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Abstract

We analyze prescription behavior of physicians in the public and private sector. We study two major diseases for which an effective, widely accepted low-cost treatment and alternative, more expensive treatments are available. We find that private sector physicians are more likely to prescribe the expensive medication. The result holds after controlling for individual-level factors including health indicators based on detailed administrative data, and patient fixed effects. In one of our cases, we further find that the same physicians prescribe different medication when working in different sectors. These results are consistent with higher 2nd degree moral hazard in the private sector.

Keywords: healthcare, prescription behavior, public sector, private sector
JEL-codes: I11, H42, I18

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1. Introduction

Performance differences between the public and private sector is one of the most fundamental questions in public economics, as it determines the proper role of the public sector in a market economy. Healthcare is a prime example given that organizing, funding, and production of health services is one of the most important functions of the public sector in many countries, with supplementary private provision. Reasons for public sector involvement stem from information problems potentially leading to adverse selection and moral hazard, and hence inefficiency in private funding and production.

The purpose of this paper is to examine differences in the determination of costs in the public and private sector for an important item of healthcare expenditures: expenditure on medication. Drug expenditures amount on average to 17% of health care costs (1.4% of GDP) across OECD countries (OECD 2018). We study the determinants of physicians' prescription behavior, and whether prescription behavior differs between physicians when they operate in the private or public sector. More specifically, we examine whether physicians in either sector are more likely to prescribe a high-cost medicine, when an effective, widely accepted low-cost alternative treatment for the same condition is available.

The received wisdom in much of earlier literature suggests that private producers typically have better incentives to contain costs, albeit this may have adverse consequences for quality when quality is not contractible. The seminal paper in this strand of literature is Hart et al. (1997). Knutsson & Tyrefors (2022) provide a recent empirical contribution related to healthcare, by studying ambulance services, that supports those theoretical arguments.

Our paper challenges the view that incentives and outcomes regarding cost containment are necessarily superior in the private sector. When private service provision interacts with public financing – as it often does in health care – the incentives for cost containment crucially depend on details of reimbursement contracts and insurance. In the setting that we study, patients have a generous public insurance for prescription drug expenditures. Such insurance may lead to moral hazard in the form of demand for

higher cost medication, for example if higher cost carries an impression of better quality. (Actual quality may be hard for a patient to judge; healthcare is a prime example of a so-called credence good.) As we argue in the paper, physicians in the private sector may have stronger incentives to respond to moral hazard on the patient side for competition reasons, by prescribing higher cost medication even if it is not medically more effective.[1] The moral hazard in this instance is of second-degree because physicians are agents that react to anticipated moral hazard on behalf of patients.

In general, cost differences between public and private providers are notoriously difficult to assess and interpret, because of the potential correlation between cost and quality and because of potential selection issues, for example due to differences in case-mix between public and private sector. Our setting has several attractive features in this respect: First, we analyze differences in behavior in the public and private sector at the level of individual physicians. This is rare in the literature, yet important given that choices of individual practitioners ultimately determine patient outcomes and costs. Second, we study an institutional setting where we observe different treatments for the same condition, with varying costs but equally generous insurance.

Third, we use exceptional individual-level data with over 15 000 physicians and over 720 000 patients, with very detailed patient-level information including administrative data on health. This allows us to examine observationally similar patients who visit different sectors. Fourth, another attractive feature of our analysis setting is that many doctors work in both sectors allowing us to control for physician selection between sectors.

We compare treatment differences between public and private sector physicians in two cases where an effective, widely accepted low-cost treatment and alternative, more expensive treatments for the same condition are available. The first case is type 2 diabetes where the low-cost treatment (metformin) is identified as the primary treatment in the current care guidelines. The second case is high cholesterol where also

[1] Andersson et al. (2019) provide a review of evidence on differences in outcomes between public and private sector providers in settings where public services may be outsourced to a private provider, but there is no consumer choice between providers.

a cheap and commonly accepted treatment (simvastatin) is available, but the treatment guidelines are less binding. Both conditions are very important for both public health and healthcare costs. Finland, a country of 5.5 million people, has 250 000 diagnosed cases of type 2 diabetes and 700 000 individuals receiving medical treatment for high cholesterol. Type 2 diabetes is also one of the most important single diseases from the point of view of healthcare costs in advanced countries.

We find that in both cases, physicians are significantly more likely to prescribe the expensive alternatives in the private sector. The result holds also after controlling for a wide variety of individual-level factors including a range of carefully specified health indicators based on administrative data. The result holds also for a small subsample of patients for whom we are able to control for individual fixed effects. Further, in the case of type 2 diabetes, we find that the same doctors prescribe more expensive medication when working in private sector clinics.

The main message of the paper is two-fold: our results indicate that observationally similar patients – or even the same patients – receive different treatment depending on the sector they visit. The finding raises cause for concern, regardless of the precise reason behind the observed differences: If we are successfully able to control for relevant health factors, our findings imply that a substantial fraction of patients does not receive treatment that is solely determined by medical considerations. Second, even though the evidence is not fully conclusive, our findings suggest that moral hazard in prescription behavior is stronger in the private sector: public sector physicians substitute a high-cost alternative for a medication specified in the current care guidelines and in the case of diabetes, the same doctors choose different treatment depending on sector. Further, our results are consistent with patient income differences being a key driver behind treatment choices.

Our paper is related to several strands of literature. The literature on credence goods markets has used field experiments to identify second-degree moral hazard in the context of taxi drivers (Balafoutas et al. 2013, 2017) and repair services. Literature on health care services in this context is scarce. Lundin (2000) and Iizuka (2012) analyze moral hazard in prescription behavior, but do not discuss how to disentangle whether it

originates on the supply or demand side of the market, nor do they examine differences between sectors. Lu (2014) uses a randomized trial in China to analyze whether doctors' prescription behavior depends on whether (fake) patients are insured. Other recent papers analyzing physician moral hazard – in contexts other than prescription behavior – include Clemens and Gottlieb (2014), who use data from Medicare and find a positive relationship between physician payments and the supply of medical services. Gottschalk et al. (2020) randomized patients to dentists in Switzerland and analyzed how treatment recommendations depend on patient's socioeconomic status and the amount of information signaled by the patient. Einav and Finkelstein (2018) review the literature on patient moral hazard, and also note the scarcity of empirical evidence on physician responses. Our study supplements the above-mentioned papers by analyzing how physicians' prescription behavior depends on the sector in which they work, with different incentive structures, thus contributing to the important policy question of performance differences between public and private sector providers.

In health policy, many countries are moving towards a larger degree of private provision of health services. A prominent example is the U.K. (see e.g. Propper 2018), and more closely related to our context is Sweden (e.g. Dietrichson et al. 2020). The evidence is mixed on overall performance differences between sectors, and evidence relates mostly to differences between hospitals (for reviews, see e.g. Pita Barros & Siciliani 2012, Tynkkynen & Vrangbaek 2018). Literature on physician-level differences in behavior between sectors is scarce. Ohlsson et al. (2010) examine the association between patient socio-economic status and medication choices for high cholesterol, separately for public and private healthcare in Sweden. Das et al. (2016) analyze the behavior of physicians working in the public and private sector in rural India using (fake) patients randomized to physicians in an audit study. They find that among doctors with private and public practices, quality is higher in private clinics. In contrast to the fairly small sample sizes in this earlier work, we use a random sample of 2/3 of physicians operating in Finland, together with exceptionally rich and extensive individual-level administrative data on patients. As in Das et al. (2016), in a subsample analysis, we use panel data on doctors who operate in both sectors. We are not aware of other analyses of treatment differences between the public and private sector using physician-level data in advanced countries.

The paper proceeds as follows. The institutional setting and potential mechanisms that may cause differences in prescription behavior between sectors are described in Section 2. It also discusses medication guidelines that are relevant for our case studies. Our data is described in Section 3. Section 4 presents our empirical approach and results. Section 5 discusses our findings and Section 6 concludes.

2. Background

2.1 Institutional setting

All Finns have mandatory public health insurance coverage and can visit a public primary healthcare center. In addition, numerous private clinics also provide primary healthcare services.

The share of the private sector in healthcare provision has been steadily increasing in recent years and was just over 30% in 2016 (measured by the share of net value added in social and healthcare services; Kotakorpi & Seuri 2019). Patients in the private sector are on average wealthier and healthier than in the public sector. Further, socio-economic differences in health are fairly large (Tarkiainen et al. 2012).

During the time period we study, public healthcare was organized by municipalities. Outpatient care is provided in municipal health centers where a 20.6€ patient fee per visit can be charged.

The public health insurance provided by the Social Insurance Institution (SII) of Finland also partially reimburses for the use of private healthcare services. The reimbursement for private healthcare visits is however generally low and based on fixed fees. On average, the SII covers 16% of the costs of private visits (SII 2020a). Private top-up insurance is common among the patients of private clinics, with 16% of the Finnish adult population having a private insurance (Finance Finland 2020). Naturally, private healthcare visits can also be paid out-of-pocket.

In addition, employed patients can visit occupational health services free of charge with improved access compared to the municipal health centers. Occupational healthcare can be operated either by public or private providers and it is classified in our analysis as public or private according to the sector of the provider.

The public health insurance covers the use of prescribed medication, and drug purchases are typically reimbursed directly at the pharmacy by the SII. The insurance covers 40–100% of the drug costs after an annual 50€ deductible. While the basic reimbursement rate is 40%, diabetes patients and chronically ill high cholesterol patients are entitled to a special reimbursement rate of 65% after submitting a medical certificate to the SII.

Importantly, the out-of-pocket costs of prescription drugs do not depend on the sector in which they are prescribed, because drug purchases are in both cases subject to similar public insurance, and possibly a private top-up insurance.

An interesting institutional feature for our analysis is that many physicians in Finland operate in both sectors. For example, physicians who hold a position in a public healthcare center or hospital, may also have a private practice.

Incentives of doctors may depend on the sector where they operate. For example, the payment scheme in the public sector is mainly based on a monthly salary as fixed basic pay makes up, on average, three quarters of the salary of public sector physicians in primary care. In the private sector, payment schemes are much more varied because doctors can work either as salaried workers, or as private practitioners. In 2016, 35% of private sector physicians were private practitioners, and charge on average approximately 100 € per visit. (Finnish Medial Association 2016.)

2.2 Potential mechanisms

Differences in drug prescriptions for a given diagnosis may arise for several reasons. Next, we discuss factors originating from the demand side (patients), or on the supply side (physicians). For a model of treatment choice incorporating these features, see for instance Chandra et al. (2012).

Demand side factors. Even for the same diagnosis, patient needs may differ for several reasons related to their health status. For example, different drugs may be optimal for different degrees of severity of the same condition. If patients have comorbidities, some drugs may not be suitable. Patients may prefer a particular drug also for idiosyncratic reasons. For example, a higher price or brand may carry an impression of better quality even in the absence of actual quality differences. The willingness to pay for perceived quality may depend on socio-economic factors, especially income. Further, if patients are insured – as they are in the cases that we study – there may be demand for overtreatment (moral hazard).

Supply side factors. Supply side factors relate to physicians' characteristics and institutional factors. Important physician characteristics are physicians' skill and preferences including their degree of altruism. These may affect how closely a physician's choice of treatment will match what is optimal for the patient.

Relevant institutional factors include payment schemes and other factors that influence physicians' incentives that are likely to be sector specific.

Insurance in general may give rise to so called second-degree degree moral hazard, where the physician accommodates the patient's demand for overtreatment (see e.g. Dulleck et al. 2011). In our setting, incentives for moral hazard on the patient side should be similar in both sectors as the reimbursement scheme for prescriptions does not depend on the sector. On the physicians' side, however, incentives for second-degree degree moral hazard may be stronger in the private sector. In private clinics, patients can typically choose their physician directly and the physician stands to make a profit that depends on the number of patient visits. This may increase the likelihood that the physician accommodates potential moral hazard arising on the patients' side. In the public sector, on the other hand, the role of performance pay is minor, and patients' possibilities to choose a particular physician are limited in practice. Different sectors may also exhibit different workplace norms, e.g. a stronger norm for cost-containment in the public sector.

Finally, physicians' prescription behavior may also respond to advertising and amenities offered by pharmaceutical firms (Carey et al. 2021). However, we are not aware of empirical studies on this issue in the Finnish context nor how the advertising or amenities depend on the sector.

In the empirical analysis, we study demand side factors by controlling for a variety of patient characteristics, including socio-demographic characteristics, income, and importantly, health status. In addition to a proxy for overall health, we use information on comorbidities that may render certain drugs unsuitable for that patient. For a small subset of patients, we are able to control for patient fixed effects.

Regarding supply side factors, we supplement our main analysis by focusing on a subsample of physicians who work in both sectors. For this group of physicians, we are able to control for physician selection into different sectors by using physician fixed effects. Previous literature has argued that intrinsically motivated agents are more likely to select into the public sector (see e.g. Besley and Ghatak (2005); Francois and Vlassopoulos (2008) provide a review of the literature). If we manage to successfully control for factors that relate to both patient and physician selection into each sector, any remaining differences in prescription behavior between sectors should be informative about other sector-specific institutional factors that influence treatment decisions.

2.3 Medication guidelines

We study prescription behavior in the context of two diseases that are both characterized by the availability of an effective, widely accepted low-cost treatment and alternative, more expensive treatments for the same condition. Both cases are also very important from the point of view of public health and healthcare costs in advanced countries.

Type 2 diabetes. Diabetes is one of the most important chronic conditions that causes increasing costs to the healthcare systems globally (Searing et al. 2015). It is closely linked to the obesity epidemic and increasing costs of diabetes are also evident in Finland. For example, the treatment costs increased by 83% over the period 1998–2007

(JaVale et al. 2010). Approximately 250 000 individuals are diagnosed with type 2 diabetes in Finland, and about 24 000 new cases of type 1 or 2 diabetes start receiving medication per year. Approximately 15% of total healthcare costs in Finland are related to the treatment of diabetes (Current Care Guidelines 2020).

The guideline for pharmacological therapy for type 2 diabetes is clear, namely that "metformin, if not contraindicated and if tolerated, is the preferred initial pharmacological agent for type 2 diabetes" and the treatment should be started at or soon after diagnosis if lifestyle changes alone are not sufficient to achieve glycemic goals. The grounds for this recommendation are that "metformin has a longstanding evidence base for efficacy and safety, is inexpensive, and may reduce risk of cardiovascular events and death". A combination of metformin and other treatment options should be considered if the target levels of blood glucose are not achieved within approximately 3 months. (American Diabetes Association 2016, S53-S54.)

The Finnish guidelines on the treatment of type 2 diabetes are essentially similar to the American guidelines, with lifestyle changes and metformin treatment being the primary forms of care that should be started as soon as a diagnosis is made, and the need for additional treatments should be considered if target blood sugar levels are not reached 3–6 months after diagnosis.

One criterion for metformin being the primary treatment is its relatively low cost, as stated in the treatment guidelines. In 2017, the price per 100 tablets was 4.11 € in Finland, compared to e.g. 128 € for one of the main alternative medicines, gliptin. Taking into account differences in dosage (2–3 tablets of metformin vs. 1 of gliptin), the alternative treatment appears to be 10–16 times more expensive than the recommended treatment. (Pharmaceuticals Pricing Board 2020.)

Cholesterol. Statins, i.e. HMG-CoA reductase inhibitors, are the most important class of cholesterol-lowering drugs. They are used in the treatment of dyslipidemia, with the aim of both preventing and treating atherosclerotic cardiovascular diseases. In Finland, statins are prescribed to over 700 000 individuals and the annual costs related to statins exceed 80 million euros (SII 2020b).

On the Finnish market, there are six different statins available of which simvastatin is the most common one. Historically, simvastatin has clearly been the low-cost treatment for high cholesterol. The price for atorvastatin has been declining, and by 2017, approached the same level as the price for simvastatin. For example, at the beginning of the year 2017, the price per 100 tablets of simvastatin (30mg) was around 35 €, whereas the prices for atorvastatin (20mg) and rosuvastatin (10mg) were 41.4 € and 61.7 €, respectively. (Pharmaceuticals Pricing Board 2020.) The comparison takes into account the defined daily doses which differs across statins.

In sum, the two cases are similar in that a cheap, commonly accepted treatment option and alternative more expensive treatments are available for the same condition. Both cases are also very important for public health and healthcare costs. Key differences, on the other hand, are that type 2 diabetes has more clear-cut treatment guidelines in stating that metformin is the first treatment option. Further, the different treatment options for high cholesterol are more similar to each other, both medically and cost-wise, than are the different treatment options for diabetes.

3. Data

Sample. Our analysis data is based on a two-thirds random sample of physicians working in Finnish out-patient care. For these physicians, we observe every patient with a medical drug prescription. The data include detailed background characteristics of the patients and all their prescriptions in 2016–17. Thus, the patient data includes prescriptions also from physicians who are not in the initial sample.

We construct the analysis data by combining different administrative registers. The main data source is the Kanta e-prescription register which has information on drug prescriptions and purchases covering the entire Finnish population. The sampling is based on a population of physicians with any prescriptions in the register between 2015 and 2017. Then, all patients with prescriptions by the sampled physicians were included in the dataset. In the empirical analysis, we focus only on the observations

from 2017 because the earlier years are incomplete due to gradual rollout of the e-prescription register.

Patient data. Patient characteristics are obtained from the Folk datasets of Statistics Finland. The demographic variables used in the analysis include age, education, gender, place of residence and information on spouse and immigrant background. In addition, we use information on the disposable income of the patients.

We construct health indicators using the benefit registers of the Social Insurance Institution. Individuals' general health status is proxied by their total sum of reimbursed drug expenditures including all drug categories. Individuals with multiple health problems are more likely to use several different types of drugs and for longer time periods, which generates higher annual costs.

Second, we observe whether a patient has been disabled or has been entitled to special reimbursement of drug expenses due to a disease considered chronic, such as mental and cardiovascular diseases. We use these as additional indicators of the patient's health. Importantly, we also separately identify patients who are eligible for special reimbursement of drugs that are used in the treatment of type 2 diabetes and high cholesterol, already in the year preceding the main analysis. Having such an entitlement means that these patients are more likely to be prescribed the high-cost alternative treatment, as all recently diagnosed patients should, according to treatment guidelines, receive the low-cost treatment as a default.

Third, we use an indicator for whether the patient has received a prescription for a medicine that has been found to have harmful medical interactions with the low-cost treatment of interest. In this case, prescribing the low-cost alternative should clearly be less likely. To capture the concurrent use of conflicting medication, this variable is measured in the analysis year 2017, while most other health indicators and all background characteristics are measured in 2016. See the appendix Table A1 for detailed variable descriptions.

Physician data. For each prescription we observe the prescribing physician's pseudonymized identifier. The physician characteristics available in the data include the sector of employment (public or private) where each prescription was written and the physician's field of specialization.

4. Empirical analysis

The objective in this analysis is to study how the prescription behavior of physicians differs between private and public sector practitioners and whether these differences can be explained by observed patient and physician selection. We focus on two different analysis populations: patients who have received either diabetes or statin (cholesterol) medication in 2017. Our unit of observation is a patient visit with a prescription for these conditions. The sample sizes are around 475 000 patient visits for diabetes and 705 000 patient visits for high cholesterol.

4.1 Descriptive statistics

Patient data. Table 1 shows how patients differ in their characteristics between public and private visits. Patients with a prescription from a private physician are younger, more often men and living with a spouse compared to patients who visited a public health center. The financial resources available to the private patients are also substantially larger as they have over 50% higher disposable income on average.

Patients in the public and private sector also differ markedly in their health status. Table 1 shows that public sector patients had over 30% higher overall prescription drug expenditures. Public sector patients are also 9–15 percentage points more likely to have been eligible for special reimbursement for diabetes or cholesterol medication than private sector patients in 2016. This implies that a larger fraction of public sector patients has a longer history with the given diagnosis. On the other hand, public and private sector patients do not differ notably in how likely they are to have a prescription for a medication that prohibits the use of the low-cost treatment for diabetes or cholesterol, measured by the variable medication interaction.

Turning to a comparison of the patient populations receiving statins or diabetes medication, they are relatively similar with respect to their socio-economic characteristics. The main differences are that the patients with a prescription for statins are slightly older and more often women. However, health indicators point to interesting differences as the patients receiving statins have lower medical costs and they are also less likely to have a special reimbursement eligibility. On the other hand, medical interactions appear to be relevant in the case of statin prescriptions but not for diabetes medication.

Table 1. Descriptive statistics. The characteristics of patients using medication for type 2 diabetes or statins by physicians' sector of employment in 2016.

	Diabetes medication		Statins	
	Public	Private	Public	Private
Age	66.7	58.3	69.1	59.5
	(12.1)	(10.9)	(11.0)	(10.7)
Men (%)	54	63	50	62
Spouse (%)	57	68	60	72
Immigrant background (%)	4	3	3	3
Basic education (%)	43	20	42	18
Secondary education (%)	37	39	35	37
Tertiary education (%)	20	41	23	45
Disposable income (eur)	20 128	33 890	20 624	35 179
	(10 944)	(19 164)	(11 370)	(20 535)
Prescription drug costs (eur)	1 486	1 134	1 032	660
	(2 365)	(2 165)	(2 595)	(1 352)
Special reimbursement (%)	82	67	21	12
Medication interaction (%)	0.01	0	11	12
Number of prescriptions	415 061	60 250	602 883	102 190
Number of patients	255 301	35 294	517 447	86 563

Note: The group means are calculated for the patient visits with a prescription either for diabetes medication or statins. Standard deviations are in parenthesis. Special reimbursement refers to an eligibility for the higher reimbursement rate either for diabetes medication or statins in 2016. Medication interaction refers to a use of drug with a harmful medical interaction with the low-cost treatment of interest in 2017.

Physician data. The physician's sector of employment is a key variable for our analysis. Physicians can work only in the public sector, in the private sector, or both. For

example, a physician who works in a public health care center, may also see patients through a private practice. The share of physicians working in the public sector alone is 69% and 66% of those who prescribed medication for type 2 diabetes or high cholesterol, respectively. It is not very common for physicians to write multiple prescriptions for these conditions within the same year in both sectors. In our data, 780 physicians have at least one prescription for diabetes and 1222 physicians have at least one statin prescription in both sectors (and in total, at least 5 prescriptions).

Private sector physicians are more commonly specialized in occupational healthcare or have some other field of specialization. On the other hand, public sector physicians are more often junior professionals without any field of specialization. The mixed-sector physicians are mainly specialists but rarely in the field of occupational healthcare. Figure 1 shows the distribution of mixed-sector physicians by their share of prescriptions written in the private sector. The fact that we are able to observe Finnish physicians practicing in both sectors allows us to estimate a fixed effects model controlling for physician selection into the two sectors.

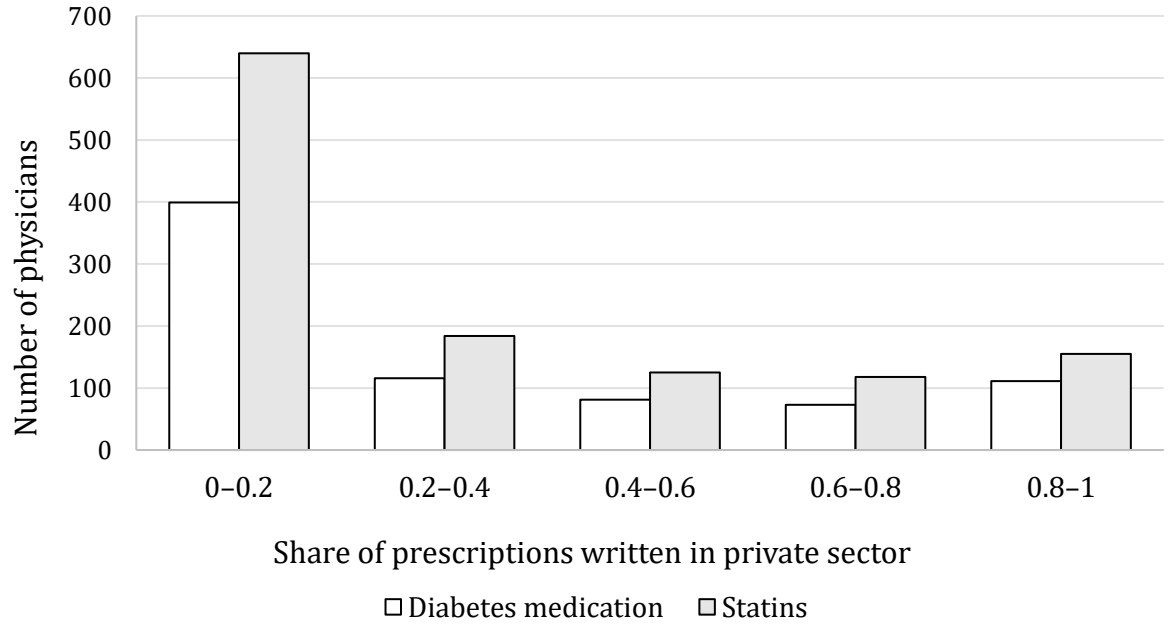

Figure 1. Distribution of mixed-sector physicians by their share of private prescriptions. The figure includes physicians who wrote prescriptions for diabetes medication or statins in both sectors (at least 5 prescriptions in total).

4.2 Empirical model

To control for the observed differences in patient characteristics, we estimate linear probability models using OLS where the dependent variable is a dummy for whether a low-cost treatment was prescribed for each condition – that is, metformin in the case of treatment of type 2 diabetes and simvastatin in the case of treatment for high cholesterol. The main explanatory variable of interest is a dummy for prescriptions written in the private sector. Our model is specified as:

$$y_i = \alpha + \beta\, private_i + \gamma\, X_i + \varepsilon_i,$$

where *y* is an outcome variable taking value 1 when the low-cost treatment was prescribed in a patient visit *i* and 0 otherwise. The variable *private* indicates whether a physician gives the prescription in a private clinic. The set of control variables is denoted by X_i.

We estimate the model using two different analysis samples and different sets of control variables. First, in our baseline specifications we explore the role patient characteristics in explaining the difference between the public and private sector using the full analysis sample. Model (1) includes no controls and gives the raw difference in the likelihood of receiving the low-cost treatment in a private visit. Then models (2–6) add the following control variables successively: demographic controls (age, gender, education, and indicators for having a spouse and immigrant background), income deciles, the deciles of drug costs and other health indicators, and indicator for medication interaction. All control variables, except for some health indicators, are observed at the end of the year preceding the outcome measures. Complete model outputs for specification (6) are presented in the appendix (Table A2).

Second, we study the role of supply side factors in prescription behavior by focusing on a subsample of physicians who were active in both public and private sector in 2017. This allows us to extend the model with physician fixed effects δ_j, which capture the physician *j* specific likelihood of prescribing the low-cost treatment. These results are reported in Section 4.5.

4.3 Baseline results

Type 2 Diabetes. We begin by reporting the results for the treatment of type 2 diabetes in the top panel of Table 2. Model (1) documents the difference in the rate of prescribing the low-cost medication between physicians working in the private and public sectors before controlling for patient characteristics. The estimate shows a statistically significant 1.5pp lower share of patients receiving the low-cost treatment in private clinics.

In the subsequent columns, we successively add controls to account for patient selection. Models (2) and (3) include controls for demographic characteristics and income deciles of the patients. Although public sector patients are nearly ten years older and have substantially lower incomes on average, the estimated difference in the likelihood of receiving low-cost medication changes only little.

Adding controls for the health status of the patients has a stronger impact on the estimate. Model (4) adds previous year cumulative drug costs and a set of indicators for specific diseases. The drug costs can be interpreted as a general proxy for patients' health status and the additional indicators control for common morbidities in Finnish population including cardiovascular diseases, cancers, mental health, and dementia. This increases the magnitude of the estimate notably from -1.6pp to -4.8pp.

Model (5) includes an indicator for the entitlement of special reimbursement for diabetes medication in the year preceding the analysis year. The entitlement requires a medical certificate on a diabetes diagnosis, and it increases the reimbursement rate of diabetes medication. Controlling for the entitlement changes the estimate further to -6.5pp.

A full set of patient controls is included in model (6). The final control variable is an indicator for medication interaction which does not have any impact because it is very rare in the case of type 2 diabetes. When comparing the estimated difference to the mean of 54.3% for public sector patients, the results imply a 12% lower rate of prescribing the low-cost medication in the private clinics.

Table 2. Differences in prescriptions for type 2 diabetes medication and statins between private and public sector physicians. The average rate of the low-cost treatments in the public sector and the estimated difference between sectors.

	Public mean	(1)	(2)	(3)	(4)	(5)	(6)
Diabetes medication							
Estimate	0.543	-0.015	-0.021	-0.016	-0.048	-0.065	-0.065
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
N	475 311						
Statins							
Estimate	0.430	-0.089	-0.061	-0.046	-0.050	-0.051	-0.050
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
N	705 073						
Control variables							
Demographic characteristics			x	x	x	x	x
Income deciles				x	x	x	x
Drug cost deciles & health ind.					x	x	x
Special reimbursement						x	x
Medication interaction							x

Notes: Estimates from a linear probability model for prescriptions in 2017. Robust and clustered (at patient level) standard errors in parenthesis.

Finally, for a small subsample of patients who visit both the public and the private sector in the same year, we are able to control for patient fixed effects. These are patients that visited both sectors within one year, which allows us to control for all time-invariant individual characteristics. The treatment difference in this sample is slightly smaller than in the whole sample but remains significant: the point estimate is -0.029 (0.007), which amounts to about 6 % of the public sector mean. However, we regard the analysis without patient fixed effects as our main analysis, and present results with fixed effects only as supplementary evidence. The reason is two-fold: First, the number of patients who visit both sectors is very small (4693) compared to the entire data. Second, the benefit of controlling for all individual differences is not clear in our context: we should only control for those differences that are relevant for determining the right treatment, that is, typically factors that relate to health. For example, if some individuals are more vocal in demanding high-cost treatment for other than health-related reasons (when treatment is subject to generous public insurance),

this should not factor into the treatment decisions, and such personal differences should not be controlled.

Cholesterol. The middle panel of Table 2 reports the estimated difference between private and public sector prescriptions for statins (cholesterol medication). The estimated raw difference between sectors shows a substantial 8.9pp lower share of low-cost medication in the private sector. Adjusting for demographic differences in model (2) reduces the difference to 6.1pp, and then adjusting for the income differences in model (3) reduces the difference further to 4.6pp. Thus, the impact of controlling for socio-economic factors nearly halves the difference between sectors for statin prescriptions whereas it had only a minor impact in the case of diabetes even though the differences in the patient mix between the sectors are fairly similar in the two cases.

Models (4) and (5) add control for patients' health status. Controlling for drug costs and general health indicators increases the difference slightly. Then, controlling for the eligibility for special reimbursement for statins has a similar impact. Together adding these controls increase the estimated difference to 5.1pp.

Model (6) adds an indicator for medication interaction with statins. While the interaction affects every tenth patient with statin prescription, the estimate changes only a little. The 5.0pp estimated difference between sectors implies, relative to the public sector mean, a similar 12% lower rate of prescribing the low-cost medication in the private clinics as in the case of diabetes medication. Finally, for the small subsample of patients (6001 individuals) where we are able to control for patient fixed effects, the treatment difference remains significant albeit being slightly smaller than in the main analysis: the point estimate is -0.024 (0.005) which corresponds to 8 % of the public sector mean.

In sum, in both cases we find a significant difference in the rate of prescribing the low-cost medication between sectors. The difference persists after controlling for a rich set of patient background characteristics, and is notable in size at 12 % relative to the public sector mean in both cases. Despite strong selection of patients into sectors, our results thus indicate that the treatment differences are not explained by patient

selection on observable characteristics, and observationally similar patients are more likely to receive low-cost treatment if they visit a public healthcare center.

4.4 Role of physician characteristics

To explore the role of physician characteristics on prescription behavior, we focus on a subsample for physicians who have been active in both sectors and prescribed either diabetes medication or statins. In this subsample, we can use physician fixed effects to control e.g. for potential selection according to individual-specific intrinsic motivation.

Focusing on the subsample of physicians who work in both sectors reduces the number of observations substantially, because the majority of physicians work in a single sector. Further, this restricts the analysis to a subsample with more experienced practitioners because most of the young physicians without a field of specialization are employed in public health centers alone. After restricting the sample to physicians with prescriptions in both sectors, we observe around 43 000 and 76 000 patient visits with prescriptions for diabetes medication and statins, respectively.

Table 3 replicates first the analysis presented in Table 2, successively controlling for different patient characteristics, using the subsample of mixed-sector physicians. The final column introduces physician fixed effects to the model. The first thing to note from Table 3 is that the mean rate of prescribing the low-cost medication in the public sector drops by 3–4pp compared to our baseline analysis including the full sample of physicians. This suggests that the mixed-sector physicians treat a selected set of patients with potentially more demanding cases of diabetes and high cholesterol.

Table 3 shows that after controlling for patient characteristics (models 4–6), estimated differences in diabetes treatment between sectors are of similar magnitude as for the full sample. The specification with the full set of patient controls shows a 5.9pp lower rate of low-cost prescriptions in the private sector and a relative difference of 12% of the public sector mean.

A similar result holds for statin prescriptions, where the results when controlling for patient characteristics are again comparable to our main analysis. The model with the full set of patient controls shows a 4.4pp lower rate of low-cost prescriptions in the private sector and a relative difference of 11%.

Physician fixed effects are introduced in Model (7). In the case of statins, the treatment difference between the sectors disappears when physician fixed effects are controlled for. However, for diabetes, the difference in prescription behavior between sectors persists. The estimated relative difference remains notable in size at 10% of the public sector mean. This implies that the same doctors prescribe different medication for similar patients, depending on the sector where they see the patient. Thus, the treatment differences that we observed in our main analysis for diabetes are not explained by physician selection into different sectors.

Table 3. Analysis of physicians working in both sectors (prescriptions for type 2 diabetes medication / statins written at both public and private clinic – at least 5 prescriptions in total). Physician-level fixed effects included in the last model.

	Public mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Diabetes medication								
Estimate	0.506	-0.029	-0.025	-0.021	-0.044	-0.059	-0.059	-0.053
		(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.008)
N	42 861							
Statins								
Estimate	0.401	-0.074	-0.057	-0.045	-0.046	-0.044	-0.044	-0.0036
		(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)
N	76 138							
Control variables								
Demogr. char.			x	x	x	x	x	x
Income deciles				x	x	x	x	x
Drug cost deciles & health ind.					x	x	x	x
Spec. reimb.						x	x	x
Medic. interaction							x	x
Physician-level FE								x

Notes: Estimates from a linear probability model for prescriptions in 2017. Robust and clustered (at patient level) standard errors in parenthesis.

5. Discussion

For both diabetes and high cholesterol, we found large and significant differences in treatment across sectors: After controlling for individual characteristics, patients are 12 % more likely to receive the low-cost treatment in the public sector.

Given that large differences remain after controlling for a wide variety of background characteristics related to socio-economic background and health status, the differences in treatment between sectors are not explained by patient selection on these observable characteristics. Further, for a subset of physicians who work in both sectors, we can control for physician fixed effects. In the case of diabetes, treatment differences are not explained by physician selection either: the same doctors behave differently depending on the sector of operation.

It appears clear that such large differences in treatment between sectors are problematic: regardless of whether the reason behind these differences is undertreatment in the public sector, or overtreatment in the private sector, our findings suggest that there is a substantial fraction of patients whose treatment is determined by some other factors besides medical considerations.

Several features of our findings suggest moral hazard and over-treatment in the private sector: First, even though cost differences between public and private sector are in general notoriously difficult to interpret, our setting provides good grounds for a meaningful comparison: we compare treatment choices for a given condition, and both treatments are subject to similarly generous public insurance. Further, the low-cost treatment is widely accepted and known to be effective; in the case of diabetes, the low-cost treatment is specified as the primary treatment in the current care guidelines. The finding that private sector doctors substitute the treatment specified in the guidelines for a more expensive alternative for patients with observationally similar health, is suggestive of moral hazard.

Second, the pattern that we find is consistent with patient income differences being a key driver behind treatment choices. The raw difference (before including controls) in

treatment between sectors indicates that public sector patients are less likely to receive the high-cost treatment. Public sector patients are on average less healthy. To the extent that less healthy patients are more likely in some cases to benefit from the high-cost alternative, the direction of the difference is exactly opposite to what we expect to see, if the result were due to patient selection according to health. On the other hand, income differences may pull in the other direction: more wealthy and more educated private sector patients may be more likely to demand high-cost treatment; those treatments are subject to generous, but still only partial public insurance. Given the sign of the difference between the sectors, it appears that the latter effect dominates. This is especially so in the case of cholesterol medication, where controlling for income reduces the treatment difference significantly. These patterns are consistent with second-degree moral hazard.

Third, the result that large treatment differences persist in the case of diabetes even after controlling for both patient and physician selection, suggest that there is something about the sector of operation per se that leads to differences in treatment. This may relate to institutional arrangements, such as payment systems and hence physician incentives, as discussed in Section 2.2. For example, physicians may have a stronger incentive to accommodate patient requests for more expensive medication, when working in the private sector and competing for patients. There may also be a stronger norm for cost-containment in the public sector; recall that a large fraction of the costs of these drugs are reimbursed from the public purse. Such a norm may be less binding or prominent for statins than diabetes medication, as the price differentials between different statins are smaller.

Our paper contributes to the literature analyzing the relative merits of public and private provision (e.g. Hart et al. 1997, Knutsson & Tyrefors 2022), challenging the view that private providers have better incentives for cost containment. Rather, such incentives naturally depend on details of insurance and regulation. Further, we complement the literature on moral hazard in treatment decisions (Lundin 2000, Iizuka 2012, Lu 2014, Gottschalk et al. 2020) by analyzing differences between sectors, arguing that moral hazard may be more pronounced in the private sector. This has important implications for how to interpret the relationship – typically considered a

trade-off – between costs and quality. If higher costs in the private sector are an indication of moral hazard, high costs do not go hand in hand with better quality but may instead be an indication of over-treatment. Over-treatment, on the other hand, is likely a more relevant concern in advanced than in developing countries. In the latter context, Das et al. (2016) found quality to be higher in the private sector.

6. Conclusion

This study provides evidence of treatment differences in public and private healthcare, contributing to an analysis of performance differences between the public and private sector in a domain that is crucial for welfare. We find that for two very common and expensive health conditions, type 2 diabetes and high cholesterol, observationally similar patients are more likely to receive more expensive treatment when visiting a physician working in the private than in the public sector. In the case of diabetes, we further find that physicians who work in both sectors prescribe more expensive medication when they see patients in private clinics.

Our baseline results point to an important conclusion: observationally similar patients receive different treatment depending on the sector they visit. This finding is important in itself: For organization of publicly funded health care, large differences in treatment between sectors are problematic, regardless of their cause. Ideally, publicly insured patients' medication should be based on a medical assessment, and not on the sector of the service provider. Our results suggest that for a substantial fraction of patients, treatment decisions are influenced by other factors besides medical considerations.

Although we are unable to pin down exactly to what extent either of the sectors deviate from the optimal treatment, our results suggest that private health service providers may be more susceptible to moral hazard. Our paper contributes to the literature comparing the relative merits of public and private provision, challenging the view that private providers have better incentives for cost-containment. Further, if higher costs in the private sector are an indication of stronger moral hazard as our results suggest, then

higher costs do not go hand-in-hand with higher quality, but may instead be an indication of over-treatment. This has implications for the debate on the division of labor between private and public sector, and cautions against a straight-forward conclusions regarding efficiency gains from increased private provision.

References

American Diabetes Association (2016). Approaches to glycemic treatment. In Standards of Medical Care in Diabetes 2016. *Diabetes Care*, 39 (Supplement 1), S52–S59.

Andersson, F., Jordahl, H., and Josephson, J. (2019). Outsourcing public services: Contractibility, costs, and quality. *CESifo Economic Studies*, 2019, 349–372.

Balafoutas, L., Beck, A. Kerschbamer, R., and Sutter, M. (2013). What drives taxi drivers? A field experiment on fraud in a market for credence goods. *Review of Economic Studies*, 80(3), 876-891.

Balafoutas, L., Kerschbamer, R. and Sutter, M. (2017). Second-degree moral hazard in a real-world credence goods market. *Economic Journal*, 127(599), 1-18.

Besley, T. and Ghatak, M. (2005). Competition and incentives with motivated agents. *American Economic Review*, 95(3), 616-636.

Carey, C., Lieber, E. M. and Miller, S. (2021). Drug firms‘ payments and physicians’ prescribing behavior in Medicare Part D. *Journal of Public Economics*, 197, 1-14.

Chandra, A., Cutler, D. and Song, Z. (2012). Who ordered that? The economics of treatment choices in medical care. *Handbook of Health Economics*, vol. 2, 398 – 432.

Clemens, J., and Gottlieb, J. D. (2014). Do Physicians' Financial Incentives Affect Medical Treatment and Patient Health? *American Economic Review*, 104 (4), 1320-49.

Current Care Guidelines (2022). Dyslipidemiat. Käypä hoito -suositus. Suomalaisen Lääkäriseuran Duodecimin ja Suomen Sisätautilääkärien Yhdistys ry:n asettama työryhmä. Helsinki: Suomalainen Lääkäriseura Duodecim, 2022 (accessed on 1 April 2022).

Current Care Guidelines (2020). Tyypin 2 diabetes. Käypä hoito -suositus. Suomalaisen Lääkäriseuran Duodecimin, Suomen Sisätautilääkärien yhdistyksen ja Diabetesliiton Lääkärineuvoston asettama työryhmä. Helsinki: Suomalainen Lääkäriseura Duodecim, 2020 (accessed on 1 July 2021). [In Finnish.]

Das, J., Holla, A., Mohpal, A. and Muralidharan, K. (2016). Quality and accountability in health care delivery: Audit-study evidence from primary care in India. *American Economic Review* 106, 3765-99.

Dietrichson, J., Ellegård, L.M. and Kjellsson, G. (2020). Patient choice, entry, and the quality of primary care: Evidence from Swedish reforms. *Health Economics*, 29, 716-730.

Dulleck, U., Kerschbamer, R. and Sutter, M. (2011). The economics of credence goods: On the role of liability, verifiability, reputation and competition. *American Economic Review*, 101, 526-555.

Einav, L. and Finkelstein, A. (2018). Moral Hazard in Health Insurance: What We Know and How We Know It? *Journal of the European Economic Association*, 16(4), 957–982.

Finance Finland (2020). Tilasto sairauskuluvakuutus 2009–2019. [In Finnish.]

Finnish Medial Association (2016). Physicians in Finland – statistics on physicians and the healthcare system 2016. https://www.laakariliitto.fi/site/assets/files/5223/ll16_tilasto2016_net1_170114.pdf (accessed 25 Jan 2022).

Francois. P. and Vlassopoulos, M. (2008). Pro-social Motivation and the Delivery of Social Services. *CESifo Economic Studies*, 54(1), 22-54.

Gottschalk, F., Mimra, W. and Waibel, C. (2020). Health services as credence goods: A field experiment. *Economic Journal*, 130(629), 1346-1383.

Hart, O., Shleifer, A. and Vishny, R.W. (1997). The proper scope of government: theory and an application to prisons. *Quarterly Journal of Economics*, 112(4), 1127-1161.

Iizuka, T. (2012). Physician agency and adoption of generic pharmaceuticals. *American Economic Review*, 102(6), 2826-58.

Jarvala, T., Raitanen, J., and Rissanen, P. (2010). Diabeteksen kustannukset Suomessa 1998–2007. Tampere: Finnish Diabetes Association and University of Tampere. [In Finnish.]

Knutsson, D. and Tyrefors, B. (2022). The Quality and Efficiency of Public and Private Firms: Evidence from Ambulance Services. *Quarterly Journal of Economics*,137(5) 2213-62.

Kotakorpi, K. and Seuri, A. (2019). Yksityisen ja julkisen sektorin työnjako sosiaali- ja terveydenhuollossa. *Talous & Yhteiskunta*, 1/2019. [In Finnish.]

Lu, F. (2014). Insurance coverage and agency problems in doctor prescriptions: evidence from a field experiment in China. *Journal of Development Economics*, 106, 156-167.

Lundin, D. (2000). Moral hazard in physician prescription behavior. *Journal of Health Economics*, 19(5), 639-662.

OECD 2018. Pharmaceutical spending (indicator). doi: 10.1787/998febf6-en (accessed on 28 September 2018).

Ohlsson, H., Lynch, K. and Merlo, J. (2010). Is the physician's adherence to prescription guidelines associated with the patient's socioeconomic position? - An analysis of statin prescription in South Sweden. *Journal of Epidemiology and Community Health*, *64*(8), 678-683.

Pharmaceuticals Pricing Board (2020). Viitehintajärjestelmä. Viitehintaryhmät ja viitehinnat – päätökset. 2017. [In Finnish.]

Pita Barros, P. and Siciliani, L. (2012). Public and Private Sector Interface. *Handbook of Health Economics*, vol. 2, 928-1001.

Propper, C. (2018), Competition in Health Care: Lessons from the English Experience. *Health Economics, Policy, and Law*, 13, 492–508.

Seuring, T., Archangelidi, O. and Suhrcke, M. (2015). The economic costs of type 2 diabetes: A global systematic review. *Pharmacoeconomics*, 33(8), 811-831.

Social Insurance Institution, SII (2020a). Statistical database Kelasto. Reimbursements of medical expenses: Number of recipients and reimbursements paid out (accessed on 1 July 2021).

Social Insurance Institution, SII (2020b). Statistical database Kelasto. Reimbursements of medicine expenses: Number of recipients and prescription data (accessed on 1 July 2021).

Tarkiainen, L., Martikainen, P., Laaksonen, M. and Valkonen, T. (2012). Trends in Life Expectancy by Income from 1988 to 2007: Decomposition by Age and Cause of Death. *Journal of Epidemiology and Community Health* 66 (7), 573–78.

Tynkkynen, L. K. and Vrangaek, K. (2018). Comparing public and private providers: a scoping review of hospital services in Europe. *BMC health services research 18(1)*, 1-14.

Viikari, J. (2003). Miten valitsen potilaalleni parhaiten soveltuvan statiinin? Duodecim 2003; 119: 954-9. [In Finnish]

Appendix

Table A1: Description of variables used in the regression models.

Dependent variable (2017)	Indicator for low-cost treatment vs. more expensive alternative Diabetes case: drug with ATC code A10BA02 (metformin) vs. drug, other than metformin, belonging to the ATC group A10B (Blood glucose lowering drugs, excluding insulins) Statin case: drug with ATC code C10AA01 (simvastatin) vs. drug, other than simvastatin, belonging to the ATC group C10A (Lipid modifying agents, plain)
Indicators for demogr. controls (2016)	
Age groups	Diabetes case: under 25, 25-34, …, 75-94, over 95 years of age Statin case: under 45, 45-64, …, 75-84 and over 85 years of age
Female	Female vs. male
Immigrant background	Foreigner or born abroad vs. Finn and born in Finland
Spouse	Living with vs. without a spouse
Education level	Basic, secondary, tertiary education
Place of residence	Helsinki area, Southern Finland, Western Finland and Åland, Eastern and Northern Finland
Income deciles	Calculated based on disposable income of the entire Finnish adult population
Drug cost deciles (2016)	Calculated based on the annual drug costs of all individuals in the sample. Includes all drugs belonging to the reimbursement scheme of SII. Reference group: no drug costs.
Other health indicators (2016-2017)	Patient is incapable for work or has a special reimbursement eligibility for medicines based on specific diagnostic codes* or reimbursement codes** listed below.
Musculoskeletal disorder	M00-M99 (indicating incabability for work)
Mental disorder	F00 - F99 (indicating incabability for work), 112, 118
Cerebrovascular disease	I60 - I64 (excl. I63.6)
Coronary heart disease	I21-I22 or 120.0
Cancer	C00-96, D06, D09.0-1, D30, D32-33, D41-43, D45-D47, D76, N87.2
Dementia	307
Spec. reimbursement eligibility (2016)	Diabetes case: eligible based on the code 215 (Diabetes, non-insulin-treated)**. Statin case: eligible based on the code 206 (Chronic coronary artery disease and dyslipidemia associated with chronic coronary artery disease) or 211 (Severe hereditary disorders of lipid metabolism) **.
Medical interaction (2017)	Diabetes case: prescription for a drug belonging to ATC group B05D or B05Z, i.e., the patient suffers from moderate or severe kidney failure (see Current Care Guidelines 2020). Statin case: prescription for a drug with ATC code J02AB02, J02AC01, J02AC02, J01FA01, J01FA09, J01FA10, C08DA01, C08DB01, C01BD01, N06AB03, L04AD01, L04AD02, J01MA02, J01MA06 or A02BA01, for a drug belonging to ATC group J05AE, N06AA or C10AB (see Viikari 2003, Current Care Guidelines 2022).

Note: * The diagnostic codes are based on the 10th edition of the International Classification of Diseases (ICD-10).** The reimbursement eligibility codes are used by Social Insurance Institution in their reimbursement scheme for prescription drugs.

Table A2: Coefficient output for model (6) in Table 2.

	Diabetes medication	Statins
Private sector	-0.065	-0.050
	(0.002)	(0.002)
Female	0.012	-0.035
	(0.001)	(0.001)
Immigrant background	-0.042	0.013
	(0.004)	(0.004)
Spouse	0.004	-0.030
	(0.001)	(0.001)
Secondary educ.	0.002	-0.017
	(0.002)	(0.001)
Tertiary educ.	0.009	-0.016
	(0.002)	(0.002)
Under 25 years of age	-0,018	
	(0.014)	
25-34	-0.019	
	(0.006)	
35-44	-0.048	
	(0.004)	
Under 45 years of age		-0.033
		(0.004)
45-54	-0.048	-0.018
	(0.002)	(0.002)
55-64	-0.020	-0.014
	(0.002)	(0.002)
75-84	-0.011	0.052
	(0.002)	(0.002)
Over 85 years of age		0.146
		(0.003)
85-94	-0.069	
	(0.003)	
Over 95 years of age	-0.234	
	(0.018)	
Southern Finland	-0.027	0.009
	(0.002)	(0.002)
Western Finland	-0.020	0.028
	(0.002)	(0.002)
Eastern and Northern Finland	-0.013	-0.004
	(0.002)	(0.002)
Income decile 2	0.019	0.002
	(0.004)	(0.004)
Income decile 3	0.028	-0.003
	(0.004)	(0.003)
Income decile 4	0.027	-0.017
	(0.004)	(0.003)
Income decile 5	0.024	-0.028
	(0.004)	(0.004)
Income decile 6	0.019	-0.034
	(0.004)	(0.004)
Income decile 7	0.010	-0.036

	(0.004)	(0.004)
Income decile 8	0.013	-0.047
	(0.004)	(0.004)
Income decile 9	0.003	-0.051
	(0.004)	(0.004)
Income decile 10	-0.020	-0.078
	(0.004)	(0.004)
Drug cost decile 1	0.026	-0.012
	(0.011)	(0.008)
Drug cost decile 2	0.038	0.008
	(0.01)	(0.008)
Drug cost decile 3	0.093	0.031
	(0.008)	(0.007)
Drug cost decile 4	0.095	0.059
	(0.007)	(0.006)
Drug cost decile 5	0.116	0.160
	(0.007)	(0.005)
Drug cost decile 6	0.120	0.151
	(0.006)	(0.005)
Drug cost decile 7	0.125	0.122
	(0.006)	(0.005)
Drug cost decile 8	0.064	0.087
	(0.006)	(0.005)
Drug cost decile 9	-0.134	0.078
	(0.006)	(0.005)
Drug cost decile 10	-0.247	0.076
	(0.006)	(0.005)
Musculoskeletal disorder	0.0001	-0.020
	(0.005)	(0.005)
Mental disorder	0.073	0.099
	(0.003)	(0.003)
Cancer	0.026	0.010
	(0.003)	(0.003)
Cerebrovascular disease	0.040	-0.145
	(0.016)	(0.008)
Coronary heart disease	0.024	-0.053
	(0.005)	(0.003)
Dementia	-0.0002	0.075
	(0.005)	(0.004)
Spec. reimb. eligibility	-0.201	-0.140
	(0.002)	(0.002)
Medical interaction	-0.418	-0.027
	(0.017)	(0.002)
Constant	0.832	0.407
	(0.007)	(0.006)
N	475311	705073