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Gruber, Stefan; Kiesel, Markus

Empfohlene Zitierung / Suggested Citation:
Gruber, S., & Kiesel, M. (2010). Inequality in health care utilization in Germany? Theoretical and empirical evidence for specialist consultation. *Journal of Public Health*, *18*(4), 351-365. https://doi.org/10.1007/s10389-010-0321-2

J Public Health (2010) 18:351–365
DOI 10.1007/s10389-010-0321-2

ORIGINAL ARTICLE

Inequality in health care utilization in Germany? Theoretical and empirical evidence for specialist consultation

Stefan Gruber · Markus Kiesel

Received: 19 April 2009 / Accepted: 11 February 2010 / Published online: 13 March 2010

Abstract
Aim In view of increasing concern about a two-class system in the German health care sector, this study investigates the relevance of health insurance schemes and other socioeconomic characteristics to the level of specialist health care provision.
Subjects and Methods Referring to Ronald M. Andersen's model of health care utilization and more content-based approaches, we implement a negative binomial hurdle regression to estimate the number of specialist visits within the last 12 months. Our data source is the German sample of the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) in 2004.
Results The results show that men's number of specialist visits is markedly sensitive to *predisposing* and *enabling* factors, whereas women's health care utilization depends less on such socioeconomic characteristics. With reference to previous findings concerning general practitioner consultation, the assumption of a *bipolar health care system* providing general practitioner care primarily to the statutory insured and specialist care to the privately insured is supported empirically as to men. Education, which is considered to be highly correlated with health lifestyles, has a positive effect on medical health care. Every additional year of education increases by about 10% the probability of men seeking specialist consultation. Furthermore, the results indicate an unfavorable situation for the self-employed concerning health care because of their specific employment situation and health insurance coverage.
Discussion The research results suggest the existence of relevant differences in the amount of specialist consultation according to health insurance and other socioeconomic features. Further research could concentrate on the question of whether these inequalities in utilization levels indicate overprovision or underprovision of ambulant health care. Moreover, we recommend longitudinal research that is particularly suited to detangle age and cohort effects.

Keywords Specialist consultation · Health care utilization · Health insurance · Supply-induced demand · Hurdle regression

S. Gruber
Institut für Arbeitsmarkt-und Berufsforschung,
Regensburger Str. 104, 90478 Nürnberg,
Nuremberg, Germany
e-mail: stefan.gruber@iab.de

M. Kiesel (✉)
Bremen International Graduate School of Social Sciences, Wiener Straße/Celsiusstraße,
Postfach 330440, 28334 Bremen, Germany
e-mail: mkiesel@bigsss.uni-bremen.de

Introduction

The increase of economic incentives and benefit cuts in statutory health insurance has been accompanied by concern about a two-class system in the German health care sector. Qualitatively better care is increasingly associated with individual resources or access to private health insurance. In the wider society and the media, responses to the recently published study of the Institute for Health Economics at the University of Cologne (Lungen et al. 2008) showed the high sensitivity towards topics concerning the health sector. Lungen et al. illustrated that patients with statutory health insurance have to wait about three times longer for an appointment in a specialist practice than clients of private insurance companies. Moreover, according to analyses of the Gesundheitsmonitor

(health monitoring) survey, people with statutory health insurance have shorter talks with their physicians and consider themselves less informed about their medical condition as well as less involved in the decision making about their further treatment compared to privately insured people (Mielck and Helmert 2007: 62).

By means of the analysis of the contact frequency between doctor and patient, this study aims to contribute to the clarification of actually existing differences in specialist health care provision referring to health insurance and other socioeconomic characteristics in the German health care system. Numerous studies in this field use the number of doctor visits as a key indicator to approximate the amount of received health services.

Concerning the socioeconomic factors of health care utilization, most research examines income as the crucial independent variable. Van Doorslaer et al. (2004a) find that, after controlling for the greater health care needs of low income groups, substantial degrees of horizontal inequity favoring the high income groups emerge in 12 EU member states collected in the European Community Household Panel survey of 1996. The pro-rich pattern was strongest in Ireland and Portugal, and the weakest in the Benelux countries. Van der Heyden et al. (2003) approve the positive relation between income and specialist care utilization in Belgium based on the Belgian Health Interview Survey of 1997. In addition to this, it has been pointed out that low income groups tend to avoid or delay physician visits more often than high income groups (Burström 1990; Mielck et al. 2009; Rückert et al. 2008).

However, according to Cameron et al. (1988) income appears to be much more important in determining health insurance choice than determining health care service use. Similarly, van Doorslaer et al. (2002, 2004b) highlight the positive correlation of income and private health insurance.

Research on the impact of private coverage on health care utilization patterns is much less common, though. Based on an analysis of the European Community Household Panel, Jones et al. (2004) show in an international comparative study that private insurance is positively associated with the probability of specialist visits in Ireland, Italy, Portugal, Spain and the UK. This correlation has also been found in Switzerland (Bisig and Gutzwiller 2004). In Germany, an impact of private health insurance on specialist health care use could not be confirmed yet (Andersen and Schwarze 1997; Pohlmeier and Ulrich 1995).

In the context of higher utilization levels of general medical care by people with statutory health insurance (Andersen and Schwarze 1997; Bergmann et al. 2005; Gruber and Kiesel 2009; Pohlmeier and Ulrich 1995; Thode et al. 2005), it seems reasonable to suppose that the latter group receives more medical care from specialists in return and to test this statement with current data again. Gruber and Kiesel (2009) showed that privately insured persons have lower general practitioner utilization than people with statutory health insurance. Their statistical chance for at least one consultation within the last 12 months is for about two-thirds lower than that of statutory insured persons. In addition to that, the privately insured display lower rates of consultation if treatment takes places. These results become more meaningful by comparing them to the consultation of specialists. Only the consideration of both general practitioners and specialists permits evaluations about ambulant health care inequalities depending on insurance status and other socioeconomic characteristics. Based on the assumption that the quality of medical treatment is strongly correlated with the number of doctor visits, substantial differences should be of considerable interest not only for scientists but also for political decision makers. The focus is placed on elderly people who are characterized by high medical necessity and growing demographic importance. The empirical analysis is based on the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) in 2004. Statistical calculations have been performed with STATA v10.

First Ronald M. Andersen's model of health care utilization is introduced, serving as the theoretical background for the analysis. By combining the model with other more content-based approaches, a broad overview of important determinants of health care utilization is provided. The organizational structure of the health care system regulates the access to health services. Therefore, we itemize some important facts about the German health care system. Next, the selection of variables is presented and combined with hypotheses concerning the direction of influence for the most important variables. In a further step, a negative binomial hurdle regression model is implemented to estimate the number of specialist visits. This method has already been used for a current study of general practitioner utilization (Gruber and Kiesel 2009). Finally, the findings are discussed and compared to the results of general practitioner utilization.

Conceptual frame

Ronald M. Andersen's model of health services utilization was first developed in the 1960s. It gives an overview of the relevant social determinants for medical care (Andersen and Newman 1973). Although it has been subject to continuous sophistication in the interim (Andersen 1995), Andersen's original theoretical framework classifying individual determinants into predisposing, enabling and need still can be considered as a reference model in international utilization research.

Andersen describes the process of health services utilization as a causal interaction of three different levels (see Fig. 1):

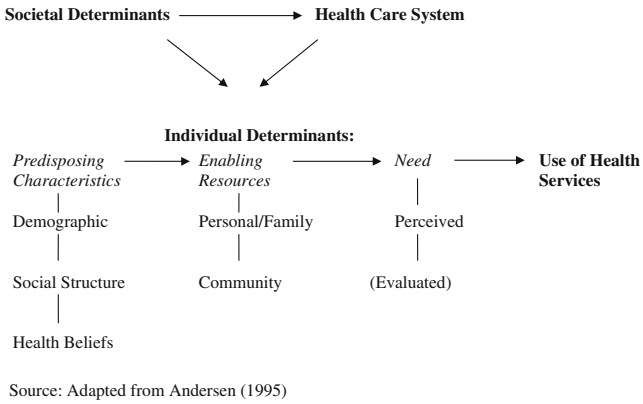

Fig. 1 The behavioral model of health services utilization of Ronald M. Andersen. Source: Adapted from Andersen (1995)

societal determinants, the health care system and individual determinants. The societal determinants consisting of medical technology and social norms guide and configure the health care system. The health care system in turn allocates available resources to care institutions and forms the organizational framework to provide medical services. Both the societal determinants and the health care system control the effects of individual determinants, which are structured by the hierarchical trichotomy of predisposing, enabling and need.

The predisposing attributes are determined by demographic characteristics (age, sex, marital status and past illness), the individual social structure (education, race, family size, religion, etc.) and beliefs, values and knowledge about health and medical services.

The enabling characteristics refer to specific individual resources that affect the access to health services. Income and the type of health insurance are the central variables in this context. But the composition of the community (region of country, urban or rural character, etc.) can also influence the individual ability to visit a doctor.

The most important reason for health service utilization is a person's need and accordingly his/her state of health. Andersen distinguishes between subjective experienced and objective estimated states of health. Both do not have to be consistent with each other.

The model offers a good theoretical frame for the operationalization of analysis in the health care sector. However, it is quite arbitrary with regard to contents and hypotheses. Therefore, it is necessary to enrich the model with substantial theory and mechanisms so that selection of variables becomes more concrete.

Further approaches

Like other countries, Germany is affected by inequality concerning a person's state of health and life expectancy. The lower the social status of a person in the society, the higher is his/her risk of getting ill and the lower the individual life expectancy (Mielck 2005). Following Bourdieu (1982), social stratum is characterized by different patterns of thinking, cognition and evaluation, which he called habitus. A stratum-specific habitus could influence utilization of health services in several aspects. Differences in trust in the health system, varying evaluations of health risks and the grade of social proximity in doctor-patient-relationships may correlate with social strata, thus illustrating habitus-related vertical inequality patterns. Bourdieu's theory of capital indicates that differences in the endowment with cultural capital can serve as a determinant for different health lifestyles and socio-structural health inequalities (Abel et al. 2006: 187).

In modern industrial nations, job-related dimensions determine social strata (Hradil 2006: 34). Persons who belong to the same stratum are characterized by similar occupational status, income and education. Hradil identifies different levels of stress and charges on the one hand as well as different knowledge and abilities to handle these charges on the other hand as socio-structural factors affecting the state of health. According to him, the latter dimension is an expression of specific health lifestyles. These lifestyles were indeed influenced by vertical indicators of social strata, thus corresponding to the habitus concept. However, empirical studies show that demographic characteristics like age, gender and family situation exert an even more important influence on health behavior (Hradil 2006: 47; Schneider and Spellerberg 1999). Unhealthy behavior like smoking, unbalanced diet, excessive consumption of alcohol and lack of exercise appear more frequently in lower social strata (Mielck 2005). Nevertheless, a causal model of health (care) behavior needs to consider the impact of age-specific experiences and identifications, gender-specific attributions and life-cycle effects referring to a certain affinity to demand medical care.

Breyer et al. (2005: 222) point to the problem of moral hazard. Moral hazard means that the existence of insurance weakens the incentive for risk-averse behavior. The costs for health services utilization are reduced by health insurance. Consequently, the demand for services is expected to be higher if the insurance company covers more costs or a broader range of costs.

Whereas moral hazard points to decisions impelled by the patient himself, the concept of supply-induced demand refers to medical treatment surpassing the patient's needful health care based on the physician's decision (Breyer et al. 2005: 334–337). Commonly, the finding that health care utilization increases with growing numbers of doctors in a region is taken as an indicator for this (Andersen and Schwarze 1997: 5; Pohlmeier and Ulrich 1995: 356–357). With increasing local density of health care suppliers, physicians could tend to raise utilization levels unnecessar-

ily. Taking into account the growing competition, care suppliers could be guided increasingly by their own financial interests instead of patient requirements. To measure the effects of supply-induced utilization, it is proposed to distinguish between initial contacts to the physician, which are patient induced, and follow-up contacts, which are mainly doctor induced (Andersen and Schwarze 1997; Pohlmeier and Ulrich 1995). In addition to the indicator of rising utilization with high care provider density, Pohlmeier and Ulrich (1995: 357) suggest that high levels of health care use and more follow-ups of private insurants compared to people covered by statutory schemes could indicate supply-induced demand. As the commissioning of services by private companies is considerably higher than by statutory insurances, care providers could take this as financial incentive to raise private insurants' treatment intensity.

Regional allocation and organizational form of the medical institutions are not exclusively a matter of oversupply. Sociologists emphasize potential social inequalities and barriers of regional distinctions between urban and rural areas as well as social gradients in the distribution of doctor offices, which can affect the individual chance for treatment. (Geil et al. 1997: 297; Gordala 1981: 120).

Social networks are considered to play a relevant role in the handling of illness status (Gordala 1981: 116–118). Persons who live in a partnership, for example, could function as a mirror for each other's health problems. It is supposed that social integration in networks like a family and circle of friends has positive effects on health status. Hence, an analysis of health care utilization should take the individual's close relationships and social networks into account.

The German health care system

Information about the health system's organizational form is necessary to understand the causal process of the utilization process. The following implementations refer to regularizations existing in 2004 because this is the time of service utilization under study.

About 90 percent of the German people are members of the statutory health insurance (Gesetzliche Krankenversicherung) as compulsorily or voluntarily insured persons or as non-contributory family members (Simon 2005). If a person's income exceeds the threshold for statutory health insurance, one can choose between membership in statutory health insurance or private health insurance (Private Krankenversicherung). Being excluded from this rule, public servants and the self-employed are often insured by private companies.

Both types of health insurances differ concerning benefit catalogs, the calculation basis for contributions, financial incentives against unnecessary utilization and remuneration of care providers. Members of private companies can choose between several types of service packages and different levels of co-payments. The statutory insurance scheme consists of one standard benefit catalog that is supposed to cover all necessary treatments. Benefit catalogs of private insurants often perform equally or better in comparison to those of statutory health funds (Busse and Riesberg 2005: 234). However, they can even cover a smaller range of services depending on the therapy scopes selected, e.g., the self-employed often take out policies with relatively high deductibles and tend to forego coverage for all fields of care (Busse and Riesberg 2005: 95).

Contributions to the statutory health insurance are calculated according to economic status. In contrast to that, contributions for private insurance companies are calculated on the basis of individual risk depending on age, sex and past medical history. In the long run, private insurants' contribution rates shift with respect to changing utilization patterns.

Since 2004 the statutory health funds have been obliged to give incentives for using primary care physicians (Hausarztmodell). Once per quarter the statutory insurant has to pay a practice fee of €10 for the first visit of a doctor. Moreover, patients have to pay 10 percent of the price for most drugs with minimum of €5 and maximum of €10. The co-pay for hospitalization has also been raised to €10 per day. In this context, it has to be considered that SHARE measures utilization as contact to doctors within the last 12 months. As data collection was carried out between April and October 2004, it remains unclear whether contacts have taken place before or after the introduction of these additional fees. Members of private insurance companies usually are free of co-pay with respect to ambulant doctor visits. Their choice between specialist and general practitioner consultation is not exposed to incentives. In the medium term, private providers reimburse all arising costs for the majority of the insurants (who have effective coverage). However, in the case of utilization, insurants have to advance money, and in the long run the insurance rate is liable to increase. If no or few services are used, a substantial part of the paid contribution can even be refunded by the private insurance company.

On top of full private insurance coverage, private companies offer supplementary services that can be used to upgrade the statutory insurance scheme. Insurants featuring statutory plus additional private coverage will be considered separately in the analysis.

The commissioning of doctors by health insurance companies is a complicated process. In general, the remuneration for the treatment of private insurants is less complicated and usually higher. Consequently, the incentive

for doctor-induced health services utilization is larger for members of private insurance companies.

Methods

Population and sampling

The data that we use for analyzing specialist consultation is the German part of the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) in 2004 [for methodological details, see Börsch-Supan and Jürges (2005); Börsch-Supan et al. (2005) give an introduction to the survey contents]. The survey comprises representative information on health and socioeconomic status as well as on the social and familial situation of the elderly and is well accepted by the international research community (Allin et al. 2009; Bolin et al. 2007; Kohli et al. 2009; Mielck et al. 2009). SHARE covers persons 50 years old or older and their partners who were surveyed independent of their age. To allow for inferences to a population of older individuals we exclude persons less than 50 years old from our sample. Furthermore, we do not take into account people older than 90 years and the highest and lowest percentile of the household gross income distribution in order to eliminate statistical outliers from the analysis. Sample heterogeneity because of extreme groups or cases, like people over 90 years often being characterized by highly intensive health care use, or people of extremely high or low income, could affect the efficiency of the statistical estimation process. Therefore, we have decided to leave these cases out for the purpose of reaching a more homogeneous dataset. As we aim to analyze the effect of private insurance on specialist visits, people without explicit insurance coverage for ambulant treatment are ignored as well. Finally, we include only persons with former or current labor market activity to estimate the effect of occupational group on health care provision.

Our sample size of 2,260 is based on all cases with complete data concerning the variables used in the multivariate analysis. In consideration of gender-specific health behavior (Thode et al. 2005: 304), morbidity (Schellhorn 2003: 23) and health service supply, e.g., gynecology and urology, we examine different samples for men (n=1,071) and women (n=1,189). A descriptive examination investigating the impact of the case by case exclusion of missing values shows that the distribution of values only changed marginally in the sample, except men's health care need, which increased between 3.5 and 10 percent per indicator compared to the population before the case exclusion. As we will not interpret the coefficients of health status, we assume no further negative impact on our estimators by excluding the cases with missing values.

Table 1 lists the variables used to explain the number of specialist visits within the last year as proxy for medical specialist care. The table displays either percentage and absolute number to characterize binary variables or mean and standard deviation in case of metric variables.

Operationalization

We categorize *health insurance* into three different types: (1) statutory health insurance without any private coverage for outpatient treatment, (2) statutory health insurance with voluntary supplementary private insurance for ambulant treatment and (3) complete private coverage including ambulant care. The SHARE study provides information about the particular scope of statutory and private insurance schemes. According to our definition, additional private insurance means that coverage is used at least for one of the fields of *specialist treatment*, *free choice of doctors* or *no co-payments for drugs*. Similarly, fully privately insured persons will have coverage including *direct access to specialist treatment*, *free choice of doctors* or *no co-payments for drugs*.

In our sample 81 percent of men and 86 percent of women are solely associated with the statutory health insurance and do not hold any private coverage for outpatient treatment. Additionally to the statutory scheme, 5 percent of each subsample takes out voluntary add-on insurance for ambulant care to improve their health services. Fourteen percent male and 9 percent female respondents have their health insurance including ambulant services entirely from private providers.

We will use the degree of urbanization as a variable to approximate the distribution of health care institutions. The specification of regions as village, small town, large town, suburbs or city is assessed by the interviewer. Moreover, we control for the lower doctor density in Eastern Germany (Weber 2005).

The financial resources of households indicate their capability to afford costly treatments that are not covered by the insurance. Income will be considered as the household gross equivalence income according to the OECD. We use the "OECD-modified equivalence scale," which assigns a weight of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child (Hagenaars et al. 1994; OECD 2009).

The level of formal education, a proxy for health lifestyle, is operationalized as years of education. In wave 1 of SHARE, the years of education are not asked directly, but are derived from ISCED-97 categories (Mannheim Research Institute for the Economics of Aging 2009: 22; information on ISCED-97 in: United Nations Educational Scientific and Cultural Organization 2006; Mannheim Research Institute for the Economics of Aging 2007: 6).

Table 1 Sample description: explanatory variables

Explanatory variables	Percentage[a]/mean[b] (Men: n=1,071)	Percentage[a]/mean[b] (Women: n=1,189)
Health insurance		
Statutory *(ref.)*	81% (870)	86% (1,022)
Statutory + ambulant	5% (55)	5% (64)
Private incl. amb.	14% (146)	9% (103)
Sociodemography		
Income	31,486 (29,102)	29,970 (29,261)
Years of education	14.20 (2.54)	12.97 (2.72)
Partner	83% (891)	70% (828)
Born not in G	19% (207)	19% (220)
Age	64.27 (8.75)	64.25 (9.55)
Employment		
Employed *(ref.)*	31% (337)	28% (330)
Retired	59% (627)	53% (633)
Disabled	4% (39)	2% (20)
Unemployed	6% (66)	4% (48)
Homemaker	0% (2)	13% (158)
Blue/white collar *(ref.)*	79% (847)	90% (1,071)
Civil servant	11% (122)	4% (44)
Self-employed	10% (102)	6% (74)
Region		
New Laender	17% (179)	20% (232)
Big city	17% (179)	15% (184)
Suburbs	12% (124)	11% (125)
Large town	12% (131)	13% (150)
Small town	28% (305)	31% (372)
Village *(ref.)*	31% (332)	30% (358)
Health status		
Support	13% (137)	17% (204)
Chronic conditions	61% (651)	61% (724)
Cardiovascular risk factors	0.70 (0.81)	0.68 (0.80)
Lung	0.09 (0.32)	0.07 (0.29)
Cardiovascular disease	0.21 (0.45)	0.12 (0.35)
Musculoskeletal	0.14 (0.36)	0.26 (0.48)
Cancer	6% (68)	7% (79)
Stomach	7% (73)	6% (68)
Pain	0.65 (0.64)	0.75 (0.66)
Respiratory	0.28 (0.58)	0.25 (0.56)
Faint	0.13 (0.41)	0.24 (0.53)
Legs	7% (78)	17% (202)
Sleep	16% (170)	25% (293)
Incontinence	3% (34)	4% (51)

[a] Percentages are displayed for categorical variables, absolute numbers in parentheses; [b] means are displayed for metric variables, standard deviation in parentheses

- Lower secondary education or the second stage of basic education is coded as 10 years of schooling ("Volks- oder Hauptschulabschluss," "Realschulabschluss").
- (Upper) secondary education is coded as 12 years ("Fachhochschulreife") or 13 years of education ("Abitur," "Haupt-oder Realschulabschluss mit Lehre oder Berufsfachschule").
- Post-secondary non-tertiary education is coded as 16 years of formal education ("Fachhochschulreife oder Abitur mit Lehre oder Berufsfachschule").

– The first stage of tertiary education is coded as 16.5 years ("Fachschulabschluss"), 17 years ("Fachhochschulabschluss") or 18 years of schooling (Hochschulabschluss).

We differentiate among self-employed, civil servants and blue or white collar workers in order to account for their varying institutional access to health insurance schemes and their specific employment situations. As more than half of the persons from our two particular samples are retired, these occupational indicators relate to current or former positions in the labor market.

The transition to retirement is an important change in life that might affect health behavior. Hence, we integrate the variable *employment status* indicating the values *retired* and *employed*. The residual values *disabled*, *unemployed* and *homemaker* will not be of interest for the interpretation.

Close social relationships facilitate the perception of and coping with illness. Thus, we incorporate an indicator for partnership in the statistical model. Possible migration-specific socio-cultural characteristics are controlled for by the dummy variable *born in Germany.* Similarly to retirement, age could stand for gradually changing health attitudes.

The most immediate determinant of utilization is certainly the health status. For this, SHARE provides a rich set of objective health indicators. On account of multidimensionality and high information loss, we do not generate a sole morbidity index. We rather pool particular binary indicators to two- or three-stage sum scores referring to a principal component analysis and content-related plausibility. Thereby, the different health dimensions are preserved for multivariate analysis. The aim of this strategy is not to interpret the resulting need coefficients, but to balance the sample population by health status in an accurate way so that the *predisposing* and *enabling* effects are not affected by morbidity anymore. We consider the following variables to control for health care need:

(1) *support*: in need of support concerning daily activities (dummy),
(2) *chronic conditions*: long-term health problems, disease or handicap (dummy),
(3) *cardiovascular risk factors*: sum score of "high blood pressure," "high blood cholesterol" and "diabetes,"
(4) *lung*: sum score of "chronic lung disease" and "asthma,"
(5) *cardiovascular disease*: sum score of "heart attack or other heart problems" and "stroke or cerebral vascular disease,"
(6) *musculoskeletal*: sum score of "arthritis or rheumatism" and "osteoporosis,"
(7) *cancer*: cancer or malignant tumor (dummy),
(8) *stomach*: stomach, duodenal or peptic ulcer (dummy),
(9) *pain*: sum score of "pain in neck, knees, hips or other joint" and "stomach or intestinal problems,"
(10) *respiratory*: sum score of "heart trouble," "breathlessness" and "persistent cough,"
(11) *faint*: sum score of "falling down," "fear of falling down" and "dizziness, faints, blackouts,"
(12) *legs*: swollen legs (dummy),
(13) *sleep*: sleeping problems (dummy),
(14) *incontinence* (dummy).

Hypotheses

As outlined in the section about the German Health Care System, both statutory and private health insurance schemes comprise particular terms and conditions affecting the level of health care utilization. Add-on insurances are considered as a weakened form of the depicted private scheme so that arguments can be applied in a similar manner. Taking all aspects of insurance-specific incentives into account, the theoretical effect is inconclusive, and empirical evidence is needed to reach clarification.

The modeling strategy will allow to distinguish *general attachment* to the sector of specialist medicine from the level of utilization *in case of treatment*. In case of insurance, the former effect mainly referring to patients' decisions could contain information about *moral hazard*. However, differences in attachment probabilities may derive either from oversupply or from undersupply, making an interpretation difficult. Differences in the level of health care utilization *if treatment takes place* could come from doctor decision and thus indicate supply-induced demand. Indeed, the latter could also be a consequence of different benefit catalogs. A higher level of doctor concentration that is accompanied by increasing utilization might also indicate supply-induced demand.

Because health insurance covers almost all costs of health care utilization, income is expected to show no substantial effect. It serves rather as an indicator for social stratum. Theoretically more strongly associated with social stratum on the one side and social milieu on the other side should be the level of formal education. It is supposed to be connected positively with health lifestyle and knowledge about symptoms and the health care system. Thus, a positive effect of education is expected, which has already been confirmed for most of the Western European countries and the USA (Bisig and Gutzwiller 2004: 73; Van Doorslaer et al. 2000).

Riphahn et al. (2002: 20) point to the fact that the self-employed suffer income losses as a consequence of doctor visits in contrast to employees. Therefore, we expect a lower level of medical care utilization compared to employees or workers. On the other hand, we anticipate that the group of civil servants indicates a relatively high level of utilization because of the high job security.

Furthermore, we suppose that retirement has a positive effect on health care because the temporal commitment to the employment market disappears and people have more free time at their disposal. Retirement could also influence health lifestyles positively as this late period of life is generally connected with frailness and as "time to care for one's health." We state an analogue life-cycle effect for the aging process that could stand for gradually changing health attitudes and increasing affinity to health issues. Hence, the age coefficient should not merely represent morbidity, which will be controlled for in detail.

In addition to the suggested main effects, we will investigate interactions between health insurance, occupational status, employment status and age:

a. Differences in utilization concerning the occupational status (blue-/white collar, civil servant, self-employed) during employment are expected to disappear in retirement as the specific job characteristics disappear. Gruber and Kiesel (2009) showed that the general practitioner utilization of self-employed rises to the level of employees in retirement.
b. Furthermore, we suppose an intensification of insurance-specific utilization patterns in retirement compared to employment as a consequence of increasing free time and life-cycle effects. As the number of private insurants' general practitioner consultation decreases in retirement (Gruber and Kiesel 2009), we assume that they instead increase their specialist utilization in comparison to public insurants.
c. As the mode of private insurance often varies between occupational groups (see above), we expect on the one hand a relatively low utilization level of privately covered self-employed having high deductibles and on the other hand a relatively high utilization level of privately covered civil servants.
d. Finally, we introduce an interaction of age and retirement, which results in estimating two different age effects with particular slopes for the employed and the retired. This means reciprocally that the retirement effect can differ with age. This modeling strategy is based on the assumption that we are confronted with two differing life-cycle stages with varying subjective importance of health issues.

Statistical model

Estimating the number of doctor visits is a classical field for the application of count data regression models (Cameron et al. 1988; Cameron and Trivedi 1998). Count data are able to exploit the specific information of a positive discrete variable with right skewed distribution, which is the case for our dependent variable *number of specialist visits within the last 12 months* in the sample distribution for both men and women.

Standard models to estimate count variables are the Poisson regression and the negative binomial regression. These models imply that there is one single process generating the number of doctor visits. However, referring to principal agent theory, it was suggested to assume two theoretically different processes that are responsible for the outcome in the field of health care utilization (Cameron and Trivedi 1986; Pohlmeier and Ulrich 1995; Andersen and Schwarze 1997): first, the demand-induced initial consultation and second, the demand- *as well as* supply-induced following contacts. Because only the latter process—the decision for further contacts—is affected by doctor influence, standard models would lead to misspecification. Compared to recently suggested latent class models (Deb and Trivedi 1997; Bago d'Uva 2006), which act rather inductively, hurdle models are derived from substantive theoretical consideration and can be estimated more easily. It has been pointed out, though, that the interpretation of hurdle models in terms of principal agent theory depends on identification of illness spells. Indeed, we cannot be sure that only single and uncensored episodes exist in our data base, but hurdle models can be theoretically meaningful nevertheless. As they indicate in the first step whether the health care sector is generally utilized or not, which always refers to the individual, we still assume theoretical validity. However, the strict differentiation between the effects of the first and second step coefficients could be weakened.

The estimation of hurdle models is two-part: first, the probability to have contact to medical specialist *at all*—to take the hurdle—is computed reflecting the patient's decision, and second, the number of specialist visits *in case of utilization* is computed reflecting also doctor influence. We will estimate the first process as logistic regression and the latter as zero truncated negative binomial regression (ZTNB); other models can also be implemented (for detailed information: Cameron and Trivedi 1998; Long and Freese 2006).

The probability π of zero consultation is only estimated in the logistic model. The probability of a number of specialist visits higher than zero results from the zero truncated negative binomial model, which is weighted by the probability of taking the hurdle $(1-\pi)$:

$$\Pr(y = 0|x) = \pi \tag{1}$$

$$\Pr(y|x) = (1 - \pi)\Pr(y|y > 0, x)\text{for y} > 0 \tag{2}$$

Table 2 Results of the main models

Negative binomial-logit hurdle regression				
Specialist visits	Men		Women	
	Logit[a]	ZTNB[b]	Logit[a]	ZTNB[b]
Public + ambulant	0.169	0.506**	0.085	0.174
Private incl. amb.	−0.062	0.668***	0.560*	−0.015
Civil servant	0.231	−0.121	−0.291	0.307
Self-employed	−0.285	−0.470**	−0.476*	−0.184
Log_income [c]	0.130	−0.088	0.215**	−0.045
Education (centered)	0.095***	−0.001	0.051*	0.006
Partner	0.221	−0.041	0.477***	0.045
Born not in G	0.115	−0.382***	0.019	0.030
Age_c (centered)	0.055**	0.070***	0.011	−0.008
Retired*Age_c	−0.066**	−0.077***	−0.039*	0.012
Retired	−0.407	−0.488**	−0.203	0.101
Disabled	−0.412	0.275	0.058	−0.261
Unemployed	0.742	0.017	0.860	1.360***
Homemaker	−1.146	2.550***	−0.179	0.441**
New Laender	0.230	−0.032	−0.175	−0.195
Big city	0.107	0.441***	0.654***	0.030
Suburbs	0.110	0.447***	0.243	0.299
Large town	0.086	0.467***	−0.149	0.061
Small town	−0.367*	0.143	0.205	0.244*
Support	−0.113	0.243*	−0.099	0.226
Chronic conditions	0.526***	0.572***	0.202	0.463***
Cardiovascular risk factors (sum score)	0.010	−0.089*	−0.102	−0.080
Lung (sum score)	0.205	−0.234*	0.165	0.335*
Cardiovascular disease (sum score)	0.655***	0.050	0.294	0.418*
Musculoskeletal (sum score)	0.563**	0.099	0.406**	0.303***
Cancer	1.411***	0.298*	0.241	0.866***
Stomach	0.350	0.016	0.386	−0.178
Pain (sum score)	0.499***	0.103	0.284**	0.011
Respiratory (sum score)	−0.060	−0.065	0.225	−0.116
Faint (sum score)	0.114	0.049	−0.030	0.018
Legs	−0.0446	0.280	−0.036	0.235
Sleep	0.188	0.390***	0.210	0.095
Incontinence	−0.142	0.783***	−0.324	0.371
Constant	−1.963**	1.752**	−2.127**	0.530
Ln alpha [d]		−0.397***		0.411*
BIC [e]	3.31e+07	3.31e+07	4.67e+07	4.67e+07
n	1071	1071	1189	1189

***p<0.01, **p<0.05, *p<0.1.
[a] Logit coefficients indicate the change of logarithmized probability to utilize ambulant specialist health care if the independent variable increases by one unit; [b] ZTNB coefficients indicate the positive or negative influence of the independent variables on the number of doctor visits in case of general utilization; [c] natural logarithm of income; [d] dispersion parameter of negative binomial regression; [e] Bayesian information criterion= −2*ln(likelihood)+ln(n)*k

The expected number of specialist consultations results from the conditional mean of the zero truncated model, which is weighted by the probability of utilizing ambulant specialist health care in general:

$$E(y|x) = (1-\pi)E(y|y>0,x) \quad (3)$$

Results

Table 2 shows the first results of the multivariate estimation of the number of specialist visits by gender. In each case two rows of coefficients are calculated. The first row shows logit coefficients, which indicate the change of the logarithmized probability to utilize ambulant specialist

health care if the independent variable increases by one unit. Odds ratios are obtained by calculating the exponent. The second row displays the positive or negative influence of the independent variables on the number of doctor visits *in case of general utilization*. Here, one has to bear in mind that the estimates from the ZTNB must not be interpreted in a numerical way as factor changes like in the standard Poisson or negative binomial regression, but only directionally as positive or negative correlation (Long and Freese 2006: 384-385, 389).

On the one hand, it appears that the general probability of specialist utilization does not seem to differ between insurance groups. The positive effect of privately insured women is just slightly significant. On the other hand, we find a strong positive effect of the treatment intensity for both supplementary and fully privately insured men.

Civil servants do not seem to have a higher consultation rate than blue or white collar workers in spite of their reliable employment situation. Again, women's differences are less significant.

Whereas income does not seem to affect men's consultation probability, financial resources exert a significant influence on women's attachment to specialist health care.

The significant (men) and respectively slightly significant (women) logit coefficients indicate that highly educated people use the specialist health care sector to a greater extent than less educated people. According to the estimation, the probability of men's utilization increases about 10 percent for every additional year of education. Similarly to insurance and employment status, education level plays a much more important role for men than for women.

Partnership turns out to have great explanatory power concerning women's specialist health care. Women living with a partner in the same household have a significantly higher probability of using specialist health care (about 60 percent).

Men who are not born in Germany have a significantly lower number of specialist visits than men born in Germany, although they do not differ as to their general attachment to the specialist care system.

Women's specialist health care does not vary significantly by age or between the employed and retired. Effects of aging and retirement also turn out to be insignificant even if morbidity is not controlled for (result not shown). This indicates that elderly women display a relatively constant level of specialist care utilization.

In contrast, men are characterized by significant age coefficients in both stages. Employed men, thus male sample members aged between 50 and 65 years, show a positive aging effect. In retirement, the aging process

Table 3 Results of the interaction models

Negative binomial-logit hurdle regression				
Specialist visits	Men		Women	
	Logit [a]	ZTNB [b]	Logit [a]	ZTNB [b]
Public + ambulant	0.169	0.399*	0.094	0.171
Private incl. amb.	−0.095	1.189***	0.121	−0.002
Civil servant	0.195	−0.212	0.489	0.363
Self-employed	−0.022	−0.756**	−0.437	−0.181
Ln_income[c]	0.114	−0.017	0.219**	−0.041
Education (centered)	0.095***	−0.006	0.053*	0.002
Age_c (centered)	0.053**	0.069***	0.013	−0.008
Retired*age_c	−0.063**	−0.080***	−0.040*	0.012
Retired	−0.364	−0.425*	−0.213	0.118
Retired * civil servant			−1.901*	−0.193
Retired * self-employed	−0.538	1.076***		
Retired * public+amb.				
Retired * private incl.amb.	0.139	−0.585**	1.212*	−0.049
Public+amb. * self-employed				
Private incl.amb. * self-employed	−0.178	−1.155**		
Control variables[d]	[d]	[d]	[d]	[d]
Constant	−1.853**	0.995	−2.157**	0.488
Ln alpha[e]		−0.469***		0.409*
BIC[f]	3.30e+07	3.30e+07	4.67e+07	4.67e+07
n	1071	1071	1189	1189

***p<0.01, **p<0.05, *p<0.1. [a] Logit coefficients indicate the change of logarithmized probability to utilize ambulant specialist health care if the independent variable increases by one unit; [b] ZTNB coefficients indicate the positive or negative influence of the independent variables on the number of doctor visits in case of general utilization; [c] natural logarithm of income; [d] control variables not mentioned: *partner, not born in Germany, disabled, unemployed, homemaker, regional variables, health variables* (cf. Table 2); [e] dispersion parameter of negative binomial regression; [f] Bayesian information criterion=−2 * ln(likelihood)+ln(n)*k; main and corresponding interaction effects are framed when they both are significant

adopts a negative sign (0.055 – 0.066=−0.011 respectively 0.070–0.077=−0.007). Moreover, retired men are characterized by overall lower treatment intensity than employed men. Interestingly, the age coefficient remains slightly positive in retirement when morbidity is not controlled for (result not shown), which suggests a constant increase in health care need because of morbidity in older ages.

The remaining variables concerning employment status are not interpreted because we did not focus on them theoretically.

Differences in specialist health care between Eastern and Western Germany do not occur. However, we find significant regional coefficients indicating a positive correlation of specialist consultation level and grade of urbanization. Particularly men living in big cites, suburbs or large towns are characterized by higher utilization compared to men living in rural areas or villages.

The Bayesian information criterion (BIC) is a popular measure for comparing maximum likelihood models. As the model with the smaller value of the information criterion is considered to be better, we conclude that the explanatory variables used in the equations to explain specialist health care are more suitable to men than to women. Men's utilization seems to be more sensitive concerning *predisposing* and *enabling* conditions.

In the next step we would like to test for the interaction terms a, b and c (see above; interaction d already belongs to the main specification). Initially, all six interaction variables indented in Table 3 have been included in the main model. Then, only the variables with significant coefficients have remained in each specification, and the estimation has been repeated. Thus, interaction terms are included according to their gender-specific explanatory power. On the one hand, the interaction effects in the female sample cannot be interpreted because they are only slightly significant and the accessory main effects remain insignificant. On the other hand, we find strong evidence supporting interactions for men in the second step equation: first, the utilization level of the self-employed differs in employment status. Their number of specialist visits is higher within the group of retired than within the group of employed. Second, the privately insured in retirement display a lower consultation rate compared to privately insured in employment. As we control for morbidity, this effect may reflect the decreasing

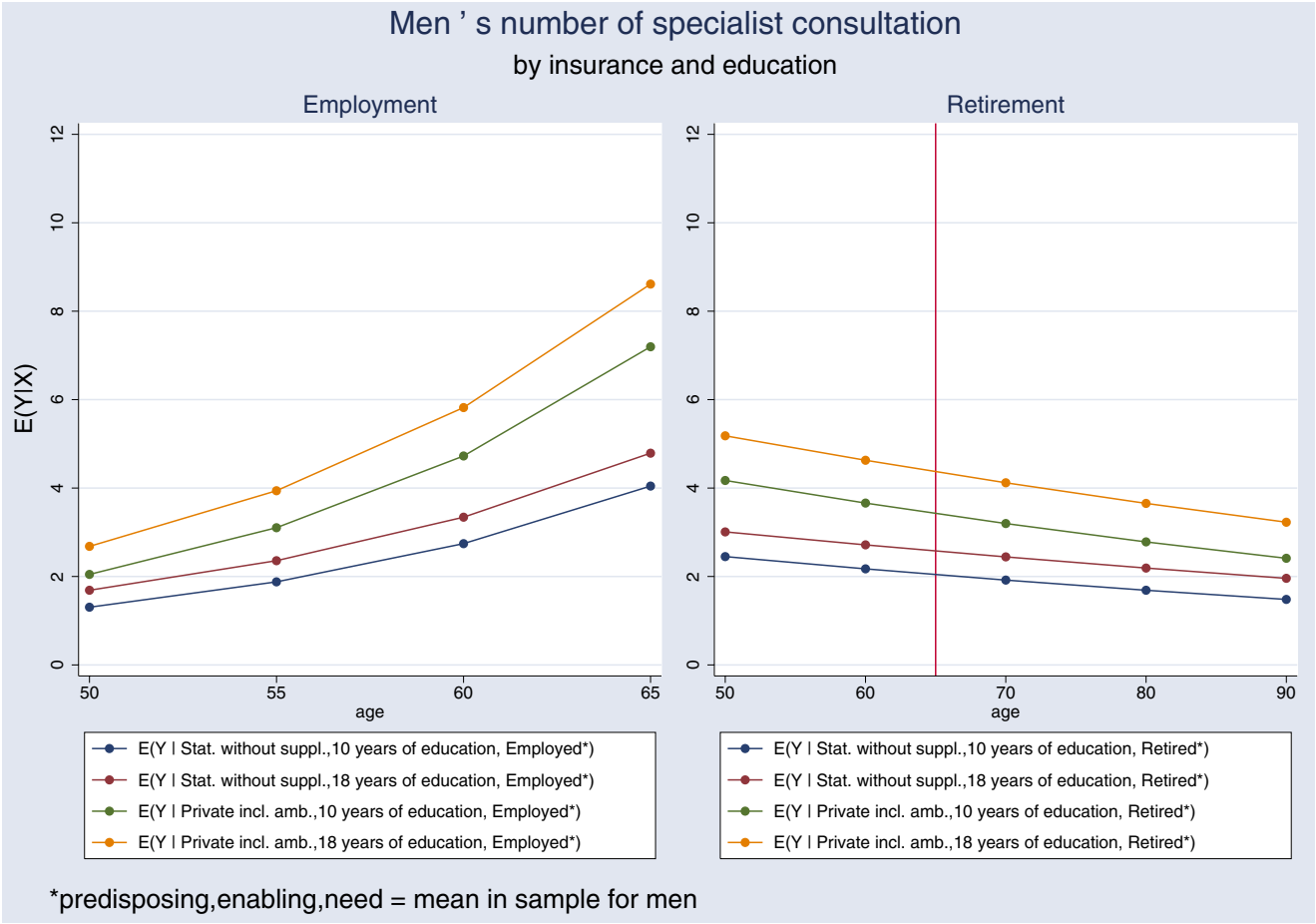

Fig. 2 Conditional expected means of men's specialist consultation within the last 12 months

numbers of preventive examinations in older ages. Third, specialist care utilization differs to a larger extent between the self-employed and employees covered by private health insurance than between self-employed and employees covered by statutory health insurance.

To illustrate theoretically important differences among groups, we calculate conditional expected means according to formula 3 (see above). Referring to the main model in Table 2, Fig. 2 displays the expected number of specialist visits of male sample members having on the one side different values of education, insurance, age and employment status and on the other mean values concerning the other sample characteristics. As STATA v10 does not calculate confidence intervals of conditional means from truncated negative binomial regression, figs. 2 and 3 do not contain information about significance.

The age ranges from 50 to 65 concerning the employed and from 50 to 90 concerning the retired. The vertical line at age 65 represents the regular pension start in Germany. It becomes apparent that men's utilization is stratified by insurance: Privately covered insurants show higher health care use than those covered by the statutory scheme. Moreover, these insurance groups are themselves internally differentiated by education.

Similarly, referring to the model in Table 3, Fig. 3 illustrates the role of the interaction of occupational status, insurance and employment status. Again, the privately insured display generally higher numbers of specialist visits than those covered by statutory insurance. In case of employment, these insurance specific patterns are internally stratified by occupational class: The self-employed show lower levels of utilization than employees—independent of their insurance scheme. If we look at these groups in case of retirement, there is no further difference related to occupational status within the group covered by statutory insurance.

Discussion

The empirical analysis shows that the process of health care utilization differs significantly between men and women.

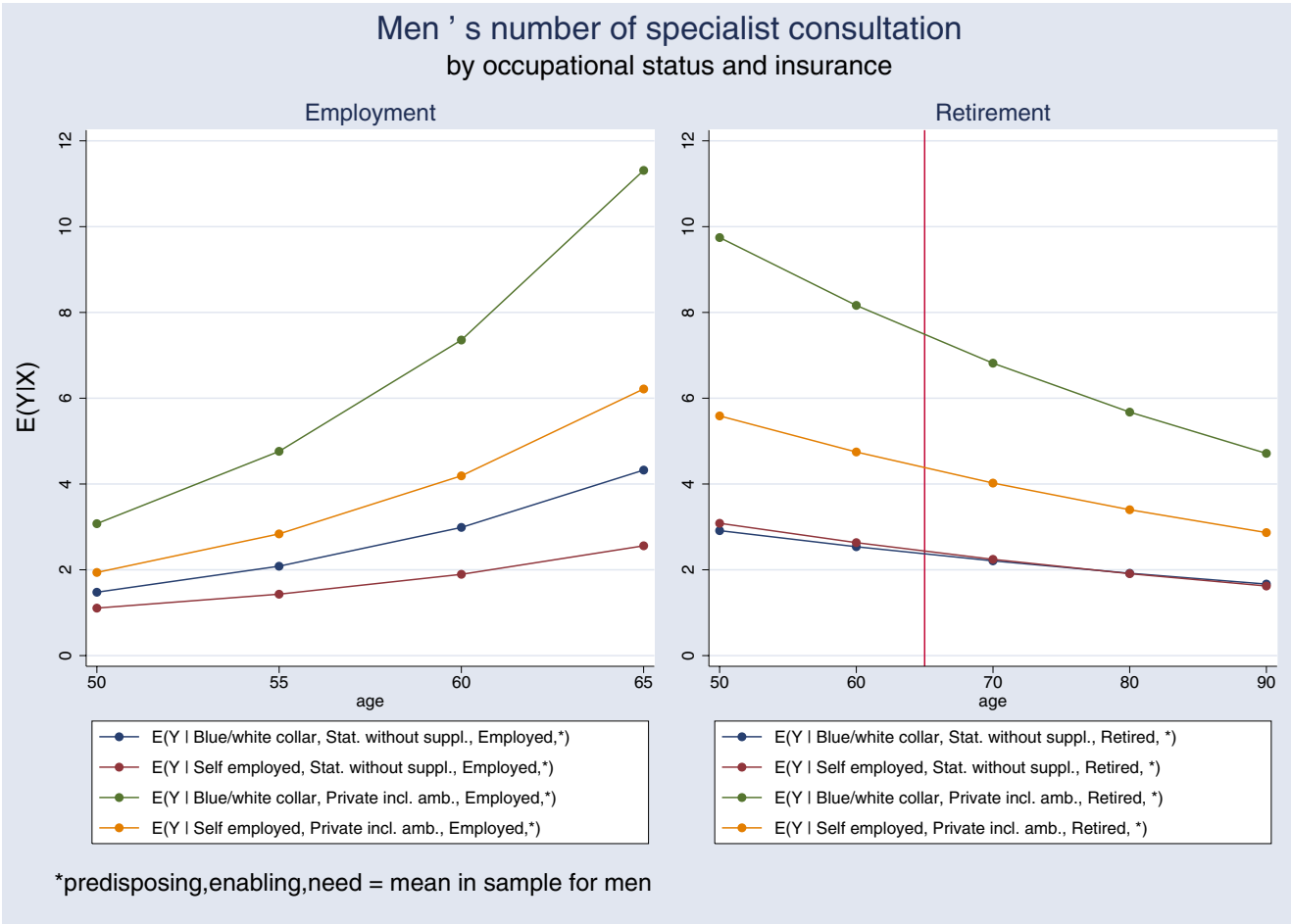

Fig. 3 Conditional expected means of men's specialist consultation within the last 12 months

Whereas men's number of specialist visits is markedly sensitive to *predisposing* and *enabling* factors, women's health care utilization depends less on such socioeconomic characteristics. However, financial resources and partnership are conditions that are significantly associated with women's number of specialist consultation.

As differences by insurance status for the whole population cannot be found, there is no empirical evidence supporting the general thesis of *supply-induced demand* or *moral hazard* due to insurance. However, we find a strong positive effect of the treatment intensity for both supplementary and fully private insured men. Having a relatively low basic level of health care use, *supply-induced demand* might be more relevant to men than to women because of more opportunities to raise their treatment intensity. The assumption of a *bipolar health care system* providing general practitioner care primarily to the statutory insured (Gruber and Kiesel 2009) and specialist care to the privately insured is supported empirically as to men. This structural inequality in health service provision should be considered further in the field of health system research and health policy.

In addition to inequality due to insurance status, we maintain that ambulant health care provision is stratified by educational attainment. Education, which is considered to be highly correlated with healthy lifestyles and knowledge to exhaust benefit catalogs, does indeed matter to utilization, be it general practitioner care (Gruber and Kiesel 2009) or specialist care. Thus, we support the thesis of an *educational gradient* in the German health care system.

Besides, the composition of ambulant health care varies with a *regional gradient*: while general practitioner consultation is more common in rural regions (Gruber and Kiesel 2009), the utilization of medical specialist care increases with the degree of urbanization. This might be taken as evidence for supply-induced effects.

As the lower probability for the self-employed to consult a specialist can only be confirmed in case of employment, the hypothesis of their disadvantageous employment situation affecting health care use in a negative way is supported empirically. We do not find differences between the self-employed and employees in case of retirement, which has also been indicated by the analysis of general practitioner utilization (Gruber and Kiesel 2009).

Finally, self-employed people with private health insurance seem to have a rather unfavorable insurance coverage because of comparatively high deductibles and partly restricted scopes of coverage. As under the statutory scheme differences between the self-employed and employees cease in retirement, the privately insured self-employed maintain their relatively low level of specialist consultation that they display likewise in employment.

Our analyses show the existence of significant differences in the extent of specialist consultation between socioeconomic groups. Based on the applied research method, though, it is not possible to make a statement about the absolute level and adequacy of the varying utilization patterns. Further studies could concentrate on the question whether these findings of horizontal inequity indicate rather overprovision or underprovision of ambulant health care in Germany. From our point of view, only very specific quantitative research focusing on one single treatment, a homogenous group of therapies, or qualitative research capturing the complexity of health care demand is able to produce concrete evidence.

Moreover, we recommend longitudinal research that is particularly suited to detangle age and cohort effects. Cross-sectional data either allow to estimate the impact of cohorts or to quantify age effects because the two variables are completely collinear. However, it is of particular interest to investigate how the aging process develops over different birth cohorts. In longitudinal data, different birth cohorts for the same age can be identified that enables the estimation of both effects.

Acknowledgments We wish to thank Prof. Dr. Henriette Engelhardt-Wölfler for her support and suggestions. Also, our appreciation goes to Dr. Andreas Mielck for his useful comments following the *Health Inequalities III* conference in Bielefeld.

The SHARE data collection has been primarily funded by the European Commission through the 5th framework program (project QLK6-CT-2001-00360 in the thematic program Quality of Life). Additional funding came from the US National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064). Further support by the European Commission through the 6th framework program (projects SHARE-13, RII-CT-2006-062193 and COMPARE, CIT5-CT-2005-028857) is gratefully acknowledged.

Conflict of interest The authors declare they have no relevant associations that might pose a conflict of interest.

References

Abel T, Abraham A, Sommerhalder K (2006) Kulturelles Kapital, kollektive Lebensstile und die soziale Reproduktion gesundheitlicher Ungleichheit. In: Richter M, Hurrelmann K (eds) Gesundheitliche Ungleichheit. VS Verlag für Sozialwissenschaften, Wiesbaden, pp 185–198

Allin S, Masseria C, Mossialos E (2009) Measuring socioeconomic differences in use of health care services by Wealth Versus by income. Am J Public Health 0:AJPH.2008.141499v1

Andersen HH, Schwarze J (1997) Angebotsinduzierte Nachfrage bei zunehmendem Wettbewerb, Eine empirische Analyse der Inanspruchnahme ambulanter ärztlicher Leistungen. Berliner Zentrum Public Health, Berlin

Andersen RM (1995) Revisiting the behavioral model to medical care: does it matter? J Health and Soc Behav 36:1–10

Andersen RM, Newman JF (1973) Societal and individual determinants of medical care utilisation in the Unites States. Milbank Meml Fund Q Health Soc 51:95–124

Bago d'Uva T (2006) Latent class models for utilization of health care. Health Econ 15:329–343

Bergmann E, Kalcklösch A, Tiemann C (2005) Inanspruchnahme des Gesundheitswesens. Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz 12

Bisig B, Gutzwiller F (2004) Gesundheitssystem Schweiz: Gibt es eine Unter- oder Überversorgung? Rüegger, Zürich/Chur

Bolin K, Lindgren B, Lundborg P (2007) Informal and formal care among single-living elderly in Europe. Health Economics 17(3)

Börsch-Supan A, Brugiavini A, Jürges H, Mackenbach J, Siegrist J, Weber G (ed) (2005) Health, Ageing and Retirement in Europe—First Results from the Survey of Health, Ageing and Retirement in Europe. Mannheim Research Insitute for the Economics of Aging (MEA)

Börsch-Supan A, Jürges H (2005) The Survey of Health, Ageing and Retirement in Europe—Methodology. Mannheim Research Institute for the Economics of Aging (MEA)

Bourdieu P (1982) Die feinen Unterschiede. Kritik der gesellschaftlichen Urteilskraft. Suhrkamp, Frankfurt a M

Burström B (1990) Increasing inequalities in health care utilisation across income groups in Sweden during the 1990s. Health Policy 62:117–129

Breyer F, Zweifel P, Kifmann M (2005) Gesundheitsökonomie. Springer, Berlin

Busse R, Riesberg A (2005) Gesundheitssysteme im Wandel: Deutschland. WHO Regionalbüro für Europa im Auftrag des Europäischen Observatoriums für Gesundheitssysteme und Gesundheits-politik, Kopenhagen

Cameron AC, Trivedi PK (1986) Econometric models based on count data: comparisons and applications of some estimators and tests. J Appl Econ 1:29–53

Cameron AC, Trivedi PK (1998) Regression analysis of count data. Cambridge University Press, Cambridge

Cameron AC, Trivedi PK, Milne F, Piggott J (1988) A microeconometric model of the demand for health care and health insurance in Australia. Rev Econ Stud 55:85–106

Deb P, Trivedi PK (1997) Demand for medical care by the elderly: a finite mixture approach. J Appl Econ 12:313–336

Geil P, Million A, Rotte R, Zimmermann KF (1997) Economic incentitives and hospitalization in Germany. J Appl Econ 12:295–311

Gordala J (1981) Schichtspezifische Differenzen bei der Inanspruchnahme ärztlicher Leistungen. In: Bundesministerium für Arbeit und Sozialordnung (ed) Wissenschaftlicher Preis Gesundheitsökonomie 1978/79 und 1979/80, Kurzfassungen der ausgezeichneten Arbeiten. Bonn, pp 105–130

Gruber S, Kiesel M (2009) Wer konsultiert den Allgemeinarzt in Deutschland? Eine Analyse zum Einfluss von Versicherung und anderen sozialen Merkmalen auf die Inanspruchnahme allgemeinmedizinischer Leistungen im Alter. In: Engelhardt-Wölfler H (ed) BBzS-Band 1: Altern in Europa - Empirische Analysen mit dem Survey of Health. Ageing and retirement in Europe. University of Bamberg Press, Bamberg, pp 94–143

Hagenaars A, de Vos K, Zaidi MA (1994) Poverty statistics in the late 1980s: research based on micro-data. Office for Official Publications of the European Communities, Luxemburg

Hradil S (2006) Was prägt das Krankheitsrisiko: Schicht, Lage, Lebensstil? In: Richter M, Hurrelmann K (eds) Gesundheitliche Ungleichheit. VS Verlag für Sozialwissenschaften, Wiesbaden, pp 33–52

Jones AM, Koolman X, van Doorslaer E (2004) The impact of supplementary private health insurance on the use of specialists in European countries. Ecuity - Public Papers

Long JS, Freese J (2006) Regression models for categorical dependent variables using STATA. Stata Press, Texas

Lungen M, Stollenwerk B, Messner P, Lauterbach KW, Gerber A (2008) Waiting times for elective treatments according to insurance status: A randomized empirical study in Germany. International J for Equity in Health 7:1

Kohli M, Hank K, Künemund H (2009) The social connectedness of older Europeans: patterns, dynamics and contexts. J Eur Soc Policy 19(4):327–340

Mannheim Research Institute for the Economics of Aging (2007) Documentation of generated variables in SHARE 1 release 2.0

Mannheim Research Institute for the Economics of Aging (2009) SHARE: Guide to Release 2.3.0, Waves 1 & 2. Retrieved 21/01/10, from http://www.share-project.org

Mielck A (2005) Soziale Ungleichheit und Gesundheit. Huber, Bern

Mielck A, Helmert U (2007) Das Arzt-Patienten-Verhältnis in der ambulanten Versorgung: Unterschiede zwischen GKV- und PKV-Versicherten. In: Böcken J, Braun B, Amhof R (eds) Gesundheitsmonitor 2007: Gesundheitsversorgung und Gestaltungsoptionen aus der Perspektive von Bevölkerung und Ärzten. Verl. Bertelsmann Stiftung, Gütersloh, pp 114–132

Mielck A, Kiess R, von der Knesebeck O, Stirbu I, Kunst, AE (2009) Association between forgone care and household income among the elderly in five Western European countries—analyses based on survey data from the SHARE-study. BMC Health Services Research 1–8

OECD (2009). What are equivalence scales? Retrieved January 21, 2010, from http://www.oecd.org/dataoecd/61/52/35411111.pdf.

Pohlmeier W, Ulrich V (1995) An econometric model of the two-part decision-making process in the demand of medical care. J Hum Resour 30:339–361

Riphahn RT, Wambach A, Million A (2002) Incentive effects in the demand for health care: a bivariate panel count data estimation. J Appl Econ 18:387–405

Rückert IM, Böcken J, Mielck A (2008) Are German patients burdened by the practice charge for physician visits ('Praxisgebuehr')? A cross sectional analysis of socio-economic and health related factors. BMC Health Serv Res 8(232):1–13

Santos Silva JMC, Windmeijer F (2001) Two-part multiple spell models for health care demand. The Institute for Fiscal Studies

Schellhorn M (2003) The demand for health care—Swiss evidence. Universität Bern

Schneider N, Spellerberg A (1999) Lebensstile, Wohnbedürfnisse und räumliche Mobilität. Leske+Budrich, Opladen

Simon M (2005) Das Gesundheitssystem in Deutschland. Huber, Bern

Thode N, Bergmann E, Kamtsiuris P, Kurth B-M (2005) Einflussfaktoren auf die ambulante Inanspruchnahme in Deutschland. Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz 3:296–306

Thorbecke R (1975) Bewältigung von Krankheitsepisoden in der Familie. In: Ritter-Rohr D (ed) Der Arzt, Sein Patient Und Die Gesellschaft. Suhrkamp, Frankfurt am Main

United Nations Educational Scientific and Cultural Organization (2006) International Standard Classification of Education: ISCED 1997. UNESCO - Institute for Statistics

Van der Heyden JHA, Demarest S, Tafforeau J, van Oyen H (2003) Socio-economic differences in the utilisation of health services in Belgium. Health Policy 65:153–165

Van Doorslaer E, Koolman X, Jones AM (2004a) Explaining income-related inequalities in doctor utilisation in Europe: a decomposition approach. Health Econ 13(7):629–647

Van Doorslaer E, Koolman X, Puffer F (2002) Equity in the use of physician visits in OECD countries: has equal treatment for equal

need been achieved? In: Measuring up: Improving health system performance in OECD countries. OECD, Paris, pp 225–248

Van Doorslaer E, Masseria C, the OECD Health Equity Research Group (2004b) Income-related inequality in the use of medical care in 21 OECD countries. In: Lafortune G (ed) The OECD health project: Towards high-performing health systems. Policy Studies. OECD, Paris, pp 109–166

Van Doorslaer E, Wagstaff A et al (2000) Equity in the delivery of health care in Europe and the US. J Health Econ 19: 553–583

Verbeek M (2004) A guide to modern econometrics. John Wiley & Sons Ltd., West Sussex

Weber I (2005) Mehr Patienten, weniger Ärzte und geringere Finanzmittel. Deutsches Ärzteblatt 12:540–541