarthritis	0.130	1.108	1.064	0.0589	1.088	0.616
	(1.132)	(1.241)	(1.300)	(1.129)	(1.193)	(1.265)
% with Heart failure	4.297**	4.239**	4.251**	4.228**	4.184**	3.995**
	(1.141)	(1.252)	(1.257)	(1.128)	(1.243)	(1.241)
% Hip fracture	1.919	1.488	1.480	1.866	1.495	1.518
	(1.190)	(1.210)	(1.208)	(1.187)	(1.225)	(1.219)
% Other Psychoses	3.200	2.129	2.014	3.282	2.439	2.297
	(3.136)	(3.446)	(3.435)	(3.158)	(3.407)	(3.491)
% Schizophrenia	4.885	-0.739	-0.586	5.090	-0.220	-0.625
	(6.754)	(10.11)	(10.20)	(6.684)	(9.816)	(10.08)
Constant	-4.321	11.13	9.757	3.264	25.21	13.60
	(14.70)	(17.35)	(16.94)	(16.69)	(21.19)	(24.34)
Observations	3,876	3,876	3,876	3,876	3,876	3,876
R-squared	0.509	0.521	0.522	0.510	0.522	0.524
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	Yes	Yes
F, Visits	0.0305	0.129	0.500	0.0266	0.0127	0.110
F, % had visit/visited			0.0903			0.0728
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 14: TESTING H6 (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days
Primary care visits	0.0898**	0.0436	0.0339	0.0336				
	(0.00982)	(0.0236)	(0.0199)	(0.0194)				
% has done primary care visit				0.962				
				(1.123)				
Health center visits					-0.0260	-0.0545	-0.0637	-0.107
					(0.0238)	(0.0699)	(0.0713)	(0.0677)
Home visits					0.0968**	0.0446	0.0351	0.0288
					(0.0112)	(0.0236)	(0.0202)	(0.0198)
% has visited health center								0.902
								(0.913)
% has had home visit								2.493
								(1.600)
% Women		2.728*	3.508**	3.863*		2.288	3.046*	2.510
		(1.328)	(1.236)	(1.535)		(1.422)	(1.377)	(1.394)
Income, thousand SEK		-0.0601	0.0150	0.0244		-0.0571	0.0156	0.0423
		(0.103)	(0.0895)	(0.0963)		(0.0980)	(0.0879)	(0.0921)
% born abroad		0.717	0.595	0.576		0.707	0.593	0.489
		(0.465)	(0.428)	(0.436)		(0.482)	(0.444)	(0.463)
Age 70-74		4.453	-23.79*	-8.092		10.06	-17.95	-15.17
		(4.567)	(10.15)	(16.86)		(5.392)	(11.28)	(16.17)
Age 75-79		10.51	-52.65*	-37.32		25.91	-36.92	-33.39
		(11.89)	(23.91)	(23.05)		(16.40)	(27.70)	(27.28)
Age 80-84		7.648	-90.96*	-75.09		29.24	-68.42	-80.28
		(23.68)	(42.92)	(39.56)		(28.70)	(46.67)	(46.64)
Age 85-89		26.99	-116.2	-96.96		42.95	-98.51	-131.6
		(28.12)	(60.62)	(57.53)		(31.73)	(62.46)	(68.72)
Age 90 +		44.38	-171.1*	-141.7		43.95	-167.8*	-202.1*
		(29.81)	(81.03)	(78.33)		(29.29)	(79.53)	(82.46)
% with Cancer			5.811	5.524			5.588	4.654
			(3.541)	(3.638)			(3.579)	(3.901)
% with Stroke			7.850	7.674			8.334	7.922
			(5.277)	(5.285)			(5.478)	(5.852)
% with Joint disease			4.257	3.800			5.795	-0.954
			(12.41)	(12.20)			(12.30)	(11.14)
% with Osteoarthritis			16.08**	14.17**			15.96**	11.71*
			(5.569)	(4.790)			(5.673)	(5.110)
% with Heart failure			8.173	8.097			7.807	7.963
			(4.424)	(4.361)			(4.386)	(4.308)
% Hip fracture			10.99	11.07			10.50	9.902
			(6.542)	(6.653)			(6.522)	(6.568)
% Other Psychoses			13.51	13.54			14.28	12.50
			(13.34)	(13.38)			(13.16)	(13.63)
% Schizophrenia			9.630	10.45			11.08	4.197
			(30.51)	(31.05)			(30.69)	(29.58)
Constant	9.450	-112.1	-240.1**	-356.8	55.08**	-54.70	-181.2	-236.2
	(5.873)	(61.69)	(64.88)	(186.5)	(9.122)	(84.67)	(91.55)	(149.1)
Observations	228	228	228	228	228	228	228	228
R-squared	0.602	0.687	0.725	0.727	0.628	0.692	0.729	0.742
F, Visits	0	0.0726	0.0968	0.0917	0	0.0975	0.124	0.0982
F, % had visit/visited				0.397				0.274
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 15: TESTING H6 (PANEL DATA, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days	Planned inpatient days
Primary care visits (t)	0.0244*	0.0103	0.00148			
	(0.0118)	(0.0239)	(0.0218)			
Primary care visits (t-1)	-0.0240	-0.0328	-0.0317			
	(0.0123)	(0.0214)	(0.0193)			
Primary care visits (t-2)	0.0134	0.0120	0.0134			
	(0.00988)	(0.0136)	(0.0162)			
Primary care visits (t-3)	0.00409	0.0113	0.00834			
	(0.0128)	(0.0156)	(0.0186)			
Primary care visits (t-4)	0.0171	0.0271	0.0274			
	(0.0186)	(0.0236)	(0.0263)			
Health center visits (t)				0.0450*	-0.00774	-0.0536
				(0.0193)	(0.0470)	(0.0584)
Health center visits (t-1)				-0.00247	-0.0136	-0.0301
				(0.0152)	(0.0422)	(0.0592)
Health center visits (t-2)				6.49e-05	-0.00572	-0.0218
				(0.0175)	(0.0305)	(0.0610)
Health center visits (t-3)				-0.0151	0.00865	-0.0493
				(0.0160)	(0.0308)	(0.0546)
Health center visits (t-4)				-0.0314	0.00333	-0.0444
				(0.0192)	(0.0289)	(0.0571)
Home visits (t)				0.0134	0.0157	0.00474
				(0.0238)	(0.0235)	(0.0218)
Home visits (t-1)				-0.0442	-0.0411	-0.0398
				(0.0235)	(0.0226)	(0.0209)
Home visits (t-2)				0.0189	0.0163	0.0111
				(0.0165)	(0.0161)	(0.0194)
Home visits (t-3)				0.0111	0.0104	0.0173
				(0.0199)	(0.0185)	(0.0144)
Home visits (t-4)				0.0366	0.0279	0.0185
				(0.0286)	(0.0278)	(0.0240)
% had Primary care visits (t)			0.756			
			(0.847)			
% had Primary care visits (t-1)			0.680			
			(0.827)			
% had Primary care visits (t-2)			-0.173			
			(0.632)			
% had Primary care visits (t-3)			0.612			
			(0.817)			
% had Primary care visits (t-4)			0.631			
			(0.733)			
% Visited health center (t)						0.927
						(1.008)
% Visited health center (t-1)						0.349
						(1.301)
% Visited health center (t-2)						0.321
						(1.282)
% Visited health center (t-3)						1.329
						(1.091)
% Visited health center (t-4)						0.907
						(1.353)
% had home visit (t)						3.100
						(3.072)
% had home visit (t-1)						1.184
						(2.875)
% had home visit (t-2)						0.0954
						(3.009)
% had home visit (t-3)						-2.672
						(4.072)
% had home visit (t-4)						3.901
						(3.059)
% Women	2.795*	1.432	1.382	2.581*	1.366	0.616
	(1.088)	(0.911)	(0.914)	(1.206)	(0.924)	(0.914)
Income, thousand SEK	0.0458	0.174**	0.272**	0.0477	0.140	0.161
	(0.0796)	(0.0636)	(0.0960)	(0.0789)	(0.0889)	(0.0873)
% born abroad	0.274	-0.929**	-0.527	0.274	-1.069*	-1.055*
	(0.389)	(0.302)	(0.414)	(0.392)	(0.411)	(0.393)
Age 70-74	-21.22*	-12.36	-17.01	-17.92	-9.969	-9.326
	(9.009)	(8.199)	(9.107)	(9.863)	(9.378)	(8.567)
Age 75-79	-48.05*	-25.09	-38.77	-40.40	-19.10	-21.85
	(22.06)	(19.50)	(22.17)	(24.08)	(22.44)	(21.57)
Age 80-84	-89.27*	-43.36	-62.63	-78.91	-35.75	-50.73
	(39.64)	(32.78)	(36.31)	(41.15)	(35.77)	(38.19)
Age 85-89	-119.9*	-53.79	-69.95	-112.1	-49.70	-84.87
	(56.64)	(46.80)	(49.85)	(57.50)	(47.76)	(55.88)
Age 90 +	-173.3*	-80.72	-79.90	-172.4*	-84.89	-124.3
	(76.48)	(61.98)	(62.47)	(75.85)	(61.08)	(68.00)
% with Cancer	3.830	0.0283	-0.131	3.767	-0.00844	-0.703
	(3.328)	(3.110)	(3.178)	(3.307)	(3.105)	(3.351)
% with Stroke	7.847	3.334	3.216	8.031	3.530	4.104
	(5.123)	(3.725)	(3.784)	(5.207)	(3.808)	(3.962)
% with Joint disease	2.837	1.030	-0.158	4.111	1.923	2.340
	(12.22)	(10.00)	(9.661)	(12.05)	(9.600)	(9.714)
% with Osteoarthritis	11.43*	13.28*	12.46	11.05*	13.19*	10.65
	(5.314)	(6.459)	(6.637)	(5.347)	(6.314)	(5.882)
% with Heart failure	8.443*	8.301	8.173	8.151*	8.140	6.802
	(4.087)	(4.314)	(4.304)	(3.964)	(4.268)	(4.099)
% Hip fracture	12.82	9.979	9.854	12.67	9.999	9.940
	(6.620)	(5.695)	(5.867)	(6.656)	(5.631)	(5.928)
% Other Psychoses	16.98	20.62	18.28	17.12	21.46	21.63
	(12.63)	(15.54)	(16.70)	(12.55)	(15.99)	(16.91)
% Schizophrenia	2.081	1.966	-0.118	3.030	2.720	6.992
	(25.44)	(36.31)	(37.69)	(25.27)	(35.58)	(35.99)
Constant	-195.6**	-125.7**	-208.2**	-170.8*	-94.88	-81.76
	(57.47)	(40.93)	(75.04)	(74.62)	(75.89)	(64.11)
Observations	3,876	3,876	3,876	3,876	3,876	3,876
R-squared	0.362	0.419	0.423	0.364	0.420	0.428
Time FE	No	Yes	Yes	No	Yes	Yes
Entity FE	No	Yes	Yes	No	Yes	Yes
F, Visits	0.0926	0.268	0.330	0.00300	0.337	0.187
F, % had visit/visited			0.421			0.0255
Robust standard errors in parentheses						
**** p<0.01, * p<0.05**						

TABLE 16: ROBUSTNESS CHECK. TESTING H1 WITH AND WITHOUT CONTROLS FOR RETIREMENT HOME. (CROSS SECTION, WLS)

	(1)	(2)
VARIABLES	Inpatient days	Inpatient days
Health center visits	-0.178**	-0.177**
	(0.0578)	(0.0579)
Home visits	0.0166	0.0165
	(0.0142)	(0.0142)
% In Retirment Home		0.679
		(1.330)
Physician visits in Ret. Home		0.0357
		(0.0926)
% has had home visit	3.375**	3.447**
	(0.749)	(0.758)
% has visited health center	0.738	0.855
	(0.604)	(0.625)
% Women	2.022	1.951
	(1.060)	(1.077)
Income, thousand SEK	-0.177**	-0.162**
	(0.0568)	(0.0572)
% born abroad	0.276	0.283
	(0.191)	(0.191)
Age 70-74	3.915	4.840
	(14.89)	(14.68)
Age 75-79	34.69	32.98
	(22.21)	(22.82)
Age 80-84	44.15	37.68
	(34.28)	(36.87)
Age 85-89	53.47	40.23
	(45.50)	(50.52)
Age 90 +	33.72	11.57
	(50.23)	(62.67)
% with Cancer	8.438*	8.537*
	(3.519)	(3.566)
% with Stroke	6.577*	6.620*
	(3.071)	(3.160)
% with Joint disease	-1.118	-1.952
	(8.998)	(9.201)
% with Osteoarthritis	7.459	7.263
	(3.814)	(3.967)
% with Heart failure	14.29**	14.42**
	(3.184)	(3.247)
% Hip fracture	10.51**	10.86**
	(3.327)	(3.284)
% Other Psychoses	18.45*	18.81
	(9.097)	(9.518)
% Schizophrenia	44.19	41.36
	(28.29)	(29.32)
Constant	-66.74	-80.95
	(93.39)	(94.27)
Observations	228	228
R-squared	0.974	0.974
F, Visits	0.00556	0.00658
F, % had visit/visited	8.21e-05	8.51e-05
Robust standard errors in parentheses		
**** p<0.01, * p<0.05**		

TABLE 17: ROBUSTNESS CHECK. REPLICATING TABLE 1, USING DIFFERENT POPULATION FIGURES AS WEIGHTS. (CROSS SECTION, WLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days	Inpatient days
Primary care visits	0.245**	0.0346	0.0232	0.0232				
	(0.0134)	(0.0171)	(0.0145)	(0.0146)				
% has done primary care visit				-0.0322				
				(0.993)				
Health center visits					0.0703*	-0.143*	-0.144*	-0.165**
					(0.0331)	(0.0613)	(0.0583)	(0.0563)
Home visits					0.265**	0.0362*	0.0252	0.0171
					(0.0168)	(0.0171)	(0.0149)	(0.0142)
% has visited health center								0.370
								(0.888)
% has had home visit								3.332**
								(0.787)
% Women		2.932**	3.654**	3.646**		2.273*	2.979**	1.970
		(1.023)	(0.863)	(0.930)		(1.030)	(0.970)	(1.050)
Income, thousand SEK		-0.338**	-0.213**	-0.214**		-0.335**	-0.214**	-0.176**
		(0.0910)	(0.0669)	(0.0699)		(0.0679)	(0.0472)	(0.0543)
% born abroad		0.550*	0.384	0.384		0.528*	0.378	0.258
		(0.217)	(0.204)	(0.199)		(0.251)	(0.225)	(0.180)
Age 70-74		50.88**	4.354	4.513		73.47**	27.04*	5.428
		(5.168)	(9.428)	(10.37)		(7.530)	(11.38)	(13.01)
Age 75-79		110.2**	22.67	22.86		149.9**	62.04**	36.17
		(10.20)	(17.89)	(19.41)		(14.26)	(21.64)	(22.79)
Age 80-84		181.5**	47.24	47.40		231.5**	97.15**	44.91
		(20.84)	(30.10)	(31.06)		(22.89)	(31.69)	(35.55)
Age 85-89		289.3**	98.60*	98.62*		327.9**	138.2**	52.72
		(22.59)	(37.17)	(37.32)		(23.73)	(35.07)	(46.09)
Age 90 +		386.0**	109.4*	109.1*		392.8**	121.7**	27.97
		(24.54)	(47.02)	(47.79)		(22.13)	(39.21)	(48.96)
% with Cancer			9.276*	9.270*			8.717*	8.123*
			(3.610)	(3.655)			(3.768)	(3.627)
% with Stroke			5.456	5.453			6.247	6.282*
			(3.173)	(3.166)			(3.184)	(3.016)
% with Joint disease			4.499	4.503			7.218	-1.320
			(9.396)	(9.421)			(9.203)	(9.028)
% with Osteoarthritis			11.51**	11.54**			10.57*	7.353
			(4.028)	(3.975)			(4.298)	(3.936)
% with Heart failure			14.27**	14.27**			13.67**	14.31**
			(3.490)	(3.496)			(3.237)	(3.179)
% Hip fracture			11.15**	11.14**			10.34**	10.32**
			(3.656)	(3.763)			(3.655)	(3.481)
% Other Psychoses			18.46	18.44			19.72*	17.69
			(9.757)	(9.909)			(9.414)	(9.415)
% Schizophrenia			50.12	49.97			50.31	40.92
			(34.98)	(35.36)			(31.01)	(29.02)
Constant	9.848	4.182	-134.1*	-130.8	70.73**	90.76	-47.44	-34.20
	(7.998)	(54.39)	(50.27)	(125.0)	(12.51)	(60.97)	(66.87)	(110.2)
Observations	228	228	228	228	228	228	228	228
R-squared	0.815	0.963	0.972	0.972	0.829	0.966	0.974	0.977
F, Visits	0	0.0508	0.119	0.120	0	0.0141	0.0152	0.00710
F, % had visit/visited				0.974				0.000626
Robust standard errors in parentheses								
**** p<0.01, * p<0.05**								

TABLE 18: VARIABLES IN THE MEDICAL DATASETS.

Inpatient variable	**Oupatient variable**	**Explanation**
Id	Id	Id (encrypted)
TOTKOST	TOTKOST	Total cost (debited amount)
Akut	Akut	Whether the visit is emergent or not
Vårdtillf	Besök	Number of visits
	Besökstyp	Type of visit (for example home visit)
Klinik	Klinik	Clinic
Kommun	Kommun	Municipality/district
Specialitet	Specialitet	Specialty
Uppdragstyp	Uppdragstyp	Kind of Assignment (such as health center, home care, or emergency hospital)
	Vrdgivare1-5	Care giver 1-5 (Physician, nurse etc.)
Åldersgrupp	Åldersgrupp	Age group
År-månad	År-månad	Year and month of the visit
Vårdtid		Length of hospital stay (in days)
Diagnos		Diagnosis (ICD10)
DRG		Diagnosis Related Groups (DRG)

TABLE 19: EXACT DEFINITIONS OF MEDICAL VARIABLES

Variable	Definition
Health center visit	Besök if (Uppdragstyp = "Hemsjukvård basal - Auktoriserad" or "Kvälls- och nattpatrull" or "Husläkarjour - Auktoriserad" or "Husläkarverksamhet - Auktoriserad" or "Husläkarverksamhet, basåtagande") and (Besökstyp = "Nybesök enskilt" or "Återbesök enskilt") else 0
Home visit	Besök if (Uppdragstyp = "Hemsjukvård basal - Auktoriserad" or "Kvälls- och nattpatrull" or "Husläkarjour - Auktoriserad" or "Husläkarverksamhet - Auktoriserad" or "Husläkarverksamhet, basåtagande") and (Besökstyp = "Hembesök") else 0
Physician visits in Ret. Home	Besök if Uppdragstyp = "Läkarins särs boende - Auktoriserad" else 0
Emergency room visit	Besök if Uppdragstyp = "Sjukhusvård/Akutsjukhus" and Akut = "J" else 0
Inpatient day	Vårdtid
Cost of Inpatient care	TOTKOST
Emergent Inpatient day	Vårdtid if Akut ="J" else 0
Planned Inpatient day	Vårdtid if Diagnosis is classifed as avoidable else 0
Avoidable Inpatient day	Vårdtid if Akut = "N" else 0

TABELL 20: LIST OF DIAGNOSIS (ICD 10)

Avoidable diagnosis	Cancer	Stroke	Joint disease	Osteoarthritis	Heart failure	Hip fracture	Other Psychoses	Schizophrenia
D501	C00	I60	M00	M15	I20	S720	F060	F20
D508	C01	I61	M01	M16	I21	S721	F061	F21
D509	C02	I62	M02	M17	I22	S722	F062	F231
E101	C03	I63	M03	M18	I23		F063	F232
E102	C04	I64	M05	M19	I24		F064	F25
E103	C05	I65	M06		I25		F065	
E104	C06	I66	M07		I42		F066	
E105	C07	I67	M08		I50		F068	
E106	C08	I68	M09				F069	
E107	C09	I69	M10				F09	
E108	C10	G45	M11				F103	
E110	C11		M120				F104	
E111	C12		M315				F105	
E112	C13		M32				F106	
E113	C14		M33				F107	
E114	C15		M34				F108	
E115	C16		M353				F109	
E116	C17						F113	
E117	C18						F114	
E118	C19						F115	
E130	C20						F116	
E131	C21						F117	
E132	C22						F118	
E133	C23						F123	
E134	C24						F124	
E135	C25						F125	
E136	C26						F126	
E137	C27						F127	
E138	C28						F128	
E140	C29						F129	
E141	C30						F133	
E142	C31						F134	
E143	C32						F135	
E144	C33						F136	
E145	C34						F137	
E146	C35						F138	
E147	C36						F139	
E148	C37						F143	
I110	C38						F144	
I119	C39						F145	
I240	C40						F146	
I248	C41						F147	
I249	C42						F148	
K250	C43						F149	
K251	C44						F153	
K252	C45						F154	
K254	C46						F155	
K255	C47						F156	
K256	C48						F157	
K260	C49						F158	
K261	C50						F159	
K262	C51						F163	
K264	C52						F164	
K265	C53						F165	
K266	C54						F166	
K270	C55						F167	
K271	C56						F168	
K272	C57						F169	
K274	C58						F173	
K275	C59						F174	
K276	C60						F175	
K280	C61						F176	
K281	C62						F177	
K282	C63						F178	
K284	C64						F179	
K285	C65						F183	
K286	C66						F184	
K522	C67						F185	
K528	C68						F186	
K529	C69						F187	
N390	C70						F188	
N136	C71						F189	
J312	C72						F193	
J45	C73						F194	
J46	C74						F195	
I50	C75						F196	
J81	C76						F197	
I10	C77						F198	
J41	C78						F199	
J42	C79						F22	
J43	C80						F230	
J44	C81						F233	
J47	C82						F234	
I20	C83						F235	
E86	C84						F236	
O15	C85						F237	
G40	C86						F238	
G41	C87						F28	
R56	C88						F29	
N70	C89						F30	
N73	C90						F31	
N74	C91						F32	
N10	C92						F33	
N11	C93						F34	
N12	C94						F38	
H66	C95						F39	
H67	C96						F442	
J02	C97						F448	
J03							F449	
J06							F531	
							F84	