Promoting Healthy Living: How Doctor payment Methods Impact Patients Lifestyle Choices

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Abstract

This paper investigates the effect that visiting the doctor has on patient outcomes with respect to health related behaviours. By using a 2SLS the model investigates how patient outcomes differ given a certain number of doctor visits depending on how the doctor is paid. Specifically, salary, fee-for-service and capitation payment methods are investigated. The healthy behaviours analyzed are the smoking, alcohol consumption and physical activity, and the results are varied for each behaviour. Smoking and alcohol consumption variables do not yield results consistent with expectations, while results related to physical activity variable is more consistent with theory. Overall there is some evidence to suggest the incentives provided by the method of payment are relevant in determining patient outcomes.

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1 Introduction

One of the toughest issues policy makers have to deal with is how to effectively provide health care in a society. There is no specific answer to this question and many countries choose to approach the issue differently, leading to varied health care systems around the world. While differences exist, the primary objective remains the same; provide the best quality health care at the lowest possible cost. Each country weights the trade off between cost and quality differently, but rising costs of health care are an issue faced by many countries and regions around the world. The average amount spent on health per person in OECD countries was close to US$4000 annually according to the World Health Organization (2010). An effective solution to lowering the cost of health care while maintaining quality is something sought after by almost every country in the developed world.

Systems of health care have technical and bureaucratic features that could be adjusted to lower costs, but another effective solution is to promote healthy habits of the general population. To illustrate this, Lightwood and Glantz (2013) use a natural experiment California which showed that an investment of $2.4 billion in smoking prevention measures led to a decrease in overall health care spending by $138 billion over the same period of time. By increasing the health of the population a country can lower costs through the lower demand for health care from a given population. It is well known there are many things people can do to make them healthier, such as exercising more; drinking alcohol less or smoking less. The problem then becomes: what can policy makers do to influence individuals to make healthier choices?

This paper investigates physicians role in promoting healthy behaviours; more specifically how the method of payment of a physician can influence the health related choices of an individual. Physicians, like anybody else, can be influenced by the incentives provided through their payment. This paper investigates these incentives and attempts to show that paying physicians differently influences the behaviour of a patient. The assumption of this paper is that incentives provided by physicians is an important factor in the care they choose to

provide. The assumption seems reasonable since the point of paying physicians differently is to reward different types of work, and in turn adjust behaviour so physicians are performing their required roles.

There are 3 main methods of physician payment systems investigated in this paper: salary, fee-for-service, and capitation based systems. A salary system gives a set payment for a specified time frame, fee-for-service provides payment based on the number and type of services provided by the physician in a given time frame and a capitation based system compensates physicians based on the number of patients they have registered to them. In addition, capitation based systems are often supplemented by additional fee-for-service or salary payments. These different systems provide payments based on different criteria, and therefore provide incentives to administer care differently. This paper uses an empirical model to isolate the effect these incentives have on patient outcomes with respect to smoking, drinking and exercise habits.

Through an understanding of each payment method I hypothesize that physicians paid by a fee-for-service system will encourage healthy behaviours less in order to increase patients utilisation of health care services, while physicians paid according to capitation will encourage healthy lifestyles to reduce the utilisation of health care. Salaried physicians are not influenced by these incentives and therefore are not encouraged to provide certain advice to patients. In section 2 I present economic literature related to the topic in order to provide context. In section 3 I describe the empirical model I use to investigate the effects of doctor payment schemes. In section 4, I describe the Survey of Health, Ageing and Retirement in Europe (SHARE), a panel data set on health across multiple European countries, which I use to estimate my empirical model. In section 5 I describe my expectations of the model based on the incentives each system provides and provide an analysis on what my findings represent in the context of the model. Finally, in section 6 I will provide an overview of what I have discovered so far and where there is potential for future research.

2 Relevant Economic Literature

There is an extensive economic literature to determine why people choose to make healthy decisions and how to influence this behaviour. Studying how people make decisions related to health started with the health capital model presented in Grossman (1972) which he later improved in Grossman (1999). In the health capital model people invest in"health" which increases the number of time periods they can accumulate utility over. Individuals in this model choose to maximize lifetime utility by consuming goods to gain utility and investing health to increase the time periods they have. Individuals reach the end of their time horizon when their "health capital", which depreciates over time, drops below a certain level. This model relies on many strong assumptions and applies unrealistic homogeneity across individuals however it has been the foundation for other research to expand the understanding of individuals' choices with respect to health. The key insight that this paper gives which will be important to my research is identifying "health" rather than health care as a capital good which people invest in. This important distinction is what allows us to understand why health related behaviours are impacted by aspects of the health care system.

In a related paper, Ozkan (2014) also tries to understand how people choose to invest in their health over time, but focuses on the differences in high and low income individuals. The findings of this paper show that high income individuals typically spend less on health care throughout their lifetime due to the fact that they invest more in preventive medicine early in life which reduces lifetime spending. This paper uses income distribution to understand differences in the investments of health care, which is realistic within the privatized American system where this data is taken from, but less so generally across all health care systems. My research does a similar analysis but is looking directly at certain types of preventive medicine rather than lifetime spending on health care. In addition I use the number of doctor visits given a doctor payment method as my explanatory variable, rather than income levels.

While Grossman (1999) and Ozkan (2014) are both relevant, since they try to understand

health related decisions, unlike my research there is not a focus on the impact physicians can have on these behaviours. However, research into physician impacts has also been conducted, Freeman (2002) studies the effect of the length of a physician consultation on the outcomes for patients. The study finds that longer consultations results in physicians providing more advice on living a healthy lifestyle and reduced prescribed drugs. This differs from the analysis I have performed in that it is using length of consultations rather than the method of payment for the physician as the explanatory variable. However, the results presented are relevant to my research in that the length of consultation can be largely influenced by the health care system. In a study of six European countries Deveugele, Derese, van den Brink-Muinen, Bensing and De Maeseneer (2002) find that length of physician visits is largely influenced by the country they practice in. Their findings show that the country doctors practice in as well as other characteristics of the doctor are as important to length of consultations as characteristics of the patient. Combining the two facts that consultation lengths are determined, at least in part, by the country a physician operates in and consultation length has an effect on the healthy behaviours of patients, there is strong evidence to show that different physician incentive schemes affect healthy behaviours.

Moving to a much more similar model to the one I intend to use, Dave and Kaestner (2009) estimate the effect insurance coverage has on the consumption of preventive medicine. The model in this paper is based of the idea that increased medical coverage does reduce consumption of preventive medicine through moral hazard. However, by increasing insurance coverage an individual has more consultations with medical professionals leading to greater healthy behaviours. In my research, I want to investigate this issue but with a focus on the comparison across multiple countries. As will be the case in my research the dependent variable is some health related behaviour including time spent exercising, alcohol consumption or cigarette consumption. In the analysis provided by Dave and Kaestner their independent variables include demographic variables such as marital status and age, followed by a dummy variable indicating if they are over or under 65 and a dummy variable signifying if they were

insured before the age of 65. The data used is from a random panel survey in the United States, the reason the dummy variables are included is to see the effect on healthy behaviours of uninsured people when they turn 65 and obtain Medicare coverage. They then expand this regression to include dummy variables representing whether the individual had a doctor visit in the last year. They first estimate the effect of changing insurance coverage on the number of doctor visits, and then estimate the effect of insurance coverage and doctor visits on the healthy behaviour given. The results of this paper show that while controlling for doctor visits of a previously uninsured person there is significant effects of gaining insurance on both cigarette consumption and alcohol consumption. In both cases gaining insurance led to an increase in health impacting behaviours that was offset in different capacities by the increase in doctor visits.

3 The Model

In order to isolate the effect doctor visits have on certain behaviours I use a 2 Stage Least Squares model where the dependent variable in each model is represented by some healthy behaviour. The reason for using the 2SLS model is to avoid potential endogeneity. Individuals who care significantly about their health should be going to the doctor regularly and engaging in a healthy lifestyle. Therefore both doctor visits and health related behaviours could be correlated with some unobserved characteristic included in the error term. To avoid this I use an instrumental variable to estimate the number of doctor visits.

The health impacting behaviours I have chosen to analyze include: number of cigarettes consumed daily, number of times consumed more than 6 drinks in the last 3 months and hours of moderate or intense physical activity performed weekly.

The regression equations for this models are given by:

$$y_i = \beta_0 + \sum_{j=1}^{4} \beta_j \widehat{visit_{ji}} + \beta_5 pay_i + \beta_6 chronic_i + \beta_7 gdp_i + \beta_8 age_i + \beta_9 age_i^2 + u_i \quad (1)$$

$$visit_{ji} = \alpha_0 + \alpha_1 supply_i + \alpha_2 pay_i + \alpha_3 chronic_i + \alpha_4 gdp_i + \alpha_5 age_i + \alpha_6 age_i^2 + \epsilon_i \quad (2)$$

Together these 2 equations make up the 2SLS regressions that will be estimated. I estimate equation (2) once to get fitted estimates of doctor visits, and then estimate equation (1) separately for each payment method and each health impacting behaviour. Equation (2) represents the first stage regression to estimate the number of doctor visits, represented by the variable $visit_{ji}$ where j represents the payment method of the doctor where individual i resides. pay_i represents whether or not an individual had to pay or not to see a doctor in the last 12 months, $supply_i$ represents the number of practicing physicians per 1000 people in a particular country, $chronic_i$ represents the number of chronic conditions that affect the individual, gdp_i represents the GDP per capita in the individuals country of residence and age_i combined with age_i^2 represent a quadratic term for the age of the individual. This combination of variables is used to estimate the number of physician visits.

The instrumental variable is $supply_i$ and therefore is not included in equation (1). The variable $supply_i$ is the best instrumental variable because although each variable in equation (2) can be justified as having an effect on doctor visits, $supply_i$ is not likely to have a direct impact on any healthy behaviours. Clearly the number of available doctors can have an impact on individuals ability or desire to go see the doctor, however the number of doctors does not likely affect an individuals lifestyle choices other than through the change in the number of doctor visits.

Each other variable contains information about the individual, and therefore could affect behaviour related to health. The age terms and the term for the number of chronic conditions could impact both number of doctor visits and the choices an individual makes. As either of these values increases, an individual requires more from their doctor and requires more

visits. However, as age and chronic conditions increase people are often limited physically and are required to make certain lifestyle adjustments. For example, someone who requires an oxygen tank due to a certain condition is seriously limited in their ability to smoke or exercise and therefore reduces these activities independently of the number of doctor visits they have in a given year. The variable pay_i could also impact an individuals behaviour since it can signal certain things about the individual's ability to acquire health care. If somebody must pay to see the doctor they also likely have to pay for things like other operations or prescriptions and would therefore be indirectly encouraged to live a healthier lifestyle, in essence substituting away from the expensive forms of health care.

Equation (1) represents the main regression we are trying to estimate, and the main parameters of interest are β_j for $j \in 1, 2, 3, 4$. The term $\widehat{visit_{ji}}$ represents the number of doctor visits for observation i under payment scheme j estimated from the regression given in equation (2). Therefore for each observation the individual will be residing within a specific country, and $visit_{ji} = 0$ for each payment scheme j except the one applied in the given country. By running a separate 2SLS regression for each health behaviour under each payment method I will retrieve estimates of β_j for $j \in 1, 2, 3, 4$, and these will give an estimate of the effect of an additional doctor visit on the given behaviour under each payment method. With these estimates I will be able to investigate if the impact of a doctor visit differs in it's influence on healthy behaviours under each payment method.

4 The Data

4.1 Overview

The Survey of Health, Ageing and Retirement in Europe or SHARE is a survey conducted across 27 European countries and Israel to collect information related to health, economic status, social connections and many other topics. The survey is used across many areas of researchers and in many disciplines because of the wealth of data available. The data set I

have obtained is a panel data set which has observations across 6 waves covering 11 years. Table 5 in the Appendix provides the years in which the data was collected broken down by country. As can be seen from this table, not every country has data contained in each wave, and when the data was collected varies by year for each country. These are more technical notes as the wealth of observations and number of countries provide sufficient information to carry out the intended research.

The survey data was collected through in person interviews conducted in the primary language of the interviewee. The information was recorded into the database through a computer program used by the interviewer to avoid measurement error in transferring the data from the interview to the database. If a respondent is unable to take part in the interview for any reason there is an option for someone else living within the household to answer the survey questions on their behalf.

4.2 The Relevant Data

To answer the specific research question the main information being used is related to basic demographics; health care coverage and availability; health and health related behaviour. By using the empirical model and the specific variables discussed in section 3 the SHARE dataset provides a population that can be analyzed to answer the question: how does the payment method of a doctor affect individual behaviour with respect to health?

The most important feature of this dataset, that makes it applicable to this particular research question is that it has cross country variation in payment methods. Within specific countries doctors are often treated similarly but across countries there can be significant variation. Table 2 provides an overview of which countries in the dataset are classified under which payment methods. Each payment method contains a variety of different countries, this is important for two reasons. First, the estimates for the coefficients on the doctor visit variables are less likely to be biased due to country characteristics other than the payment

method. Second, including more countries allows the dataset to have more variation in country characteristics such as physician supply and GDP per capita. More variation in these values allow for more accurate predictions as to how they effect the dependent variable.

Payment Method	Countries
Fee-For-Service	Belgium, Switzerland, Germany, France, Greece, Luxembourg
Salary	Sweden, Portugal, Poland
Capitation Based Systems	Spain, Denmark, Estonia, Slovenia, Czech Republic, Italy

Source: Kroneman, Madelon. Paying General Practitioners in Europe. NIVEL, 2011.

Table 1: The Payment Methods of Countries in Europe

One important thing to note is that every country included in the SHARE survey is not included in the countries listed in Table 2. The reason countries were excluded from the sample is related the structure of payment within those countries. That is, countries were excluded if there was variation in how doctors in the country are paid. For example, certain countries such as Ireland provide payments differently based on specific regions within the country. Other countries such as Austria have both private and public systems in which doctors are paid differently. Based on the data obtained there is no way to identify how an individual's doctor is paid and therefore the data was excluded from these countries. Further, the dataset is large enough that sample size is not an issue and therefore including observations that have the potential to cause bias is unnecessary.

. Another important note is that the SHARE data used in the analysis only includes observations from the wave 6 of the dataset. That is, this analysis uses one time period of the panel dataset as a cross-sectional dataset that does not vary over time. There are two main reasons for the omission of previous waves of data. First, the variables included in the model are not present in every wave and therefore these observations must be excluded. In certain cases the variables of interest are excluded altogether and in other cases the way the variable is measured changed from one wave to another. Since the measurement of these variables are not the same observations must be excluded. Second, the variation in payment methods over time makes estimating the model much more complex and will likely result in biased

estimates. While some information on reform to payment methods in certain countries can be found and accounted for, the exact transition of systems can often be complex. Countries in many cases have transition periods in which pilot projects are implemented resulting in varied payment methods within a country at one time. To avoid results that contained these types of observations I only used the most recent data in which doctor payment systems are easily identifiable in the selected countries.

In the final regressions presented in the next section only wave 6 is included. I chose wave 6 to be included since it is the most recent data, it has all the variables needed and has data across the most countries. In addition, information on how payment systems have worked historically is limited and it is difficult to categorize countries into different payment systems when using previous waves.

Finally, all variables are included from the SHARE dataset except for supply of physicians in a given country and GDP per capita. These variables were not available in the SHARE data and therefore were taken from the World Bank database.

5 Theoretical Expectations and Empirical Results

5.1 Payment Methods and Incentives

Now, I give an overview of the results that are expected of this model based on each system and the incentives it provides. The first system that I investigate is the fee-for-service payment method. Only the salary system does not tie pay to performance in some way. Both the fee-for-service and capitation based systems try to reward physicians based on the amount of work they must do, however what differs is the way the level of work is measured.

A salary system is fairly straightforward, it provides a set salary for a given year. In most salary systems there is some sort of bonus compensation but this is small relative to the salary, and is usually based on physicians performing speciality services in some form. Since pay in this system is not tied to performance or workload, doctors are not rewarded

for providing a certain type of care. The lack of incentives here makes it hard to judge how patients will be advised and respond to care. It is my hypothesis that the levels of healthy behaviours caused by physician consultations will be somewhere in between that of fee-for-service and capitation based on the incentives provided by these systems.

The compensation of physicians in a fee-for-service system provides much more clear incentives. The compensation for physicians in this system is based on the number of services they provide. That is, physicians record each time they provide a service to a patient and bill the insurance company, the individual or the government depending on how health care is distributed in that country. Since my research focuses on general practitioners the services are less varied depending on what the responsibilities are in a given country. Some examples of services that could be provided, are physical assessments, tests for certain diseases or health consultations.

A fee-for-service system attempts to link physician compensation closely to the amount of work they are required to do, and how specialized their services are, since more specialized services typically result in higher fees. Under this system to maximize income a physician must try to maximize the number of consultations and procedures they perform in a given year. Therefore a physician typically has an incentive to provide solutions to patients that involve repeated consultations. For example rather than advising a patient with high blood pressure to exercise more or eat healthier they may prescribe a blood pressure medication. This would require the patient to continually visit the physician and constantly renew prescriptions which would in turn boost the physicians income. The fee-for-service system makes income a function of interaction with patients regardless of health outcomes, and therefore encourages physicians to keep patients returning to the health care system.

The alternative to a fee-for-service system that also rewards physicians based on their level of work is a capitation based system. This system rewards physicians based on the number of patients they care for in a given year. Patients are required to register with a particular doctor and only seek general consultations with that doctor. The doctor is then

paid based on how many patients they have registered to them regardless of how many services they provide in a given year. In most cases capitation system are the majority of the payment but are supplemented by either fee-for-service and salary payments. The payment is still closely tied to the amount of work a physician has to do in a given year, it is not directly linked to the total amount of services provided.

In theory, this system provides greater incentives to advise patients to live a healthy lifestyle than the fee-for-service system previously discussed. If the goal of the physician is to maximize income they must try to maximize the number of different patients they have registered to them in a given year. That is, physicians want people to choose them as their "family doctor" and then have their patients schedule as few visits as possible. In this case it is in the doctors interest to have patients be as healthy as possible, as a healthier person likely needs to see the doctor less. Therefore rather than provide advice that keeps the patient returning a physician has an incentive to provide individual based solutions. If all of their patients eat healthy, exercise and do not consume harmful substances they will be able to take on more patients because people will not be visiting as often. Unlike the fee-for-service system, the capitation system compensates physicians based on their ability to see as many patients as possible, indirectly motivating them to advise individuals to improve health through lifestyle choices rather than health care solutions.

5.2 Emprical Results Related to Smoking

The first healthy behaviour analyzed in this model is the consumption of cigarettes. This variable specifically is measured as number of cigarettes smoked daily. This measure seemed the most appropriate compared to other measures for smoking, as it accurately represents typical smoking behaviour. A large population of people who smoke do so daily, therefore the number of days smoked does not give significant variation and a prediction of number of cigarettes smoked across a larger time frame is more likely to display measurement error. Displayed in Table 3 are the coefficients and standard errors on each variable from equation

(1), the regression was performed 6 times, twice for each type of payment method.

The columns are labelled with the payment system being analyzed in each regression. The reason it was ran twice for each payment method, was to remove potential bias of non-smokers. The idea being that including non-smokers would bias the coefficient estimate towards 0, as doctor visits cannot reduce smoking of an individual which already has 0 consumption. The effect do not change significantly as most people who answered the question in the data were not smokers.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	salary	fee-for-service	capitation	salary	fee-for-service	capitation
visit	-0.712	-2.139***	-1.438	-0.834	-2.187***	-1.405
	(0.585)	(0.744)	(0.996)	(0.612)	(0.760)	(0.981)
pay	-1.532	0.811	2.113	-1.860	0.860	1.993
	(1.607)	(1.270)	(2.716)	(1.660)	(1.297)	(2.690)
chronic	2.301**	4.375***	3.134*	2.475**	4.429***	3.091*
	(1.006)	(1.314)	(1.747)	(1.054)	(1.341)	(1.728)
age	-2.207	0.355	0.694	-2.390	0.323	0.745
	(1.580)	(0.823)	(0.558)	(1.629)	(0.843)	(0.547)
sqrage	0.0198	-0.00158	-0.00424	0.0214	-0.00128	-0.00469
	(0.0130)	(0.00668)	(0.00445)	(0.0134)	(0.00685)	(0.00436)
gdp	-0.000237***	-9.93e-06	4.68e-05	-0.000230***	-7.67e-06	5.28e-05
	(4.90e-05)	(3.24e-05)	(4.22e-05)	(5.09e-05)	(3.32e-05)	(4.23e-05)
Constant	82.28*	9.697	-8.746	88.22*	10.75	-10.23
	(49.34)	(25.53)	(18.40)	(50.86)	(26.14)	(18.01)
Observations	291	1,815	1,499	289	1,809	1,486

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Regression Results with cigarettes smoked daily as the dependent variable

As can be seen from Table 2 all payment methods had a negative impact on smoking behaviour. However, only physicians paid according to the fee-for-service system had a statistically significant impact on smoking behaviours. The magnitudes are all quite substantial, with the smallest effect at -0.712. This may seem like a small estimate but considering that is the reduction in daily cigarettes per doctor visit it is quite substantial. The statistical

significance and magnitude of the coefficient on doctor visits in the fee-for-service regression imply physicians in these countries impact patient behaviour much more effectively than the other two models.

It is hard to justify these results with the theory provided in this paper. The fee-for-service payment method seems to be much more effective in decreasing smoking habits. A possible explanation for this is the level of smoking. As can be seen from Table 7, fee-for-service countries have the highest average cigarette consumption across the sample. Therefore a physician may be able to have more influence on overall outcomes as they have more opportunities to cause reductions.

5.3 Emprical Results Related to Alcohol Consumption

In this section the dependent variable is measured by the number of times an individual had more than 6 drinks in the past 3 months. The measure is slightly different than the one related to smoking for 2 reasons. It is less common that drinking occurs daily, many people who drink do so once a week or less meaning daily or even weekly estimates of the number of drinks consumed may not effectively represent the individuals behaviour. Secondly, the way drinking impacts health is not the same as smoking. Unlike smoking drinking has severe health effects when done excessively but does not display significant health risks when done so in moderation. Therefore, if there is two people both who consume approximately 7 drinks a week but one does it all in one sitting while the other has one drink a day, the health implications would be very different. Since this paper is trying to investigate behaviour which impacts health, a measure of times drinking in excess is a more effective measure than the amount of drinks consumed. Table 3 represents the results for the regressions of each payment method with respect to drinking behaviour.

VARIABLES	(1) salary	(2) fee-for-service	(3) capitation
visit	0.0443**	-0.0600***	-0.00303
	(0.0200)	(0.0140)	(0.0100)
pay	0.0301	0.0188	-0.0278
	(0.0401)	(0.0213)	(0.0319)
chronic	-0.0286	0.125***	0.0281*
	(0.0258)	(0.0272)	(0.0168)
age	0.0126	-0.0591***	-0.0274***
	(0.0199)	(0.0117)	(0.00635)
sqrage	-5.15e-05	0.000498***	0.000259***
	(0.000148)	(8.57e-05)	(4.49e-05)
gdp	-1.31e-06	3.83e-07	-6.06e-06***
	(1.32e-06)	(5.28e-07)	(6.95e-07)
Constant	5.777***	8.326***	7.402***
	(0.712)	(0.409)	(0.224)
Observations	6,382	20,743	25,971

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression Results with number of times had more than 5 drinks in the last 3 months as the dependent variable

As can be seen in Table 3 for fee-for-service and salary payment methods there is a statistically significant result on the variable representing doctor visits while capitation does not have a statistically significant coefficient. However, none of the coefficients are extremely large in magnitude. The largest coefficient is on fee-for-service and is represented as -0.06. Based on this estimate it takes approximately 17 doctor visits in a year to reduce the number of instances of excessive drinking by 1 every three months. The results likely do not imply that doctors are decreasing the number of instances very little in each visit but rather that they are causing decreases in drinking for a very small percentage of the data set.

One possible explanation for these insignificant results is that drinking is often consider a cultural and social norm. Especially in European countries which in 2010 had the third highest per capita of consumption of alcohol, behind only Africa and South East Asia, as well as the highest incidence of heavy episodic drinking (defined as more than 60 grams of pure

alcohol in one sitting at least monthly) at 16.5% among all people 15 years and older (World Healh Organization 2014). Therefore a doctor's advice to cut consumption of alcohol may be taken less seriously than other recommendations. This would explain the low magnitude of the effects as well as the statistical insignificance that occurs in the capitation system. In addition, the doctor will also likely be subject to these societal pressures and therefore are less likely to give advice on alcohol related behaviour.

5.4 Empirical Results Related to Physical Activity

In this section I present the empirical results with respect to physical activity. The physical activity measure is the number of activities requiring moderate or vigorous physical exercise in an average week. This measure was used because it is the best one offered in the dataset but it is not an ideal measure. The main problem with the measure is that it does not account for time spent doing these activities. The measure counts an activity requiring vigorous activity for 2 hours the same as an activity requiring moderate activity for 30 minutes. Another issue is that the measure is self reported so there is almost certainly bias in what is considered moderate or vigorous. While these issues are present and need to be considered in the analysis of results, this still provides some insight as to how active a person is in a given week.

VARIABLES	(1) salary	(2) fee-for-service	(3) capitation
visit	-0.137***	0.186***	0.635***
	(0.0397)	(0.0242)	(0.0563)
pay	-0.115	-0.230***	-1.710***
	(0.0816)	(0.0380)	(0.176)
chronic	0.403***	-0.104**	-0.787***
	(0.0522)	(0.0484)	(0.0924)
age	-0.198***	-0.151***	-0.154***
	(0.0475)	(0.0205)	(0.0364)
sqrage	0.00192***	0.00141***	0.00139***
	(0.000356)	(0.000151)	(0.000268)
gdp	-3.14e-05***	-1.10e-05***	-2.10e-05***
	(2.58e-06)	(8.74e-07)	(3.00e-06)
Constant	9.901***	7.299***	6.353***
	(1.671)	(0.715)	(1.249)
Observations	6,382	20,743	25,971

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression Results with number of moderate and vigorous activities in the past week as the dependent variable

As can be seen from Table 4 doctors have a statistically significant effect on physically activity regardless of the payment method. Interestingly, under the salary system the coefficient is negative, implying doctor visits lead to less physical activity. This is unexpected but is likely being caused by a reverse causality effect. In a case where patients have many health issues related to lack of exercise, these patients will likely seek health care more increasing the number of doctor visits and skewing results. If individuals in these countries typically exercise less for some unobserved reason, and doctors struggle to change this we would see higher doctor visits from less physical activity causing the negative coefficient.

While both fee-for-service and capitation have positive coefficients the magnitudes are consistent with expectations. The number of doctor visits in a capitation system leads to much more larger effects on the number of activities performed weekly than does the number of doctor visits in a fee-for-service system. For this variable, it appears the incentives that

are given through a capitation system are performing as expected.

5.5 Overview and Implications

The previous three sections illustrate that their are differences in the response of individuals to consultations with physicians depending on how the physician is paid. How the responses differ is a much more complicated issue. Based on the results with respect to smoking it would seem doctors paid according to fee-for-service influence patients to live healthier lifestyles more so then doctors paid according to salary and capitation. The results with respect to alcohol consumption imply that regardless of how the doctor is paid there is not significant impact from visiting a doctor on alcohol consumption. Finally, with respect to physical activity, fee-for-service and capitation show positive results, while salary shows a slightly negative correlation between doctor visits and activities performed. Some of these results are consistent with the expectations while others deviate significantly.

The results with respect to smoking are the most unexpected results, fee-for-service having a large effect while the other two systems have an insignificant effect are exactly opposite to what was predicted in the hypothesis. This is something that is difficult to justify with theory. Two explanations are given here as to how these results could have occurred.

The first possibility is that smoking is easier to influence in these countries because on average people smoke more. This may not be true across the entire country but as can be seen in Table 7 of the Appendix individuals in countries with a fee-for-service payment method displays the highest average number of cigarettes consumed. Therefore, one would expect with more smokers who consume more cigarettes, the probability of influencing some individuals is higher than in other countries.

Another possible explanation is that doctors in these countries have higher quality training with respect to dealing with smoking. There is not a significant amount of research on this topic and therefore it is hard to justify with evidence but is something that could be worth investigating in future research.

The regression results with respect to alcohol consumption do not reveal very much information about how doctors influence behaviour. While both salary and fee-for-service methods displayed statistically significant results, the magnitude of the variables are too low to be relevant. As mentioned previously the likely cause of these insignificant results is the high level of consumption that currently exists in Europe. Since the amount of excessive drinking episodes as defined by the World Health Organization is greater in Europe than anywhere else, the societal norms that exist across the continent are likely to counter-act any advice doctors give. More controls for these factors are needed in order to get the true results of how doctors are influencing behaviour across the different payment systems.

Finally, the regression results with respect to physical activity are closely related to the predicted results based on the incentives provided by each system. The salary system is the only one which has a negative impact, which also happens to be statistically significant. The result is likely stemming from the reverse causality effect described previously where patients see the doctor more due to health related issues from a lack of exercise.

Fee-for-service and capitation systems show statistically significant positive correlations between doctor visits and moderate to vigorous activities, but the magnitude of capitation systems is much larger. This is the result that is expected based on the incentives each system provides. The capitation system promotes doctors to use lifestyle based solutions as there is little or no benefit to seeing patients more often. The fee-for-service system rewards doctors based on their ability to make patients return for more services. The implication of these differences is that fee-for-service paid doctors will advise patients to continuously seek attention from the health care system rather than solve the issues through lifestyle changes. The larger effect of the capitation system matches these results.

Looking at the results across all the regressions the evidence is mixed, depending on the measure used, as to how the incentives of a payment method influence the advice being given by physicians. While each measure of healthy behaviour yielded different results, their is evidence from the regressions related to physical activity that the incentives provided to

doctors have an impact on patient outcomes. While this is not consistent with the results from the other two regressions, outside bias could explain the differences in results. As explained previously the model does not account for all variables and makes it hard to draw conclusive implications from each regression.

5.6 Important Assumptions and Limitations

The results predicted do present some relevant information to how incentives effect doctors but there is some important caveats that must be mentioned with respect to these results. First, as mentioned previously the assumption is being made that doctors are responding to incentives. An argument can be made that doctors will not respond to incentives in payment based on an ethical obligation. I do not find this argument to have much strength as the different payment methods are designed to reward doctors for differences in work. If the incentives were not believed to have an effect on behaviour there would be much less variation in how the doctors are paid, therefore I do not believe this assumption affects the implications we can draw from the model.

An assumption that likely has much more important effects on the results, is that the effects of doctor visits are entirely determined by the payment method. The model simply tests if differences across payment systems exist but do not actually imply a causal relationship. The justification for incentives is designed to support the results but still leaves room for bias. For example, training programs in specific countries may lead doctors to be more effective in having an influence on smoking behaviour. Including some measure of difference in doctor quality across countries would be an important implication in future research on this topic.

Another limitation worth discussing is the measurement error with respect to the physical activity variable. The variable is self-reported and therefore there is significant variation in how people may respond to this question. What different people may report as physical activity could potentially skew the results. However, since the goal is to determine how

doctor's influence health related behaviours someone who receives advice from a doctor and chooses to exercise as they see fit is what the model should measure and that seems to be accurately displayed in this case. Improving the model to determine more accurately how effective this exercise is in changing the health of an individual would be a valuable area for future research.

Finally and perhaps most importantly the lack of observations over time is a significant limitation of the results. Due to limitations in the dataset, panel methods cannot be used. As mentioned previously the different waves contain different variables and therefore the effects cannot be measured over time. A fixed effects or random effects regression would be extremely useful in this context and would be an important area for future research on this topic.

6 Conclusion

This paper has attempted to show that the incentives given to a doctor have significant effects on the lifestyle choices of patients. By analyzing patient outcomes in countries with three different payment methods, with varying incentives, this paper has shown that there is effects of the payment method of doctors on patient behaviour however they are not exactly consistent with predictions. The analysis which examined the effect of consultations with physicians on smoking, alcohol consumption and physical activity displayed varied results in the effect of the payment method. Based on the incentives provided by each method it was predicted that fee-for-service schemes would result in the most unhealthy behaviour while capitation schemes would result in the healthiest behaviour.

The results for smoking and alcohol consumption gave very different results than expected. These results are likely caused by a combination of societal factors and doctors ability to affect behaviour in certain regions. The results with respect to physical activity were consistent with predictions of the model. Based on these results there is some evidence

to suggest the predicted incentives under each payment method are influencing behaviour, however more evidence is needed.

Although some inferences can be made from the current analysis there is still room for further research. Specifically, adding more controls to reduce the bias caused by cross country variation in societal factors and doctor ability. Further, exploring a dataset with similar regressors across a panel data set would help improve this analysis significantly.

Appendix

Country	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Austria	2004	2006-2007	2008-2009	2011	2013	2015
Germany	2004	2006-2007	2008-2009	2011-2012	2013	2015
Sweden	2004	2006-2007	2008-2009	2011	2013	2015
Netherlands	2004	2007	2008-2009	2011	2013	N/A
Spain	2004	2006-2007	2008-2009	2011	2013	2015
Italy	2004	2006-2007	2008-2009	2011	2013	2015
France	2004-2005	2006-2007	2009	2011	2013	2015
Denmark	2004	2006-2007	2008-2009	2011	2013	2015
Greece	2004-2005	2007	2008=2009	N/A	N/A	2015
Switzerland	2004	2006-2007	2008-2009	2011	2013	2015
Belgium	2004-2005	2006-2007	2008-2009	2011	2013	2015
Israel	2005-2006	2009-2010	N/A	N/A	2013	2015
Czech Republic	N/A	2006-2007	2008-2009	2011	2013	2015
Poland	N/A	2006-2007	2008-2009	2011-2012	N/A	2015
Ireland	N/A	2007	2009-2011	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	2013	2015
Hungary	N/A	N/A	N/A	2011	N/A	N/A
Portugal	N/A	N/A	N/A	2011	N/A	2015
Slovenia	N/A	N/A	N/A	2011	2013	2015
Estonia	N/A	N/A	N/A	2010-2011	2013	2015
Croatia	N/A	N/A	N/A	N/A	N/A	2015

Table 5: Year of data collection for each wave of SHARE by country

Variable	Definition
chronic	The number of chronic conditions that affect an individual
visit	The number of doctor visits in the past 12 months
supply	The number of doctors per 1000 people in the country the respondent resides in
age	The age of the respondent
sqrage	The age squared of the respondent
pay	A dummy variable to indicate whether someone had to pay anything for doctor visits in the past 12 months
smoke	The average number of cigarettes the respondent smokes in a day
drink	The number of times the respondent had more than 6 drinks in the last 3 months
physical	The number of moderate to vigorous physican activities in a given week
gdp	GDP per capita in constant 2011 US dollars

Table 6: Variable definitions for each variable included in the results section

Variable	Statistic	Salary	Salary	Capitation Based System
smoke	Observations	344	2,262	1,799
	Mean	16.19	19.42	15.27
	Standard Deviation	11.48	13.08	10.44
drink	Observations	7,390	23,448	29,351
	Mean	6.6	6.45	6.61
	Standard Deviation	1.08	1.25	1.08
physical	Observations	7,390	23,448	29,350
	Mean	4.21	4.24	4.38
	Standard Deviation	2.04	1.94	2.07

Table 7: Summary statistics for each dependent variable under each doctor payment method

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Discussant Remark Response and Updates

To begin with, I will give a brief overview of some of the changes I have made since my draft paper. My analysis changed substantially which resulted in different results. Since the results were different my explanation had to change slightly. Therefore some of the comments I received were not valid in the context of the updated analysis but more on that later.

The analysis changed in three important ways. First at the suggestion of Professor Kashaev I included a GDP per capita variable in the regression. The variable is included to account for the differences in economic conditions on each dependent variable and resulted in changes in the other variables. Second I included a regression that removed the people who do not smoke from the analysis, I wanted to do a similar thing for drinking but there were no 0 observations in the drinking variable. There was minimal in the smoking variable as well so the changes did not give any new information.

The final change I made is an important one, I combined the blended and capitation systems into one category. There were 2 reasons for this. Professor Kashaev revealed to me that I needed variation in my supply variable in order to use it as an instrument and I did not have any in the Capitation system and therefore I could not use it. Second, as I tried to continue research into finding another capitation system I came across a number of reports that did not differentiate capitation and blended system. It seems the intended purpose behind the system regardless of whether it is blended or not is to shift incentives to be based on the capitation system. Since this is the focus, it seems reasonable to combine the categories and treat them as capitation systems. The remaining changes are in the interpretation and conclusion sections, which are changed to fit the new results obtained in the analysis.

Repsonse to Comments by Professor Kashaev

Four comments were given by Professor Kashaev and I believe I corrected my work to be consistent with each comment. The first was to include a GDP variable which as mentioned above is included. Second was to emphasize social and cultural norms which I supplemented with statistics in the interpretation section. Third was based on an inconsistency in tables between the presentation and the paper, which to be fixed within this paper. Finally, the issue with capitation is addressed above and is corrected in this paper.

Response to Comments given by Da Wang

The first point made here is related to patients responses to physician incentives. While it could be the case that patients respond in some way to physician incentives I find it unlikely and not worth discussion. In my particular case I did not understand the way my doctor was paid until I started this research. I think this is common, and even people who do now how the doctor is paid, it will not necessarily effect how they perceive advice, depending on their relationship with their doctor. I don't believe this to be significant enough to include in the paper.

The next two comments were related to the clarification of certain descriptions. The first was a suggestion to improve the discussion of the health capital model. I changed this description slightly but did not want to emphasize it further beyond how it is already emphasized. The reason for this, is that while it is related it does not directly tie in with the idea of physician incentives and is not a tool used in the discussion of my results. The second comment was to improve the description of the pay variable in the report. I did change this description to be more clear as suggested.

The only comment related to the data description is to move it to be before the methodology section in order to make it more clear. I decided against this because there is not much justification given as to why it would make it more clear. The common flow of an economic paper I have seen is to include the methodology section before the data section and I chose

to stick to this method.

Suggestions are given desperately based on each healthy behaviour analyzed. First, with respect to smoking a number of comments are given none of which I found valuable to include in the paper. First of all, the comments discussed specific results which changed. I do agree that quitting smoking is likely the cause of large decreases, but that I do not see how that is relevant as a doctor that effectively makes patients quit smoking is effective at decreasing the overall level of cigarettes consumed. Second, substitutes for smoking are discussed, these are not important as they are healthier option to smoking. If the doctor substitutes a patient away from smoking to a vaporizer, that is effectively getting a patient to quit smoking and should not be treated differently in the data. If the concern is that these substitutes are counting individuals as continuing smoking, that is not how the data is structured, it only includes cigarettes in the value for this variable.

The final comment suggests looking at the types of drinks being consumed for the possible skewed results, however I do not think this explanation is reasonable. The suggestion is that doctors are advising patients to substitute between types of drinks rather than away from drinking which I see as unlikely. This would be reasonable advice if it was some other ingredient other than alcohol causing the health issue but not if the advice was specifically targeting alcohol consumption. The reason is the number of drinks is not dependent on the alcohol content in the beverage. One beer is counted the same as one shot of a hard liquor because the alcohol content is similar. Therefore substitutions between these types of alcohol consumption is not advice likely given by doctors to decrease the quantity consumed.

Response to Comments given by Ryan Johnson

The first point made in these discussant remarks is that the assumption needs to be justified that physicians respond to incentives. I believe it is justified as the point of different payment methods is to incentivize physicians to perform differently. This assumption is justified in the paper briefly in the introduction and further in the limitations and assumptions section

later in the paper.

The main comment on the model is that the 2SLS model is not sufficiently justified and it is not clear why this model is being used. I believe this issue has been rectified through a brief discussion of the endogeneity that could exist within the model. I believe this significantly strengthened this section of my paper.

The comments with respect to data do not require changes to the paper. First, one issue is that capitation only has one country as discussed previously this is no longer an issue in the newly structured format. Second, it is mentioned that observation counts would be valuable, these are included in the appendix for reference.

In the discussion of the results the first point mentioned is that the alcohol results are not well discussed. I believe the discussion around this issue is more thoroughly discussed in the paper now. Second, the justification for the insignificant results with respect to alcohol were justified using societal norm arguments which are criticized as unbelievable given the large effects of smoking. Updating the model changed the effects of smoking to be much less significant and therefore I believe this explanation to be realistic now. Further, the health effects of smoking are much more prominent than that of alcohol and therefore is more likely to be influenced through doctors advice. While smoking is a societal norm no information was included talking about this as the results were more varied across the sample, and therefore it was harder to justify it with evidence as is the results with respect to alcohol.

Again, I believe the comments with respect to physical activity are valid but are not important due to the change in results. More discussion is given to the measurement error with respect to the variable however the implications drawn from the results are different and the paper has changed to account for that. Similarly for the conclusions drawn the difference in results warrants a different discussion and therefore the points are related to my conclusion are somewhat invalid. What I have taken from this advice is to make weaker conclusions that are supported by the evidence which I have tried to do in the final paper.