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Income and health care utilization among the 50+ in Europe and the US[1]

This study addresses the question how income affects health care utilization by the population aged 50 and over in the United States and a number of European countries with varying health care systems. The probabilities that individuals receive several medical services (visits to general practitioner, specialist, dentist, inpatient, or outpatient services) are analyzed separately using probit models. In addition to controls for income and demographic characteristics, controls for health status (both subjective and objective measures of health) are used. We analyze how the relationship between income and health care utilization varies across countries and relate these cross country differences to characteristics of the health care system, i. e., per capita total and public expenditure on health care, gate-keeping for specialist care, and co-payments.

Key words: health care demand; socio-economic status; HRS; SHARE.

JEL classification: J14; C14; C33.

1. Introduction

Ensuring socio-economic equity and reactivity of health care systems is often considered a high priority in health care policy (Van Doorslaer et al., 2006). In the UK for example, equitable access to health care is an explicit goal of government policy (Deaton, 2002). The ministers of health from Chile, Germany, Greece, New Zealand, Slovenia, Sweden, and the UK have formed an international forum on matters relating to access to health care services, to sustain the goal of equitable access to good quality health care (Oliver, Mossialos, 2008). Policy makers should have insight in the inequality changing effects of various health care systems, as lack of access and quality may cause or reinforce the positive association between socio-economic status (SES) and health, the so-called SES gradient in health (Deaton, 2002).

In this study we compare the relationship between SES and health care utilization, exploiting the large cross-country variation in health care systems to analyze which policies are effective to make the utilization of health care more equitable. We mainly use income as our measure of SES because it is relatively easy to report for most individuals and easier to compare across countries than, for example, education level.

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The share of the total European population older than 65 is set to increase — from 16.1% in 2000 to 22% by 2025 and 27.5% by 2050 (European Commission, 2001). People 65+ represented 12.4% of the United States (US) population in the year 2000 but are expected to grow to be 20% of the population by 2030 (US Department of Health and Human Services, 2000). These numbers ask for policies reducing the burden of aging on society and at the same time ensuring the availability of health and social services for older persons, promoting their continued participation in a socially and economically productive life. Aging may not be the main factor driving up rising health-care costs over the coming decades: the demographic shift is accompanied by a changing health profile, with an increasing incidence of chronic diseases among older persons. This asks for policies aimed at containing the prevalence of chronic diseases associated with population aging and promoting preventive measures. There is ample evidence that mortality and morbidity are inversely related to SES correlates such as income, education, or wealth (Deaton, 2002). Moreover, recent studies have emphasized the positive relationship between health conditions and SES, the «health-SES gradient» (Banks et al., 2009; Busse et al., 2008; Smith, 1999), and the stylized fact that richer individuals live longer.

Although most OECD countries aim at ensuring equitable access to health care and offer basic health care to the complete population irrespective of their SES, the utilization of many health care services is associated with SES, and the nature of this association varies across countries with varying arrangements in terms of co-payments and deductibles for services and prescribed drug treatments, private health insurance and private health facilities, quality differences across hospitals and other health care facilities, private and public insurance for specific treatments such as dental care, policies for promoting preventive health care, etc.

Most likely the relationships between SES and health care use and the various types of health care services are different. For example, it is likely that the higher the SES, the better one can find one's way in the health care system, obtain a surgical treatment when needed, and the easier it is to obtain a referral to a specialist. On the other hand, general practitioners (GP) are usually more accessible to all individuals, irrespective of their SES. Disproportionate use of specialist care among the higher socio-economic status groups can be due to the association between education and health knowledge, making the higher SES groups better informed about access to and usefulness of care. Health itself also plays a role here, since the fact that low SES is associated with poor health implies that the needs of health care are higher for the low SES groups. Social policy initiatives are needed to provide access to health care on the basis of need and in order to gain control over escalating health care costs.

While the policy relevance of the relationship between SES and health care utilization seems obvious and is emphasized in the existing literature on the debate on «health equity» (cf., e. g. (Oliver, Mossialos, 2008)), it should be mentioned that there is an ongoing debate on the theoretical and operational targets. Sen (2002) discusses health equity in the broader framework of social justice, and argues that since health is central to not only quality of life but also the ability to do what one has reason to do, health equity is crucial for social justice and equitable access to health care is more important than, for example, equitable access to luxury consumption.

Although there seems to be general consensus about its importance, there is an open debate on what health equity means and what should be its goals. Oliver and Mossialos (2008) mention three principles of equity in health and health care: equal access to health care for those in equal needs; equal utilization of health care for those in equal need; and equal (or, rather, equitable) health outcomes. They conclude that only the former is a reasonable policy target, but

what is meant by equal access and equal need is not well-defined. Moreover, access to health care is hard to measure, which is why the focus is often on equal utilization of health care services as an observable proxy. Differences in preferences imply that equitable access does not lead to equitable utilization.

The contribution of our paper is empirical, in the spirit of studies like (Van Doorslaer et al., 2006), who also focus on the relationship between SES and health care utilization keeping the need for health care constant. We consider health care utilization as a proxy of health care access, since we have data on the former and not on the latter. We investigate the mechanisms that lead to a relationship between SES and health care utilization and often interpret differences in utilization as differences in access.

2. Framework

The relevant framework is the model of Grossman (1972) and its extensions; see, e.g., Grossman (2000). In this (extended) framework, individuals maximize lifetime utility, where utility in a given period depends upon consumption and the stock of health. Health has the nature of a capital good, which deteriorates over time but can be increased by investments, requiring health inputs. The main inputs are health care (preventive or curative) and health behavior ((not) smoking, exercising, etc.). The marginal return on investment in health care depends upon current health status, which is why most people seek health care if they have a health problem.

The demand for health care can therefore be seen as an input demand function. It will depend on the (effective monetary) consumer price of health care and on the available income, since the individual has to trade off investing in health against consumption. The effective price depends on co-payments and may be low if the individual has health insurance. Even if the monetary cost for the consumer is zero due to health insurance, the opportunity costs and disutility of (waiting) time will play a role. Demand for health care also declines with health, since its marginal return falls with health. The marginal return may also depend on other inputs such as (not) smoking or exercising. Finally, the demand for health care will depend upon access to information.

In this framework, the health care system and health care policy affect the use of health care services by low and high SES groups through several mechanisms. The effective (monetary) price will be more important for low income than for high income groups. Non-monetary costs such as waiting times may play a larger role for those with high opportunity costs of time (workers, and particularly workers with high SES). Access to information on health care availability will depend on education and social networks. All these features of the health care system can be influenced by health policy, and better understanding these mechanisms can help to adjust the health care system so that it better accommodates health care needs rather than willingness or ability to pay.

What does this framework imply for our analysis of how SES impacts health care use by adults aged 50+ across countries? First take current health, information access, and insurance status as given. Consider the effective price the consumer has to pay, accounting for co-payments. Demand is likely to fall if the price rises, keeping other factors constant. Since prices increase with co-payments, demand is predicted to be lower in countries with higher co-payments, ceteris paribus. But how does the income effect vary with price? If the effective price is zero, the use of health services is determined by non-monetary factors only, and the income effect is probably

close to zero. But if prices are positive, the sign of the income effect is undetermined without making assumptions on the form of the utility function, and empirical evidence is needed. We expect the income effect to be larger the higher the effective price, since the cost will be an impediment to seek health care for low income households only. This leads to the prediction that the income gradient is larger where co-payments are substantial. Moreover, we expect that average effective prices are lower in countries where the health care system is to a larger extent publicly funded, leading to a negative relation between the SES gradient and the share of public health spending in GDP.

On the other hand, health care is more costly in terms of time for higher SES groups (workers, in particular) so that demand for health care might actually fall with SES, particularly among workers and in countries where waiting times in hospitals, emergency rooms, or doctor's offices are long. In any case, the compensating effect of the opportunity cost of time leads to the prediction that the SES gradient will be lower for workers than for non-workers.

The income gradient of the use of health care may also depend upon the way in which general physicians and specialists are remunerated. In some systems they get a fee for each service, sometimes a fee for each patient, and sometimes a fixed salary. This may influence their advice to patients, and patients in different socio-economic groups may cope with this in different ways (Fabbri, Monfardini, 2002). For example, higher socio-economic groups are probably better able to force doctors to make judgments on the basis of medical grounds rather than their own financial interest.

Public or private health insurance matters a lot for the effective price of health care. If everyone is fully insured for everything and all co-payments are zero, the effective price is zero, but in other cases the effective price can be quite high. The actual costs vary across countries but also across types of care (GP care, specialist care, hospital visits, etc.), and this is one of the reasons why we model each type of care separately.

What about the stock of health? Health is positively associated with SES. Since health negatively affects the demand for health care, analyzing the relationship between health care demand and SES without controlling for health will lead to lower estimates of the effect of SES on health care use than if health is controlled for — the lower SES groups demand more care because they need it more (or because its marginal return is higher), and not because of their lower SES as such. It therefore seems better to control for health in the analysis. This is also in line with what we want to measure: health care equity refers to equitable access to health care for those in equal need, i. e., for those with the same health condition. But it raises the issue that health can be affected by past health care (and health behavior) choices.

What are the implications for the empirical strategy? We run probit regressions explaining health care utilization from SES indicators (income, in the benchmark model), and the SES measure interacted with country dummies, to examine whether the hypotheses formulated above are supported or not. Complications arise because we want to control for various factors: health behavior, information about health care services, and health[2].

As argued above, it is not a priori clear whether variation in health behavior would affect our findings. We therefore do not incorporate health behavior. As a robustness check, however, we also estimate a version of the model that includes controls for health behavior (which are avail-

[2] We do not incorporate voluntary health insurance (VHI) since this is often the own choice of the individual and may be related to the individual's preferences for health or health care (Jones et al., 2006).

able in our data). This ignores the fact that health behavior may be potentially endogenous; we do not have the appropriate instruments to take that into account.

Information access is difficult to measure. In our main model, we do not incorporate it in the regression but keep it in mind when interpreting the results. If we find a positive relationship between health care use and SES, one potential explanation is that high SES groups have more access to information.

We also cannot account for the endogeneity of health. But since controlling for health (i. e. health care needs) is crucial in our context, we control for health in the main analysis and thereby account for the potential endogeneity problems in interpreting the results as in Maurer (2007). Following (Van Doorslaer et al., 2006), we compare results that control for current health with results that do not. As an intermediate strategy, we also consider specifications that only control for a limited set of health variables that are plausibly exogenous (such as whether the doctor has ever told the respondent he or she has cancer, arthritis, etc.).

3. Health care systems in Europe and the US

We can broadly divide countries in groups according to the organization of their health care system in 2004 (the year in which our micro data were collected). The public health care systems in the first group, Denmark, Greece, Italy, Spain, and Sweden, are mainly financed by taxes and provide almost universal coverage (Beveridgean systems). The second group consists of Austria, Belgium, France, Germany, and the Netherlands whose health care systems are mainly financed by social contributions based on individual income level and which are based on coverage by social security or sickness funds (Bismarckian systems). Switzerland has a «Private mandatory insurance» system (since 1996) financed through premiums; it guarantees universal coverage by compulsory (and publicly subsidized) private health insurance. The insurance premium varies by region but is independent of income and risk.

The US is the only OECD country where voluntary health insurance is the main system for most of the population. This country has a considerable share of the population without insurance coverage: according to the Census Bureau's 2005 Current Population Survey (CPS), there were 45.8 million uninsured individuals in 2004, or 15.7% of the civilian non-institutionalized population (US Census Bureau, 2006). On the other hand, almost the complete US population of age 65 and over automatically has access to Medicare so that this part of the population is covered by a universal public health care system. In the other countries considered in this study, some population groups buy private health coverage because either they are not eligible to public coverage or they can choose to opt out of it. This is the case, for example, for the Netherlands, where a third of the population is not eligible to public health insurance coverage, and Germany, where employees with annual earnings over 45900 Euros and their dependants can choose to opt out of the statutory health insurance scheme. In Belgium and France, the insured have to pay different co-payments depending on the type of service, while doctor visits are usually free at the point of delivery in Denmark, Germany, Greece, Italy, and Spain.

Secondary care rules vary from country to country: a gate-keeping system that requires the authorization of referrals to specialists by a designated primary care provider is active in some countries, but sometimes (e. g. in Spain) gate-keeping can be bypassed through emergency de-

partments of hospitals, and in other countries it is often not enforced (Italy and Greece). In the US there is no gate-keeping system for those aged 65+.

General practitioners are paid by capitation in Denmark, Italy, and the Netherlands; by salary in Greece, Spain and Sweden, and on fee-for-service basis in the other countries (OECD, 2004). Under a capitation system, doctors are paid a fee for each patient registered with them; under a fee-for-service system, doctors are paid on the basis of the service provided; and under a salary system, doctors are employed by the state or the insurer with a salary that does not directly depend on the number of treatments or the number of patients. Remuneration of specialists is differentiated across types of specialization, but our do not allow distinguishing among these types. Specialists working in public hospitals in the European countries in the Survey of Health, Ageing and Retirement in Europe (SHARE) are mostly salaried, whereas in the US they are paid on a fee-for-service basis.

Specialist consultation requires some co-payments in most countries considered. In Italy a flat rate payment is required for public consultations and outpatient visits; in Spain specialist consultations are free at point of delivery. In Greece consultations are paid out-of-pocket. In the US co-payments do not apply to those aged 65+, who are covered by Medicare.

Unlike GP and specialists services, dental care is not publicly provided: dental visits are usually financed out-of-pocket, being paid the full cost in Italy, the Netherlands, Spain and Sweden, and financed through co-payments or co-insurance in the other countries.

4. Data

Van Doorslaer et al. (2000) compare the SES gradient in several countries using nationally representative country specific datasets. They acknowledge the potential drawback that measures of health care use, SES, health or other controls may not be comparable across countries, and emphasize the usefulness of having harmonized international data sets to avoid these potential comparability problems. For a selected set of European countries in the European Community Household Panel (ECHP), Van Doorslaer et al. (2006) analyze the relationship between the use of primary and specialist care and SES, controlling for health. Their analysis covers the complete adult population. They find that health care use increases with SES if health is controlled for, particularly specialist care.

The first wave of SHARE[3] which covers eleven European countries, in combination with the Health and Retirement Study (HRS) for the US[4] offers a unique opportunity for the analysis of the relationship among the 50+ between human capital and SES on the one hand, and the use of health care facilities on the other hand, accounting for the health-SES gradient by controlling for health. They have detailed information on health care use, including specialist visits, dental care, and in- and outpatient treatment in hospitals and also contain extensive information on SES, with harmonized data on education, income, and wealth components, as well as a rich set of objective and subjective health variables.

[3] See Börsch-Supan et al. (2005), Börsch-Supan, Jürges (2005) and http://www.share-project.org/ for details on the SHARE data.

[4] A similar source of data (The English Longitudinal Study of Ageing — ELSA) exists for England, but has no information on utilization of health care services.

This paper uses data from 2004: wave 1 of SHARE (release 2.0.1) for Europe, and wave 7 of the HRS for the US. We use data from the eleven countries in the 2004 baseline study in SHARE: Austria, Germany, Denmark, Spain, France, Greece, Italy, the Netherlands, Sweden, Switzerland and Belgium. The study sample is restricted to adults aged 50 and older and we dropped observations with incomplete information on background variables[5]. Our final sample counts 26563 individuals for SHARE and 19084 individuals for HRS.

4.1. Income and utilization of health services

Table 1 summarizes the distribution of equivalized household income in each country. Income is measured as gross annual household income for 2003, derived from disaggregated income sources including labor and non-labor income, transfer, investment, benefit, and pension income. It excludes rent payments received and imputed rents. Each income is divided by the square root of the number of household members to adjust for household size. All amounts are in thousands of PPP-adjusted dollars[6]. Table 1 shows large differences in income levels across countries, with much lower means and medians in the three Southern European countries than in the US or the other SHARE countries. Income inequality is much larger in the US than in any of the SHARE countries.

Table 1. Equivalized household income by country

Country	*N*	Mean	Standard deviation	p25	p50	p75
AT	1789	33350	32661	14017	23765	40092
DE	2899	37770	37924	15074	26333	47072
SE	2933	38381	27374	20920	31029	47180
NL	2806	41507	38941	16868	30721	53433
ES	2164	20489	29285	6334	11786	23682
IT	2440	22403	24734	8790	15342	27476
FR	2880	37576	46805	13413	22966	41116
DK	1568	38522	32883	16510	30613	48495
GR	2608	18075	17192	8329	13319	23184
CH	929	47892	44346	16627	35185	64483
BE	3547	38752	54289	12769	21520	43268
US	19084	40839	70787	13056	24879	46325
Total	45647	36679	54399	12663	23489	43315

Notes. Authors' calculations based on 2004 SHARE and HRS. Income is gross annual household income in 2003, adjusted for household size. Amounts are in thousands of PPP-adjusted dollars.

[5] The sample design implies that individuals younger than 50 years with a partner of 50 years or older are also interviewed. These respondents are not included in our analysis.

[6] Taken from the OECD website http://www.oecd.org/.

Health service use is measured by the following questions: «During the last twelve months[7], about how many times in total have you seen or talked to a medical doctor about your health?»; «How many of these contacts were with a GP or with a doctor at your health care centre?»; «During the last twelve months, have you consulted any of the specialists mentioned on card 12?»; «During the last twelve months, have you seen a dentist or a dental hygienist?». Similar questions were asked for inpatient and outpatient care. In this paper, we focus on the binary variables of using a given type of service at least once (variable coded as 1) or not at all (variable coded as 0) during the past twelve months.

Figure 1 compares the use of health care services in our data by income class across countries. HRS does not distinguish between GP and specialist visits and only provides information on «doctor visits» (GP, specialist, or outpatient visits). Figure 1 shows highly differentiated pictures of health service utilization rates across countries and health services, irrespective of income class. The fraction of the 50+ population visiting a GP at least once varies from hardly more than 60% in Greece to almost 90% in Belgium and France, countries that all have almost complete coverage of their population by the public health care system.

Differences for other services are even larger. The use of specialist services ranges from less than 20% in Denmark, to more than 50% in Germany, although coverage by public health care is less complete in Germany than in many other countries. Inpatient and outpatient services seem particularly popular in the US, but the US question refers to a two year period, compared to twelve months in SHARE. This may explain the complete difference for inpatient services and part of the difference for outpatient services. Dentist care is much less common in the southern European countries than in the US and the rest of SHARE-Europe.

There is also substantial variation in the raw income gradients. The use of doctor, inpatient, and outpatient care does not increase with income in most countries, in accordance with the fact that for basic health services most countries have achieved close to universal coverage at low or zero financial cost. In fact, the association between income and inpatient or GP care is negative, probably since low income groups are less healthy and more in need of health care, in line with existing studies (Van Doorslaer et al., 2006, 2000). For specialist and outpatient care, no clear association is found. On the other hand, the use of dental care rises with income in all SHARE countries and the US.

4.2. Demographics and health variables

Table 2 presents descriptive statistics of the explanatory variables for our estimation sample. Age is grouped into seven categories. Marital status is categorized as married or not married (including «living with a partner»). In our sensitivity analysis, we consider two alternative (long-term) SES indexes: education and household wealth. Education level is defined according to the ISCED-97 harmonized coding for international comparisons[8], with categories non-advanced qualification, high school qualification, and advanced qualification. Wealth is defined as household net worth in thousands of PPP-adjusted dollars, adjusted for household size.

[7] In the HRS, the questions refer to the last two years instead of the past twelve months.

[8] See for details on ISCED coding: www.uis.unesco.org/ev.php?ID=3813_201&ID2=DO_TOPIC.

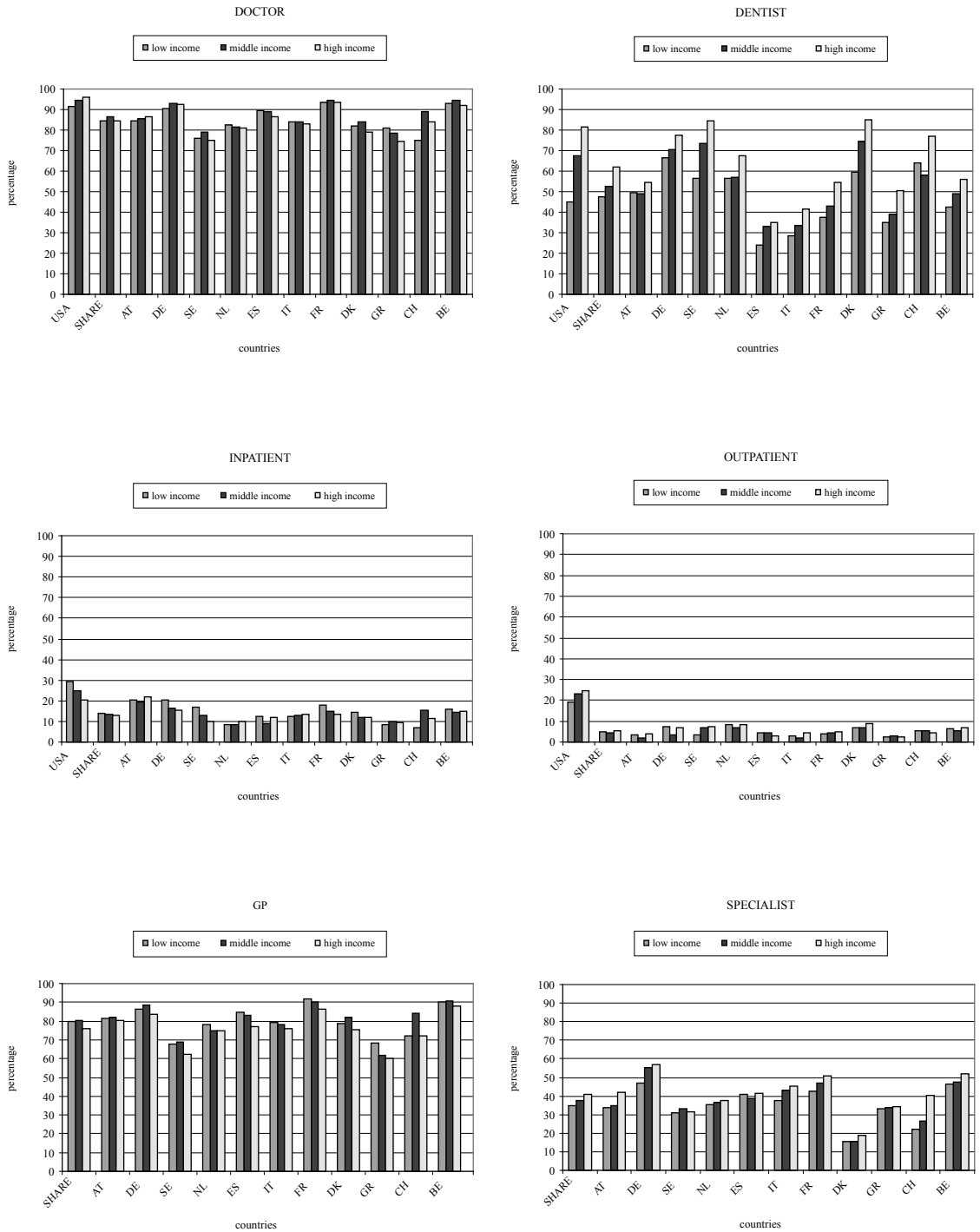

Figure 1. Health care use by income and country
(Weighted statistics based on 2004 SHARE and HRS data)

Table 2. Descriptive statistics estimation sample (total $N = 45647$)

Variable	Mean	Standard deviation
logincome	9.962	1.344
assets	288315	924720
low edu	0.398	0.489
mid edu	0.306	0.461
high edu	0.296	0.456
age 50–54	0.165	0.371
age 55–59	0.162	0.368
age 60–64	0.166	0.372
age 65–69	0.161	0.368
age 70–74	0.129	0.336
age 75–79	0.098	0.297
age 80+	0.117	0.322
woman	0.553	0.497
unmarried	0.667	0.471
sphs	0.659	0.474
adl (1+)	0.125	0.331
mobilit (1+)	0.561	0.496
chronic (2+)	0.382	0.486
underweight	0.015	0.123
normalweight	0.364	0.481
overweight	0.404	0.491
obese	0.216	0.412

Notes. Authors' calculations based on 2004 SHARE and HRS.

Health care equity is often defined as equal access for those with equal need. The need for health care services is incorporated through self-perceived health status (SPHS, coded as 0 («very good») or 1 (at most «good»)) as well as more objective measures. The variables «limitations with activity of daily living» (ADL) (such as dressing, bathing, or getting in and out of bed) and «mobility limitation» (MOBILIT) indicate the extent to which individuals consider themselves physically handicapped. Both are reclassified into two categories: no limitations (with ADL or MOBILIT) and one or more limitations. In addition, we include a dummy variable for two or more chronic diseases (CHRONIC)[9]. Finally, we control for dummies based upon body mass index (BMI: weight (in kilograms) divided by height (in cm) squared): $\text{BMI} \leq 18.5$ (underweight); $18.5 < \text{BMI} < 25$ (normal weight); $25 \leq \text{BMI} < 30$ (overweight); $\text{BMI} \geq 30$ (obese).

[9] The number of chronic diseases is a count of the following diseases: heart problems, high blood pressure, high cholesterol, cerebral vascular disease, diabetes, lung diseases, asthma, arthritis, osteoporosis, cancer, stomach ulcer, Parkinson disease, cataracts, hip fracture or femoral fracture.

5. The income gradient of health care use

We use probit models explaining the yes/no answer to the questions whether respondents have used the type of health care service at least once in the past twelve months (two years in the US). In each model, the independent variable of interest is log household income. The models are estimated separately for each type of care and for each country. In each case we also control for basic demographics (age, gender, marital status) and health[10]. Table 3 presents the marginal effects (in percentage points) at the country specific means; for example, the probability of at least one doctor visit in Austria would rise by 0.00865 percentage points if income increased by 1%, keeping all other explanatory variables constant. The general picture of Table 3 is that the income gradients are very heterogeneous across health care services and countries.

Table 3. Income gradient of health care use

Country	*N*	DOC	GP	SPEC	OUTPT	INPT	DENT
AT	1789	0.865*	0.736	1.843**	−0.241	0.087	1.442*
		(0.488)	(0.567)	(0.805)	(0.215)	(0.648)	(0.816)
DE	2899	0.715**	0.016	2.840***	0.437	−0.98	1.750**
		(0.337)	(0.575)	(0.903)	(0.416)	(0.602)	(0.747)
SE	2933	3.768***	3.853***	1.101	2.390***	0.468	6.482***
		(1.021)	(1.257)	(1.242)	(0.736)	(0.809)	(1.051)
NL	2806	1.354**	0.975	2.452***	0.519	0.717	2.141**
		(0.603)	(0.717)	(0.91)	(0.493)	(0.509)	(0.861)
ES	2164	−0.027	−0.641	1.174	−0.044	0.438	1.141*
		(0.337)	(0.474)	(0.715)	(0.24)	(0.441)	(0.604)
IT	2440	0.833**	0.591	2.585***	0.358	0.024	3.082***
		(0.360)	(0.453)	(0.658)	(0.244)	(0.393)	(0.624)
FR	2880	0.157	−0.678	2.827***	0.036	−0.353	2.924***
		(0.243)	(0.417)	(0.808)	(0.314)	(0.543)	(0.789)
DK	1568	−0.03	−0.286	1.974	0.322	2.149*	3.956***
		(0.994)	(1.107)	(1.28)	(0.846)	(1.115)	(1.165)
GR	2608	0.352	−0.854	1.587**	0.05	0.710*	1.079
		(0.502)	(0.653)	(0.668)	(0.185)	(0.41)	(0.665)
CH	929	0.966	−1.973	7.778***	−0.068	1.653*	5.299***
		(0.925)	(1.218)	(1.519)	(0.486)	(0.944)	(1.376)
BE	3547	−0.001	−0.138	2.287***	0.543	0.009	2.868***
		(0.247)	(0.353)	(0.684)	(0.347)	(0.453)	(0.685)
US	19084	1.094***	—	—	2.515***	0.032	8.491***
		(0.096)			(0.269)	(0.258)	(0.316)

Notes. Standard errors are in parentheses. ***, **, * — significance at the level 1, 5 and 10%. Marginal effects in percentage points. Variables included in the model: Log income; Demographic characteristics (age, gender, marital status); Health controls (self reported health status, adl, mobility, chronic conditions, BMI category dummies).

[10] Results of two model specifications with fewer controls are available upon request. Once basic demographics are controlled for, controlling for health often raises the income coefficient (from negative to zero, or from zero to positive, etc.), in line with the notion that lower income groups have more health problems, and health problems obviously increase the use of health care.

The first column presents the results for doctor visits (GP, specialist, or outpatient). The income slope is positive in most and virtually zero in the other countries, but there is large variation in size and significance levels. In the next three columns, GP services, specialist services, and outpatient services are considered separately. For GP use the income effect is insignificant in all countries except SE where, surprisingly, the income slope is significantly positive and quite large, whereas in DK, with a rather similar health care system, the slope is zero. Part of the explanation suggested by the theoretical framework might be that DK has no co-payments while in SE very modest co-payments exist (Docteur, Oxley, 2003, pp. 54–55). Other possible explanations might be differences in public funding of health care or whether the GP acts as a gate-keeper.

The picture for specialist use is quite different: the income gradient is positive and significant in most SHARE countries. Particularly CH has a very large income gradient, in line with Figure 1. In SE, DK, and ES, the income effect is insignificant but still positive.

For outpatient use we find significant positive income effects for the US and SE. In the US, outpatient care is more important (both in absolute terms and compared to inpatient care) than in the European countries (see Figure 1) and it seems that particularly the richer groups make much use of this. An explanation may be that co-payments on typical outpatient hospital treatments like X-rays and pathology are higher in the US than in Europe (Docteur, Oxley, 2003, Table 7). Co-payments cannot explain the strong positive income effect in SE; perhaps this is because outpatient care can substitute specialist care in this country, since SE is one of the few countries without significant income gradient in specialist care.

The income effect on inpatient care is typically small and positive and never significant at the 5% level. According to Docteur and Oxley (2003), most countries have no or a modest co-payment for every day spent in the hospital, except in the US where co-payments can be substantial. Possible explanations for a positive effect of income might be that hospitals get higher fees for treatments of higher income groups covered by different type of insurance (cf. (Van Doorslaer et al., 2000) or that access barriers (such as information acquisition or an appointment with a specialist) mainly hamper the lower income groups[11].

The strongest effect of income is in dentist and dental care use (Table 3, column 7): positive for all countries and significant at the 5% level in nine of the twelve countries. The costs of dental care are often not covered by basic insurance; higher income apparently leads to easier access and better chances to purchase an adequate and affordable level of private coverage. It is interesting to compare the country ranking of the income gradients here with the ranking of the costs of a standard treatment — dental fillings, given by Tan et al. (2008). They find the highest costs of treatment in England, Italy and Spain, and much lower costs in Germany, the Netherlands and, particularly, Denmark and France (they give no information on the other SHARE countries). If higher costs of treatment lead to higher prices for health care consumers (in the form of co-payments or because treatment is not covered) one would expect a positive relationship between the income effect and the cost. This is not what we find for ES, which has rather low income effects compared to the other countries considered, though it is one of the most ex-

[11] Stargardt (2008) compares the costs of a hip replacement across selected countries and finds that Spain is much cheaper than other countries, whereas Italy is quite expensive. There is only a weak correlation between these costs and the income effects by country, which probably could be expected since patients hardly ever pay for a hip replacement themselves.

pensive countries for dental care. IT has a higher income effect than all the countries mentioned in the study by Tan et al. (2008), except DK.

As a sensitivity analysis we checked what happens when we also control for education level (results not presented). The effect of education on health care use was significantly positive for specialist and dentist visits, but the coefficient of log income hardly changed. For doctor visits, education effects are positive and significant for six countries. For the other health care services, the education controls were generally significant (and positive) for the US only. Overall, the education effects were usually of the same sign as the income effects but significance levels sometimes differ. Including education had little effect on the sign or significance level of the income slopes. In the same way, we estimated the model adding controls for wealth (assets). This had no effect on the income coefficients and the coefficients on the wealth variables were insignificant.

We also estimated each probit model with assets or education as SES measures *instead of* log income. Whenever the coefficients on assets or on education qualifications are significant, the sign is the same as for log income, leading to results that are qualitative similar to those obtained in Table 3. Therefore the main conclusions remain unchanged when log income is replaced by another measure of SES.

6. Health care use and health policy

In the previous section we found substantial differences in the effect of income on health care utilization across countries. In this section we analyze the cross-country correlation between these income effects and several aspects of health care policy that may affect the SES gradient, presented in Table 4. Per capita total expenditures on health care, PCAPTHE and per capita public health expenditures (defined as percentage of total expenditure on health), PCPUBHE, are measures of health care funding. How this affects the income gradient depends on how additional funding is allocated. More public health expenditures can benefit the poor if they increase access to basic services, but may also be used for less basic services that are mostly used by higher income groups. Per capita health expenditures per year (expressed in USD using PPP (OECD, 2007)) vary from slightly less than USD 2000 in GR to more than USD 6000 in the United States. They are much lower in Southern European countries than in the rest of SHARE Europe and much higher in the US than in any SHARE country.

The third health care policy variable is a dummy for whether the general physician acts as a gate-keeper (GK) for access to other types of health care such as specialist care (excluding dentists). We expect that GPs do not base their referral decisions on income and therefore may reduce the importance of other determinants of using specialist care, such as its price. Since visiting a GP is hardly associated with income, gate-keeping may also reduce the gradient due to information access: the information on specialist services provided by the GP will be less related to the patient's SES than information collected by the patients themselves. On the other hand, those who are more informed may push their GP harder to refer them to a specialist. Moreover, it seems plausible that gate-keeping increases the time effort needed to obtain specialist care, making it less attractive for individuals with high opportunity costs, like higher wage earners. All these scenarios lead to the hypothesis that gate-keeping reduces the income gradient of specialist care and types of inpatient care which start with referral to a specialist. The relationship of gate-

keeping with outpatient care is not so clear since some outpatient care requires referral but other types (such as emergency care) do not. We expect that gate-keeping increases utilization of GP services, and to the extent that higher SES groups want more specialist services, that gate-keeping also has the indirect effect of increasing demand for (referrals through) GP visits.

Table 4. Health care systems in SHARE countries and US (2004)

Country	Total health expenditure (per capita USD PPP)	Public health expenditure (to total health exp.)	GP as Gate-keeper (GK)	Doctor's type of payment	Co-payments					
					DOC	GP	SPEC	DENT	INPT	OUTPT
AT	3397	0.756	No	F	No	No	No	Yes	Yes	No
DE	3162	0.769	No	F	Yes	No	Yes	No	Yes	Yes
SE	2964	0.846	Yes	C	Yes	Yes	Yes	Yes	Yes	Yes
NL	3156	0.625	Yes	C	No	No	No	No	No	No
ES	2128	0.709	Yes	S	No	No	No	Yes	No	No
IT	2401	0.758	Yes	C	Yes	No	Yes	Yes	No	Yes
FR	3117	0.794	No	F	Yes	Yes	Yes	Yes	Yes	Yes
DK	3030	0.843	Yes	F	No	No	No	Yes	No	No
GR	1991	0.446	No	S	Yes	Yes	Yes	Yes	Yes	Yes
CH	3990	0.585	No	F	Yes	Yes	Yes	Yes	Yes	Yes
BE	3311	0.731	No	F	Yes	Yes	Yes	Yes	Yes	Yes
US	6014	0.447	Yes	F	Yes	Yes	Yes	Yes	Yes	Yes

Source: (Van Doorslaer et al., 2006; OECD, 2007; WHO, 2004).

Notes. Doctor's type of payment: fee-for-service (F), capitation (C), and salary (S).

Table 4 also shows the more common type of remuneration for doctors in each country (following Jimenez-Martin et al. 2004): fee-for-service (F) with payment based upon the services provided, capitation (C) with payment for each registered patient, and salary (S) where doctors are employed by the state or the insurer with a salary that does not directly depend on the number of treatments or patients. In countries with a fee-for-service payment scheme, visits to a specialist are expected to be more likely than in countries where other types of remuneration apply.

As discussed above co-payments are expected to increase the SES health care utilization gradients since they increase the effective price of the services. Co-payments vary across service, are sometimes defined in terms of amounts, and sometimes as a percentage of the total cost of a specific service. As a consequence, specifying a co-payment amount for each broad type of health services in our analysis is not possible and we only work with a dummy variable on whether co-payments apply. Table 4 shows that co-payments for GP care are common in five out of twelve countries considered. In all these countries except GR, co-payments also apply to specialist and in- or outpatient services, while there are several countries where co-payments apply to some of these services but not to GP care. Co-payments are very common for dentist services — DE and NL are the only countries where they do not apply.

We ran similar probit models as in the previous section, pooling all countries, including country dummies, and interacting log income with the five policy indexes discussed above.

Furthermore we included only one or two macro-variables at a time. The identifying assumption in these models is that the cross-country differences in income slopes are only driven by the macro-variables in the regression, while differences in the levels of health care utilization can also be due to other factors (economic, institutional, or cultural). Unfortunately, the number of countries appeared not to be large enough to disentangle the effect of each macro-variable on the income gradient separately, neither in a multivariate regression context nor when including one macro variable at the time — results were inaccurate and insignificant (details available upon request).

Instead, we follow a descriptive approach, showing how income slopes relate to the different macro-variables described above. Figure 2 shows the results. It should be kept in mind here that the correlations are based upon 11 or 12 points (11 or 12 countries, depending on whether the US is included or not) only, and can be driven by a few of these countries. The most salient finding is a positive association between aggregate health care expenditures and the income gradient of the use of health care services. A positive association is found for doctor visits, specialist services, outpatient services, and dental care, irrespective of the measure for public health expenditures that is used. This suggests that the extra services provided in countries with relatively large health expenditures mainly benefit the richer part of the (older) population. For GP visits, the sign of the association depends on which measure of health care expenditures is used. For inpatient services, we find a negative but very weak association. Here the fact that larger health care expenditure may increase access for the poor could compensate the effect of providing extra services mainly used by the richer part of the population.

Gate-keeping is positively associated with the income gradient in doctor visits, GP visits, and outpatient services, but negatively with specialist visits. The latter effect is as expected, since the need of referral through a GP may make a specialist visit more dependent on medical need and less on other factors such as income or access to information networks. The positive associations with GP visits are in line with the fact that their greater demand for specialist services induces high income groups to visit their GP if they need a referral. The positive association with outpatient services may (again) be explained by substitution of specialist visits by outpatient hospital treatment.

The association between co-payments and income is largely as expected. It is positive for doctor visits, specialist visits, outpatient services, and dental care. It is zero or even negative for GP visits and inpatient services. Like the associations with the level of public health expenditures, this is consistent with the notion that specialist, outpatient, and dental care services contain more non-basic «luxury» services where the patients have a choice and make a tradeoff between costs and benefits. Higher (monetary) costs induced by co-payments are more often an impediment for low income groups than for higher income groups.

7. Conclusions

We have analyzed the relationship between income as a measure of SES and the use of several health care services for the 50+ population in the US and a number of European countries. Using a health production framework, we have discussed the potential theoretical effects and how they vary with prices and other institutional features. This leads to predictions for empirical work — for example, the association between the consumer price and the income effect is ex-

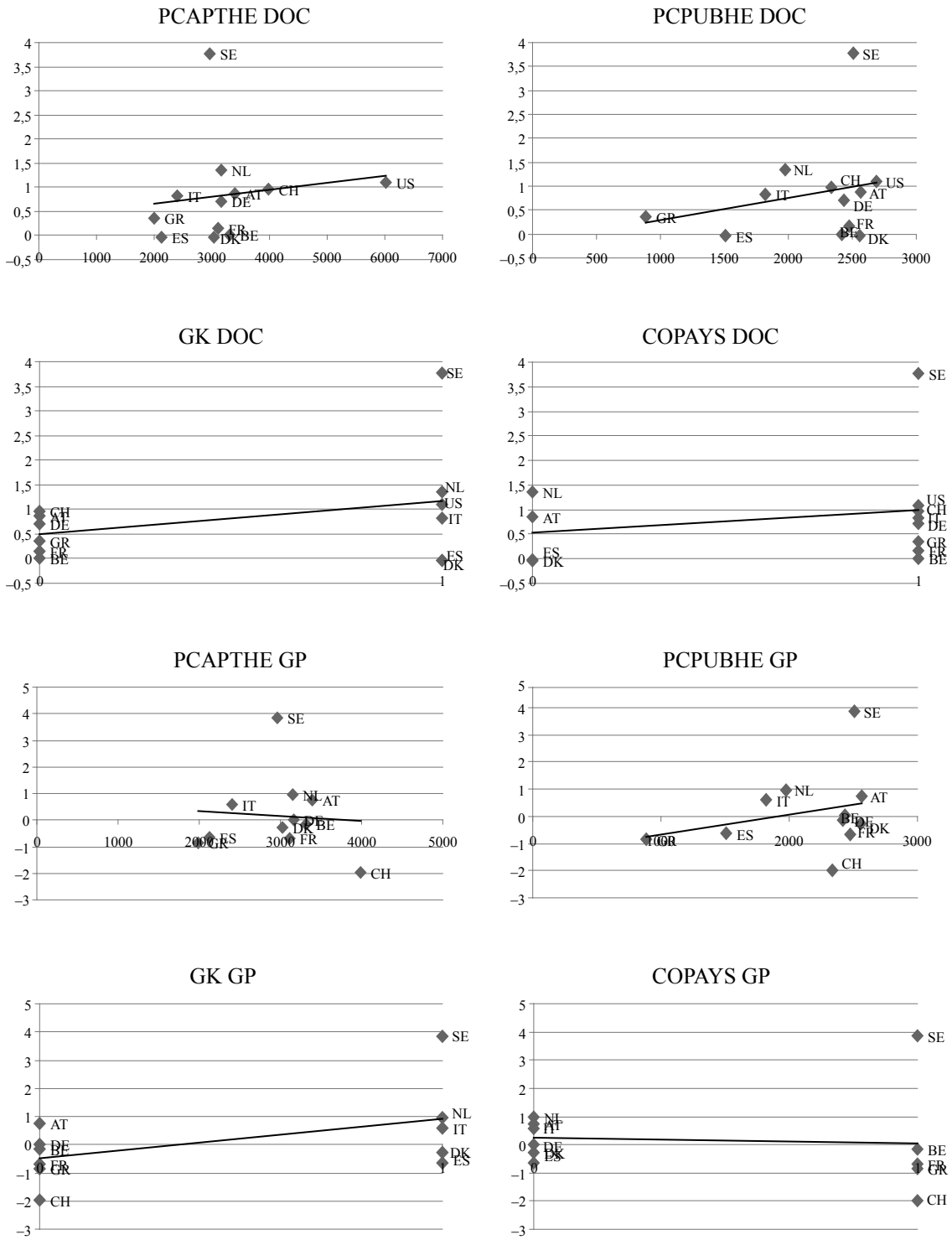

Figure 2. Income gradient and institutional variables

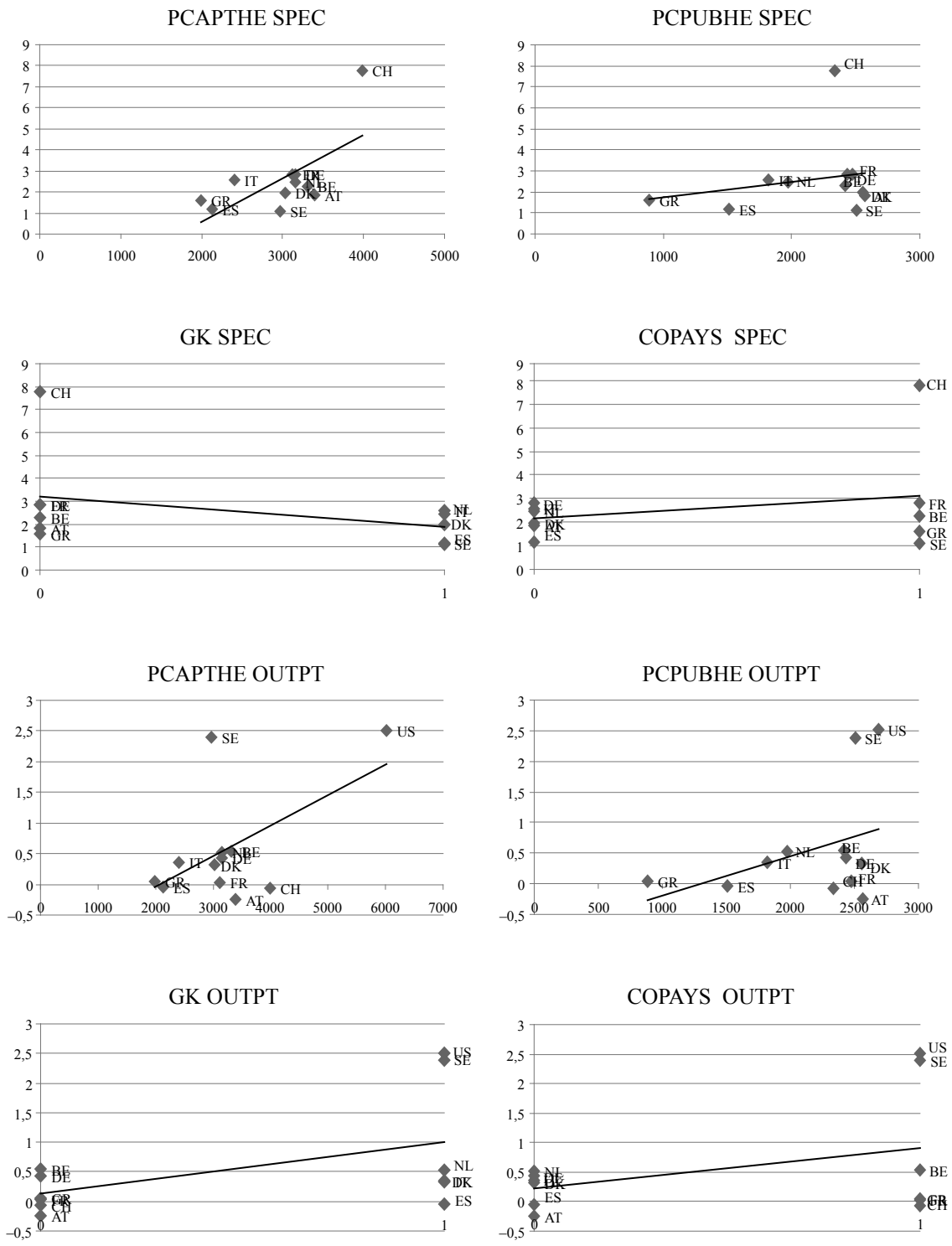

Figure 2 *(continued)*

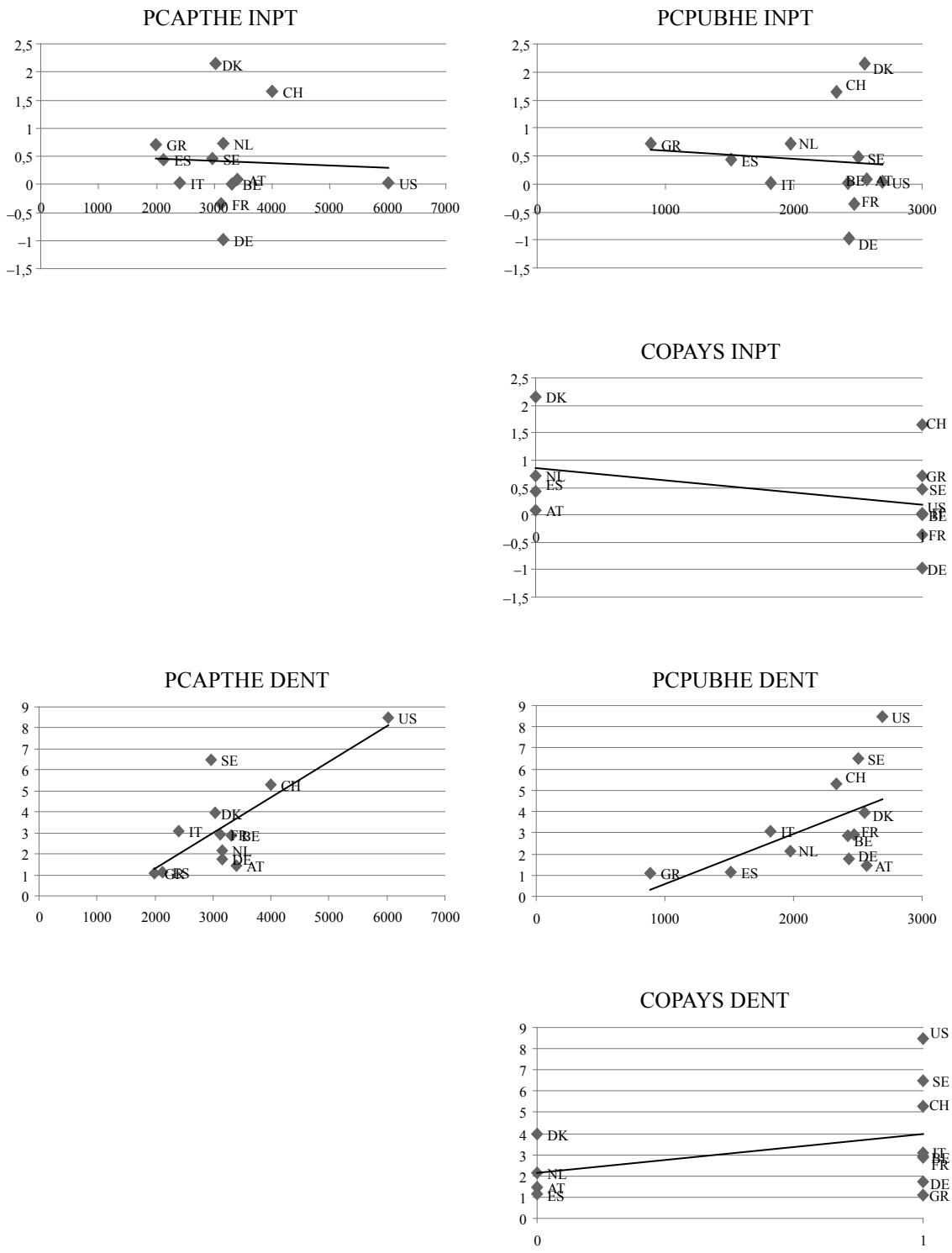

Figure 2 *(finishing)*

pected to be positive, while the effect is predicted to be negatively correlated to quality aspects such as waiting times. Health policies that change the effective price of health care services, or change other factors that make the services less or more accessible to low or high SES groups, are therefore expected to influence the relationship between the use of the health care service and socio-economic status. Since equal access to health care services for people with equal health problems is an explicit policy target in many countries, it is important to analyze which aspects of health policy lead to such a gradient.

We find clear evidence of a positive income gradient for several health care services, particularly for specialist visits, outpatient services, and dental care. These are also the services for which we find the clearest positive association between the income gradient and public expenditure on health care at the aggregate (country) level. These services probably contain more non-basic services than the other types of health care use that we consider, implying that whether or not to use them is a choice of the consumer. For low income groups, the cost may weigh more heavily and limited access to information about available health care possibilities may play a role as well. In any case, our results suggest that countries with higher public health expenditures do not automatically get closer to the policy goal of health care equity, i. e. equal access for those with the same needs. On the contrary, the extra money and services disproportionally seems to benefit the richer part of the (older) population.

Validating the theoretical predictions requires more detailed insight in the prices and characteristics of various types of health care services than is currently available. There is interesting recent work on price indicators based upon specific treatments (Busse et al., 2008) but this covers only a limited set of countries and focuses more on the production costs and reimbursements to doctors and hospitals than on the prices for the patients. Additionally future research on what is covered by which insurance is needed.

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