ZAF (2011) 44:349–362
DOI 10.1007/s12651-011-0058-6

RESEARCH PAPER

Health and disability insurance

Axel Börsch-Supan

Accepted: 25 January 2011 / Published online: 9 February 2011

Abstract Disability insurance—the insurance against the loss of the ability to work—is a substantial part of social security expenditures in many countries. The benefit recipiency rates in disability insurance vary strikingly across European countries and the US. This paper investigates the extent of, and the causes for, this variation, using econometric analyses based on new data from SHARE, ELSA and HRS.

We show that even after controlling for differences in the demographic structure and health status these differences remain. This holds for a broad set of objective and subjective physical and mental health measures as well as for contemporal, intertemporal and life-course specifications of health, including measures of childhood health.

In turn, indicators of disability insurance generosity explain 75% of the cross-national variation. We conclude that it is not health but the country-specific design of early retirement and labor market insitutions, and especially disability insurance rules, which explain the observed cross-country variation in the receipt of disability benefits.

Gesundheitszustand und Erwerbsminderungsrenten

Zusammenfassung Erwerbsminderungsrenten – eine Versicherung gegen den frühen Verlust der Fähigkeit, am Erwerbsleben teilzunehmen – stellen in vielen Ländern einen beträchtlichen Teil der Sozialversicherungsausgaben dar. Die Anteile derjenigen Menschen im erwerbsfähigen Alter, die Erwerbsminderungsrenten erhalten, zeigen ganz erstaunliche Unterschiede innerhalb Europas und den USA. Dieser Beitrag beschreibt das Ausmaß dieser Unterschiede und verwendet ökonometrische Verfahren, sie auf Basis der europäischen SHARE- und ELSA- sowie der US-amerikanischen HRS-Daten zu untersuchen.

Wir zeigen, dass diese Unterschiede auch nach einer Korrektur um die landesspezifischen Unterschiede in der demographischen Struktur und dem Gesundheitszustand bestehen bleiben. Dies gilt, obwohl wir eine sehr breite Palette von Variablen einsetzen, um die Gesundheits der Individuen in den Stichproben zu beschreiben – sowohl objektive als auch subjektive Maße, sowohl physische als auch psychische Gesundheitsmaße, und Gesundheit sowohl kontemporale als auch verzögert und über den gesamten Lebenszeitraum einschließlich der frühesten Kindheit messen.

Im Gegensatz dazu erklären Indikatoren, welche die institutionelle Ausgestaltung der Erwerbsminderungsrentensysteme beschreien, z. B. deren Großzügigkeit und Zugänglichkeit, 75 % der internationalen Querschnittsvariation. Wir schließen daraus, dass nicht Gesundheit, sondern primär die landesspezifische Ausgestaltung der Frühverrentungsmöglichkeiten und Arbeitsmarktsysteme, speziell die institutionellen Details der Erwerbsminderungsrenten, die beobachtete internationale Variation des Bezugs von Erwerbsminderungsrenten erklären.

1 Introduction

Disability insurance—the insurance against the loss of the ability to work—is a substantial part of public social expenditures and an important part of the social safety net of all developed countries. Like almost all elements of modern social security systems, disability insurance faces a trade-off: On the one hand, disability insurance is a welcome and necessary part of the social safety net as it prevents income

Prof. A. Börsch-Supan Ph.D. (✉)
Mannheim Institute for the Economics of Aging (MEA), L13, 17,
Universität Mannheim, 68131 Mannheim, Germany
e-mail: axel@boersch-supan.de

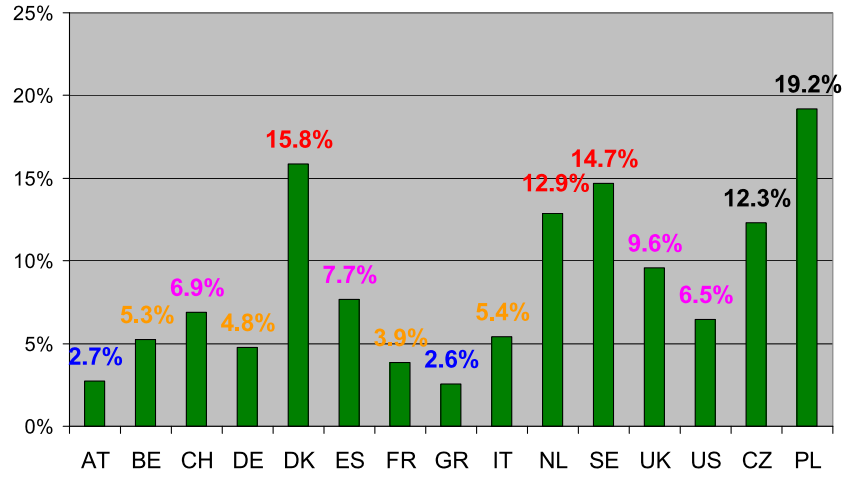

Fig. 1 DI recipiency rate in 13 European countries and the US. ***Note***: Based on 26 810 individuals aged 50 through 65 interviewed in SHARE 2004, ELSA 2004 and HRS 2004. Börsch-Supan (2005). CZ and PL based on SHARE 2006. Börsch-Supan and Roth (2010). Weighted data

losses for those who lose their ability to work before the normal retirement age. On the other hand, disability insurance may be misused to serve as an early retirement route even if the normal ability to work is not affected at all.

Understanding the trade-off between social safety provision and its misuse is important for the design of a modern social security system which maximizes social safety provision under increasingly tight financial budget constraints (Aarts et al. 1996). The aim of this paper is to shed light on this trade-off by using three waves of the Survey of Health, Ageing and Retirement in Europe (SHARE), together with data from its sister surveys in England (the English Longitudinal Study on Ageing, ELSA) and the US (the Health and Retirement Study, HRS).

Starting point for this paper is the striking variation in the recipiency rates of disability insurance (DI) benefits in Europe and the US; see Fig. 1. They are defined as the share of all individuals aged 50 to 64 who receive benefits from DI. With almost 16 and 15%, the Nordic countries Sweden and Denmark have fairly high recipiency rates. The Central European countries cover a broader range. The rate of the Netherlands is almost 13% and in the UK about 10% and thus similar to the Nordic countries while in France less than 4% of the individuals aged 50–64 receive DI benefits and in Germany slightly less than 5%. In the Mediterranean countries lower rates can be observed varying from 3% in Greece to 8% in Spain. The Eastern European countries exhibit the highest recipiency rates. While the Czech Republic with 12% is in a range with Denmark or the Netherlands, the Polish rate of more than 19% exceeds the rest by far. The DI recipiency rate in the US (6.5%) is about equal to the European average as covered by the SHARE and ELSA surveys.

Why are so many more individuals aged 50–64 receiving DI benefits in Denmark, Sweden and the Netherlands than in e.g. France or Germany? Why so many fewer individuals in Greece than in Poland? This paper investigates the causes for this variation.

Three causes are commonly mentioned to explain the large variation: demographics, health and institutions. First, while all European countries are ageing, the extent of population varies considerably. Hence, the first explanation claims that a country with an older population also has a higher prevalence of disability insurance uptake. A second potential cause for the cross-national variation is differences in health status. Can differences in physical and mental health explain why disability insurance is taken up so much more frequently in some countries than in others? Third and finally, recent studies such as Blöndal and Scarpetta (1998) and OECD (2003, 2010) based on the Gruber and Wise (1999) methodology have shown that public old-age pension systems exert large incentive effects which, according to each country's legislation, significantly increase the uptake of early retirement provisions. Do similar incentive effects arise also from disability insurance? Are differences in the European countries' legislations causing different disability insurance take-up rates? Does disability insurance constitute yet another pathway to early retirement irrespective of the health status of the individual (Kohli et al. 1991)?

The sequel of the paper proceeds as follows. Section 2 introduces the Survey of Health, Ageing and Retirement in Europe (SHARE) and describes how we merged comparable data from the English Longitudinal Study on Ageing (ELSA) and the US Health and Retirement Study (HRS). The richness of these micro data permits us to estimate regressions which relate the uptake of disability insurance to demographic and health characteristics of the respondents in these surveys. Section 3 reports the result of these regressions, and Sect. 4 applies them to a counterfactual exercise: how would disability uptake rates look like if there were no demographic and health-related differences among the countries in our sample? Our main result is that demographic and health-related differences do not explain much of the cross-national variation. We therefore turn to insti-

tutional and incentive effects and regresses disability insurance on a set of DI system indicators derived from recent OECD work. Our main result is that almost 75% of the cross-national variation can be explained by a parsimonious set of a few variables describing the generosity of, and the ease of access to, disability insurance. The remainder of the paper is devoted to testing the robustness of this result. Section 5 exploits the longitudinal character of SHARE to look whether shocks in health precipitate DI benefit recipiency. They do not. Section 6 enriches our health measures by childhood and life-course health indicators. Also this exercise does not change our conclusions which are summarized in last section.

2 SHARE, ELSA and HRS

The Survey of Health, Ageing and Retirement in Europe is modelled closely after the US Health and Retirement Study (see Juster and Suzman 1995), the first survey of this kind, and the English Longitudinal Study of Ageing (see Marmot et al. 2003) which followed the lead by HRS. Researchers from HRS and ELSA have been participating in the design process of SHARE at all stages. About two thirds of the variables in SHARE are identical to variables in ELSA and HRS, and most of the remainder are closely comparable. The longitudinal sequence of waves is synchronized among SHARE, ELSA and HRS. In 2010, HRS will collect its 8th wave, ELSA the fifth, and SHARE the fourth wave of data.

SHARE, HRS and ELSA are truly multidisciplinary surveys. Variables include health variables (e.g. self-reported health, physical functioning, cognitive functioning, physical measures such as grip strength and walking speed, health behaviour, use of health care facilities), psychological variables (e.g. psychological health, well-being, life satisfaction), economic variables (e.g. current work activity, job characteristics, opportunities to work past retirement age, employment history, pension rights, sources and composition of current income, wealth and consumption, housing, education), and social support variables (e.g. assistance within families, transfers of income and assets, social networks, volunteer activities, time use).

SHARE, as opposed to HRS and ELSA, has one additional dimension: it is ex ante harmonized cross-national. The first wave in 2004/2005 involved 11 countries, representing Europe's economic, social, institutional, and cultural diversity from Scandinavia (Denmark, Sweden) across Western and Central Europe (Austria, Germany, France, Belgium, the Netherlands, Switzerland) to the Mediterranean (Greece, Italy, Spain). In 2006/2007, additional data has been collected in the Czech Republic, Ireland, Israel and Poland, plus a second wave of data in the original countries with a significant sample enlargement. The third wave of data collection during 2008/2009 took place in those 15 countries with a slightly changed focus on life-course events, in particular health status at childhood and a life history of major health events. SHARE is the first European data set to combine extensive cross-national information on socio-economics status, health, and family relationships of the elderly population.

SHARE has made great efforts to deliver cross-nationally comparable data, such that researchers can reliably study how differences in cultures, living conditions and policy approaches shape the life of Europeans before and after retirement. The questionnaire has been translated according to a protocol ensuring functional equivalence and was administered by a Computer Assisted Personal Interview (CAPI) plus a drop-off self-completion part. Interview procedures have been harmonized with the help of a joint case management system. Methodological details of the study are contained in Börsch-Supan and Jürges (2005a), and first results summarized in Börsch-Supan et al. (2005b, 2011). The SHARE data is available at http://www.share-project.org.

This paper is based on an extract of variables which include whether a person receives disability insurance or not; basic demographic characteristics, and a broad set of health variables. These health variables include self-reported health, functional status measured by indicators of (instrumental) activities of daily living, a set of mental health questions (e.g., CES-D) indicating dementia and depression, and physical measurements such as body mass index, walking speed and grip strength. Most variables are identical in all three surveys. Weight and height (to compute body mass index) are self-reported in HRS and SHARE, while actually measured in ELSA. Grip strength is only available in SHARE.

Disability insurance is defined as all branches of publicly financed insurances against the loss of the ability to perform gainful employment. Table 1 lists the institutions in each country.

We restrict our analysis to individuals in the "window" from age 50 to age 64 in which disability insurance may serve as an early retirement device. In most countries, disability insurance benefits are automatically converted to old-age pension benefits at age 65. This is why our sample is confined to individuals until age 65. We also only include individuals who have a work history. SHARE wave 3 covers 13 115 such individuals. ELSA and HRS contribute 6732 and 4270 individuals, respectively, to the joint sample, thus consisting of up to 24 117 individuals. Actual regression samples may be smaller due to individuals with key data items missing. For joint descriptive statistics, the calibrated weights have been re-normalized to give each country equal weight.

Table 1 Disability insurance schemes considered

Austria (AT)	Staatliche Invaliditätspension
Belgium (BE)	Assurance invalidité légale/Wettelijke uitkering wegens arbeidsongeval of beroepsziekte; Pension de maladie, d'invalidité, maladie professionnelle/Wettelijke uitkering wegens ziekte of invaliditeit of tegemoetkoming aan personen met een handicap
Switzerland (CH)	Invalidenrente aus IV, assurance invalidité légale (AI) and Rendità invalidità (AI)
Czech Republic (CZ)	Státní invalidní důchod, nemocenské dávky
Germany (DE)	Erwerbsminderungsrente and Beamtenpension wegen Dienstunfähigkeit
Denmark (DK)	Offentlig sygedagpenge and offentlig førtidspension
Spain (ES)	Pensión pública contributiva y no contributiva de invalidez/incapacidad
France (FR)	Prestation publique d'invalidité (AAH, APA)
Greece (GR)	Σύνταξη αναπηρίας
Italy (IT)	Assicurazione pubblica di disabilità (anche assegno di accompagnamento) and pnsione pubblica di invalidità o di inabilità
Netherlands (NL)	WAO, Waz of invaliditeitspensioen and Algemene bijstandswet (Abw), IOAW/IOAZ, aanvullende bijstandsuitkering, Toeslagenwet (TW)
Poland (PL)	Renta z tytułu niezdolności do pracy, renta socjalna, zasiłek chorobowy
Sweden (SE)	Förtidspension (sjukersättning), yrkesskadepension, and sjukbidrag
England (UK)	Incapacity benefits (previously invalidity benefits)
United States (US)	SSDI and SSI disability pension

3 Baseline regression results

Our aim is to look which weight each of the three potential causes—demographics, health and institutions—has in explaining disability enrolment in Europe. Our strategy is straightforward. We exploit the richness of the SHARE, ELSA and HRS data to first relate individual disability insurance enrolment probabilities to three types of variables:

- demographic characteristics: age and gender;
- a broad range of variables describing current health: self-perceived health, functional physical status described by the number of limitations in activities of daily living (ADL) and limitations of instrumental activities of daily living (IADL), mental health status as measured by CES-D and EURO-D, and grip strength as indicator of physical performance. Note that this range of variables is broader than in previous health and disability studies and also includes direct measurements (e.g., Jacobzone et al. 2000; Lafortune et al. 2007);
- a set of variables characterizing the generosity of the disability insurance in each country: coverage, minimum disability level required, benefit generosity, medical assessment, and vocational assessment. These variables are taken from OECD (2003), Appendix A2.3. We have updated and extended these indicators to the countries not covered by the OECD. In general the OECD gives scores from 0 to 5 whereas a higher score represents a more generous system. At DI coverage, 5 points are given if the DI covers the whole population while 0 points represents coverage only for employees. The minimum disability level that is required to be eligible is measured as percentage measure of work disability. The lower the percentage required the higher the score given. The maximum benefit level is measured as a replacement rate. A higher rate leads to a higher score. The strictness and whether DI benefit eligibility requires a medical assessment or whether a vocational assessment is sufficient are also included in the analysis. The OECD variables do not only capture formal DI rules but also national differences in implementation and administration of the rules. Finally, we insert a measure for the strictness of the unemployment insurance as an alternative pathway of early retirement.

We then predict how enrolment rates would look like if demographics were equal across countries. If demographic differences were the main cause, enrolment rates should be very similar after taking demographic differences out. We then go through the same procedure for differences in health status. If enrolment rates are still very different after accounting for demographic and health differences, the third explanation—differences in the institutional regulations—is a likely cause.

We run three regressions: a simple linear model for the probability to become enrolled into disability, a probit specification, and a logit specification. Table 2 presents the results based on the 2004 baseline cross section. A first finding is the similarity among the three specifications. A second observation is the large unexplained variation. This is in line with the findings of OECD (2003) where only little correlation between "medical disability status" and "disability enrolment status" was found.

Demographic variables are jointly significant. Women have a lower probability to enrol into disability insurance, conditional on health. Also this was a finding of OECD

Table 2 Regression results

Variable	Linear	t-stat	Probit	t-stat	Logit	t-stat
Gender	−0.0242	−6.2	−0.1696	−5.6	−0.3228	−5.5
Age	0.0007	0.5	0.0072	0.7	0.0131	0.6
Age_50	0.0166	0.6	0.1148	0.5	0.1789	0.4
Age_55	0.0076	0.4	0.0406	0.3	0.0906	0.3
Age_60	0.0152	1.1	0.1016	1.0	0.1947	1.0
Age_65	0.0197	2.2	0.1438	2.1	0.2773	2.1
Self-reported health	0.0563	29.0	0.4301	27.4	0.8579	27.4
CES-D (Sum)	0.0153	9.5	0.0791	7.2	0.1465	7.1
ADL (Sum)	0.0445	13.2	0.1381	7.5	0.2197	6.7
IADL (Sum)	0.0364	8.0	0.1145	4.6	0.1907	4.2
Coverage	0.0467	11.2	0.3426	10.6	0.6583	10.5
Minimum disability level	0.0149	7.4	0.1154	6.5	0.2317	6.4
Benefit generosity	−0.0180	−7.3	−0.1648	−8.3	−0.3115	−7.9
Medical assessment	−0.0088	−3.7	−0.0849	−4.6	−0.1587	−4.4
Vocational assessment	−0.0136	−4.7	−0.1591	−6.4	−0.3266	−6.6
Constant	−0.2255	−2.4	−3.6933	−5.1	−6.9566	−5.0
R-squared		13.1%		19.9%		19.8%

Note: Based on 18 434 individuals aged 50 through 65 interviewed in SHARE 2004, ELSA 2004 and HRS 2004. Börsch-Supan (2005)

(2003). Older age increases for probability to be enrolled, and this more than linearly, as can be seen by the dummy specification.

All health variables are strongly significant. Since we do not have grip strength and walking speed in all three surveys, these variables are not included. Including them in the SHARE sample reduces the significance of the self-reported health measure considerably, but leaves the overall results unaffected. Noteworthy it is the significant effect of mental illness, measured by the CES-D battery, conditional on physical health.

Finally, the institutional variables are also highly significant.[1] Increased coverage (which population groups are eligible for insurance—workers only, or the entire population) increases disability enrolment, as does a lenient minimum disability level to claim benefits. The generosity of benefits is significant, but with an unexpected negative sign. The strictness of a medical exam reduces disability uptake. If vocational considerations play a role in the eligibility process, then their strictness also reduces uptake.

4 Counterfactual simulations

Our first step is to normalize disability insurance enrolment with respect to demographic differences across countries. Italy, for instance, has an older population than the European average, while Denmark has a younger population. We take out demographic differences by first establishing the influence of age and gender on disability insurance take-up. We then predict which share of our sample individuals would take up disability insurance if all countries had the same age and gender distribution as the average of the SHARE countries. The result is shown in Fig. 2, comparing the counterfactual simulation results to the baseline results in 2004 in Fig. 1.

Quite clearly, taking account of demographic differences does not make a substantive difference. Italy, featuring the highest average age of individuals aged between 50 and 65 years among the 13 countries, would have a slightly lower disability insurance enrolment if it had the age distribution of the average country. In Denmark, which is younger than average, the opposite would happen. The effects, however, are very small. Demographic differences across Europe cannot explain why the enrolment rates in disability insurance are so different in Europe.

Our second step is therefore to account for difference in the health status of the population. The health status differs along many dimensions across countries. A first dimension is self-assessed health. Self-assessed health is relatively poor in Italy and Spain, it is best in Switzerland. One major concern with the self-assessed health ratings, however, is that respondents do not perceive the health self-assessment scale given to them as absolute. Individuals with the same true health status may have different reference levels against which they judge their health. This sheds doubt on the comparability of such measures across countries (e.g., Groot

[1] Standard errors account for the fact that these variables vary across countries only (using the "cluster" option).

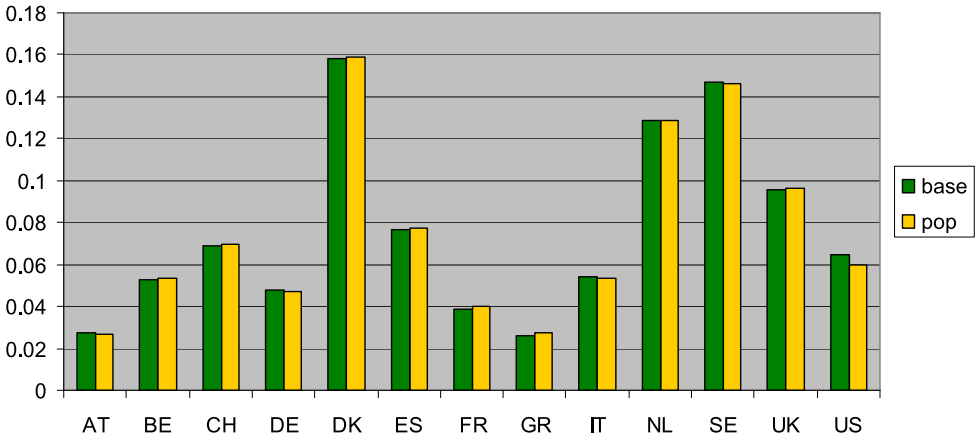

Fig. 2 Actual and predicted disability insurance enrolment if age and gender were identical in all countries.
Note: Based on linear regression specification in Table 2

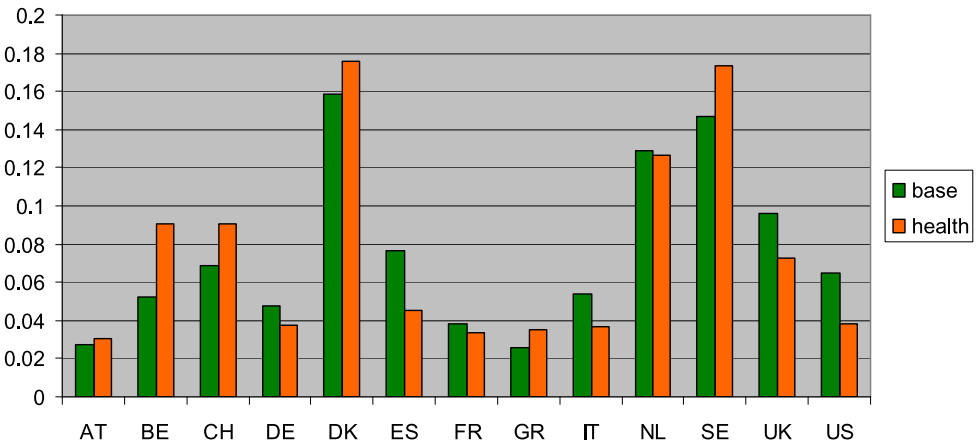

Fig. 3 Predicted disability insurance enrolment if health status were identical.
Note: Based on linear regression specification in Table 2

2000; Sen 2002). We therefore also include more objective measures such as the physical performance in daily activities such as walking or bathing. In this second dimension, Germany exhibits the most limitations and Greece the least. A third dimension is mental health. Depression, an often named reason for taking up disability insurance, varies quite substantially across the SHARE countries. Spain, Italy and France show the worst scores on the CES-D depression scale, while Denmark, Germany and Switzerland have the lowest share of depression cases. Hence, the cross-national variation in health status looks like a good candidate to explain the variation in disability insurance enrolment.

We use the same methodology to correct for the influence of the multidimensional health differences as we did with demographics. We first establish the influence of health on disability insurance take-up, and then predict which share of our sample individuals would take up disability insurance if the health status measured along the above four dimensions would be identical to the average of our 13 countries. The results are shown in Fig. 3.

The differences between enrolment rates under the actual and a hypothetically identical health status are now more pronounced. In general, the counterfactual enrolment rates go up in countries with good health, and down in countries with lower health status than the average, as expected. If the Italians and Spaniards had the same health status as the average person in our sample, their disability insurance enrolment would be much lower. The same holds, notably, for the two Anglo-Saxon countries. In Switzerland, Denmark and Sweden, it would be considerably higher.

If health would be the dominant explanation for disability insurance enrolment, the predicted shares should be equal across countries once health is identical in all countries. As Fig. 3 shows, this is clearly not the case. There are still pronounced differences. Especially the high enrolment rates in Sweden, Denmark and the Netherlands remain either relatively stable after correcting for health differences (Netherlands), or they increase even further (Sweden and Denmark). This also holds if differences in demographics and health are simultaneously corrected for (not shown). We conclude that differences in health across Europe cannot explain the cross-national variation in the European disability insurance enrolment; just the opposite: in Sweden and Denmark enrolment rates are high in spite of a very good health status of the 50–65 year olds in our sample.

Which reasons could it be? By exclusion of the first two of the three popular explanations—demographic and health-related differences—the third popular explanation remains,

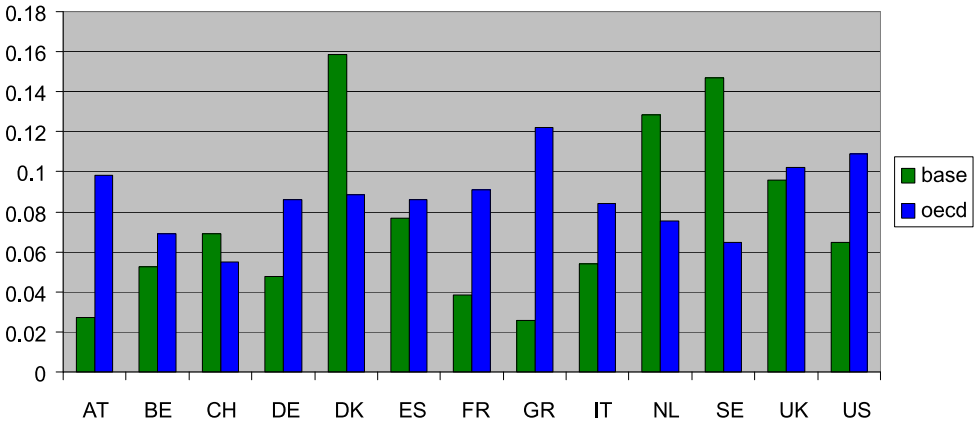

Fig. 4 Predicted disability insurance enrolment if eligibility and benefit rules were equally generous in all countries.
Note: Based on linear regression specification in Table 2

namely institutional differences, specifically enrolment and eligibility rules that make disability insurance benefits easier to receive and more generous in some countries than in others. Such rules may create incentive effects similar to those exerted by old-age pensions which often provide a financial incentive to retire early. In many countries, health requirements for disability insurance eligibility are weak. Under such circumstances, disability insurance may work as a labour market exit route to early retirement (Börsch-Supan 2001). Many countries have established very lenient work disability eligibility rules when unemployment was high.

The final step of our argument is therefore be to conduct a third counterfactual analysis which makes the key disability eligibility rules identical for all individuals in our cross-national sample and then predict the take-up outcomes in the same sprit as in Figs. 2 and 3. We employ five indicators provided by OECD (2005), measuring the coverage of disability insurance, the minimum disability level required to obtain benefits, the benefit generosity, how strict is a medical assessment applied, and whether vocational considerations play a role. We have seen that these variables are highly significant in the regression analysis (Table 2). Using the same methodology as before, Fig. 4 shows counterfactual uptake rates if these system characteristics were identical in all 13 countries of our cross-national sample.

The results are striking. The counterfactual simulation holding eligibility and benefit generosity rules approximately constant produces much more similar disability uptake rates than holding demographics and health constant.

5 Robustness: Alternative pathways and past health changes

How robust are these results? Two caveats come to mind quickly. First, the generosity of disability insurance rules is obviously only one factor representing national circumstances. In particular, the (lack of) generosity of alternative

Table 3 Determinants of DI recipiency

Variables	*Probit* marginal effects	*Linear* coefficients
Age (years)	−0.001	−0.001**
	(0.0006)	(0.0006)
Gender (dummy)	−0.044***	−0.056***
	(0.0070)	(0.0082)
Education (years)	−0.002***	−0.002**
	(0.0007)	(0.0007)
Self-perceived Health (1–5)	0.038***	0.039***
	(0.0028)	(0.0030)
ADL (0–6)	0.002	0.022
	(0.0050)	(0.0140)
IADL (0–7)	0.025***	0.067***
	(0.0046)	(0.0125)
Maximal Grip Strength (kg)	−0.001***	−0.001***
	(0.0003)	(0.0004)
EURO-D (0–12)	0.004***	0.005***
	(0.0012)	(0.0016)
Childhood Illnesses (0–7)	−0.003	−0.005
	(0.0027)	(0.0031)
Adulthood Illnesses (0–5)	0.017***	0.037***
	(0.0026)	(0.0058)
Working Gaps due to Sickness (0–2)	0.052***	0.118***
	(0.0114)	(0.0301)
Period of Very Poor Health (dummy)	0.056***	0.060***
	(0.0051)	(0.0061)
Rooms per Person	−0.003	−0.002
	(0.0065)	(0.0030)
Number of Books (dummy)	−0.002	−0.002
	(0.0055)	(0.0056)
Mathematical Skills (dummy)	−0.007	−0.005
	(0.0052)	(0.0050)
Number of Jobs	−0.003***	−0.005***
	(0.0013)	(0.0013)

Table 3 (*Continued*)

Variables	*Probit* marginal effects	*Linear* coefficients
Physical Demand of Work (dummy)	0.022***	0.024***
	(0.0053)	(0.0062)
Psychological Demand of Work (dummy)	−0.005	−0.007
	(0.0049)	(0.0051)
Married (dummy)	−0.013	−0.019*
	(0.0089)	(0.0105)
Divorced (dummy)	0.012*	0.015**
	(0.0063)	(0.0072)
Widowed (dummy)	0.005	0.005
	(0.0094)	(0.0109)
Coverage (0–5)	0.010***	0.011***
	(0.0030)	(0.0036)
Minimum Disability Level (0–5)	0.010***	0.009***
	(0.0027)	(0.0025)
Replacement Rate (0–5)	−0.007**	−0.006**
	(0.0029)	(0.0027)
Medical Assessment (0–5)	0.005*	0.007***
	(0.0025)	(0.0028)
Vocational Assessment (0–5)	−0.017***	−0.017***
	(0.0028)	(0.0034)
Unemployment Benefits (0–5)	0.013***	0.014**
	(0.0043)	(0.0055)
Constant		0.125**
		(0.0599)
(pseudo) R^2	0.233	0.147

Standard errors in parentheses, robust standard errors for the linear model. *** $P < 0.01$; ** $P < 0.05$; * $P < 0.1$

Note: Based on 10 385 individuals of the relevant age range (50 to 64 years in wave 1) with observations in both waves SHARE 2006 and SHARELIFE. Börsch-Supan and Roth (2010)

pathways to early retirement is likely to influence cross-national variation in the receipt of disability insurance. The more other types of early retirement are available, the less there is a need to use the disability insurance. Second, contemporaneous health might be a bad indicator for health-related problems causing work disability since the relevant health events may have happened much earlier.

The first caveat needs to be addressed by an equally detailed description of the alternative pathways to early retirement as we did for disability insurance in each country. One important alternative pathway is unemployment insurance. We will roughly capture aspects of this in the sequel of this section; see the last variable in Table 3. Another equally important alternative pathway is early retirement. The incentives created by such a pathway are highly specific by individual, as described by the work of the team led by Gruber and Wise (1999). Imputing the Gruber–Wise variables for the SHARE sample is a worthwhile effort for future research. More generally, the poorer the economic and labour market situation, the more frequent are difficulties for older workers to remain in or enter employment, and thus the higher is the possible receipt of DI benefits. To identify this effect, we need time-series variation. The SHARE panel will eventually provide this variation when future waves will have been added.

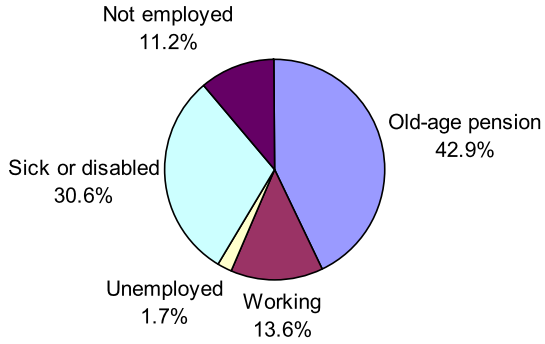

Fig. 5 Exits from disability insurance.
Note: Based on 8942 individuals of the relevant age range (50 to 64 years in wave 1) with observations in both waves SHARE 2004 and 2006

To go beyond contemporaneous associations and to address the second caveat, we take advantage of the already existing longitudinal features of the SHARE data. We first compare the two available waves with almost identical variables, and then exploit the retrospective data in wave 3.

More than two thirds of the individuals who were enrolled in disability insurance in 2004/2005 remained enrolled also in 2006/2007. About 28%, however, left disability insurance. Figure 5 shows the distribution of those who left disability insurance. Only few individuals leaving disability insurance go back to the labour market: 13.6% are working and 1.7% actively seek work. The largest category consists of individuals who transit from disability insurance into old-age pensions (almost 43%). Another 31% remain sick or disabled and rely on family transfers. The remaining 11% are homemakers. This distribution suggests that disability insurance is more a pathway to retirement than a temporary relief.

In turn, about 4% of the individuals who were not enrolled in 2004/2005 took up disability insurance two years later. These individuals provide an alternative handle to relate disability benefit receipt to health: How many of those individuals experienced a shock of bad health that could be interpreted as a precipitator for DI benefit uptake?

Figure 6 depicts the relationship between disability insurance entrance and changes in self-rated health. Negative numbers represent a worsening of the self-assessed health status, positive numbers an improvement. There are, as one might expect, more individuals reporting a worsening of health who enter disability insurance. The differences be-

tween those who entered disability insurance, however, are not very large compared to those individuals who exited disability insurance: in both groups, the most frequent category is no change at all.

The influence of more objectively ascertained health measures is even weaker. Figure 7 displays the change in grip strength, a measure which has proven to be an excellent indicator of declining health. Negative numbers indicate weaker grip strength, positive numbers a tighter grip. The correlation is very weak, and only visible in the categories -5 and $+3$.

Finally, a very similar result emerges from the EURO-D depression test, see Fig. 8.

A more formal multivariate analysis, not reported here, confirms the results of Figs. 6, 7, 8. Self-assessed functional limitations and self-reported health have significant effect on new disability enrolment, but only in some countries. Objective measures, such as a test for depression symptoms and the grip strength measure, do not contribute in explaining disability insurance entrance at all.

Current or very recent health measures, as broadly as they may be measured, may not appropriately capture the full impact of poor health on employability. Work disability may rather be the result of a long lasting process of becoming sick and finally unable to work. We therefore take a life-course approach and exploit the third wave of SHARE with its life-course variables that account for long-run effects. We first create lifetime health indicators that describe childhood and adulthood health status. In addition, we take other life-course features into account such as childhood socio-economic status, quality of the working place and marital status over the whole life course:

(1) Life-course health indicators include childhood health status and adulthood health status. Childhood health is described by the number of illnesses lived through until the age of 15. For adulthood health a similar measure is taken, and in addition a binary variable indicating if someone had suffered from an extended period of poor health. Moreover, we include the number of gaps in the working history in which a person was sick or disabled.
(2) Life-course control variables include childhood socio-economic status, work quality and marital status. The socio-economic status during childhood is measured by the number of books, rooms per person in the accommodation and relative skills in mathematics at the age of ten. Work quality is measured as the subjective assessment of the physical and psychological demands at work. We also account for the number of jobs during lifetime. Finally, we include binary variables indicating if someone has been married, divorced or widowed during her or his lifetime.

We use the same methodology as in Sects. 3 and 4: First, we relate at the individual level whether a person receives DI benefits to the above set of explanatory variables. Second, we perform simulations which hold the life-course variables counterfactually constant. Table 3 shows the regression results from a probit and a linear specification, based on wave 2 of the SHARE data 2006/2007 and restricted to individuals for which we have obtained life histories in 2008/2009, resulting in 10 385 observations.

The probit specification explains about 23% of the total variation (measured as the pseudo R^2) which is quite a satisfactory value at the individual level. The linear specification delivers essentially the same regression results (although on a different scale) but permits a more straightforward way to decompose the total variance. This is shown in Fig. 9. The full linear model explains some 14.65% of the variation in the data. Basic demographic characteristics and education explain less than 1% of the individual variation. The OECD indicators vary only across countries and therefore explain, by definition, very little at the individual level. Current health measures have the largest explanatory power with over 9% of the individual variation explained. Life-course health variables are almost as powerful and explain 7.2% of the individual variation, while the other life-course variables explain 6.5%.

Quite clearly, both current and life-course health are highly predictive of receiving DI benefits at the individual level. Together, the health variables explain 12.4% of the total variation, i.e. 85% of the explained variation. Self-rated health is far the strongest single health variable, explaining 6.8% of the total variation.

All five categories of variables are jointly statistically significant: the corresponding F-test values are 23.4 for demographic variables, 208.6 for current health measure, 29.6 for the welfare state indicators, 201.9 for life-course health and 90.3 for all other life-course variables. Table 3 presents the results for the probit and linear specification. For the probit model, marginal effects are shown rather than the regression coefficients.

Age and years of education have a negative effect on the receipt of DI benefits. Hence, older individuals have a smaller probability of receiving DI benefits. This may sound counterintuitive since health declines as we age. However, we control for health (see below), and alternative retirement pathways become available at older age. More educated individuals are less likely to receive DI benefits. Male individuals are more frequently DI benefit recipients than female.

All current health measures have the expected sign and are significant, except for the number of ADL limitations. A dummy variable of the presence of ADL limitations, however, is significant. Better health leads to a lower probability of receiving DI benefits. As a remarkable result, we find that the more subjective a health measure is, the stronger is its influence. This may be an indication of some extent of self-justification (see Banks et al. 2004).

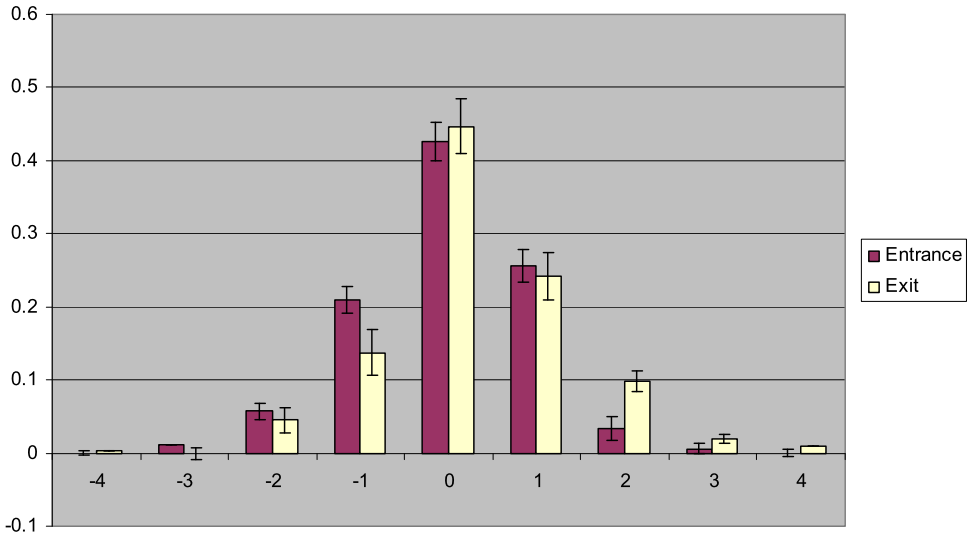

Fig. 6 Disability insurance enrolment and changes in self-rated health.
Note Based on 8942 individuals of the relevant age range (50 to 64 years in wave 1) with observations in both waves SHARE 2004 and 2006

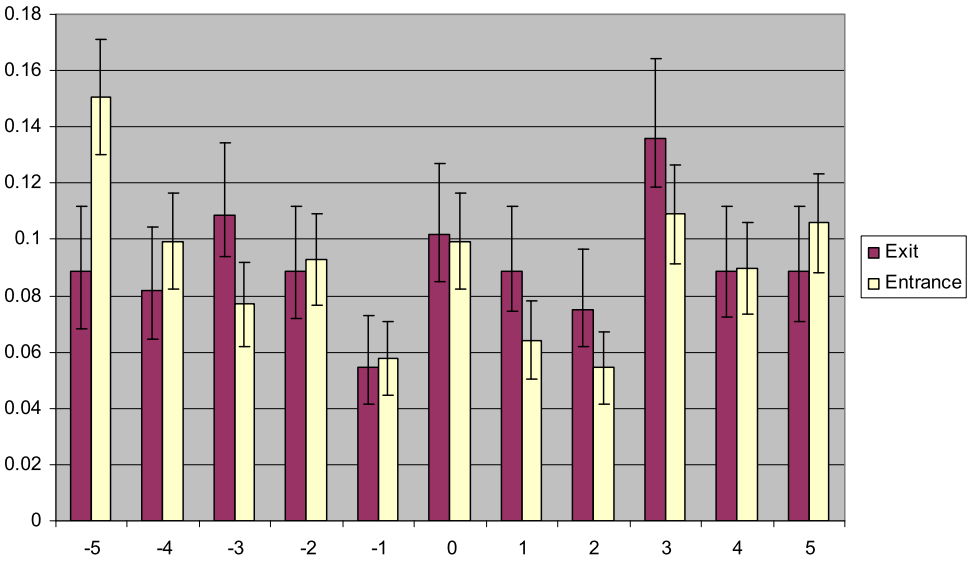

Fig. 7 Disability insurance enrolment and changes in grip strength.
Note Based on 8942 individuals of the relevant age range (50 to 64 years in wave 1) with observations in both waves SHARE 2004 and 2006

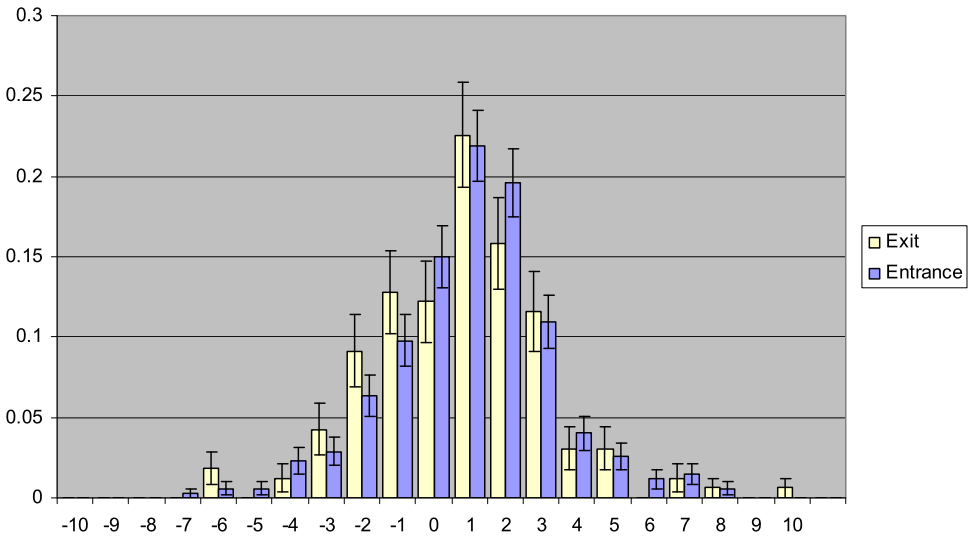

Fig. 8 Disability insurance enrolment and changes in depression.
Note Based on 8942 individuals of the relevant age range (50 to 64 years in wave 1) with observations in both waves SHARE 2004 and 2006

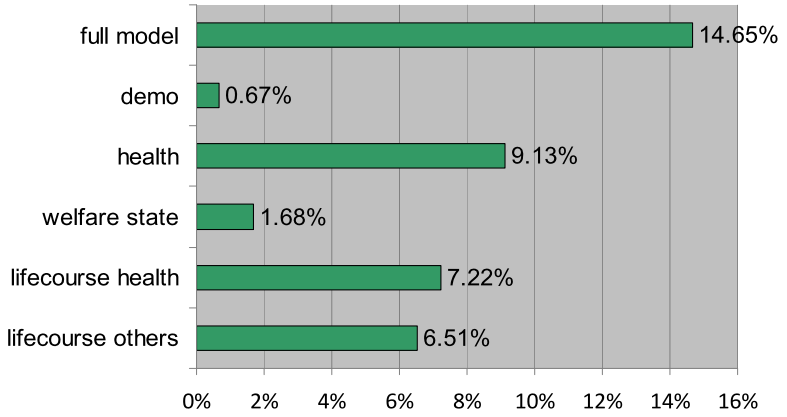

Fig. 9 Explanatory power of variable groups (in % of explained variation).
Note: Based on linear regression specification in Table 3

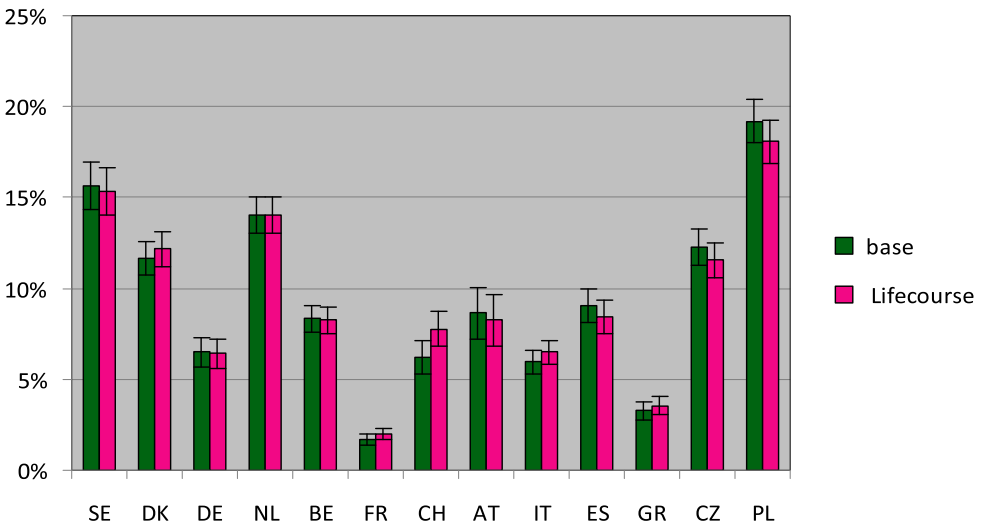

Fig. 10 Life-course health and other life-course factors.
Note: Based on linear regression specification in Table 3. Brackets denote standard errors

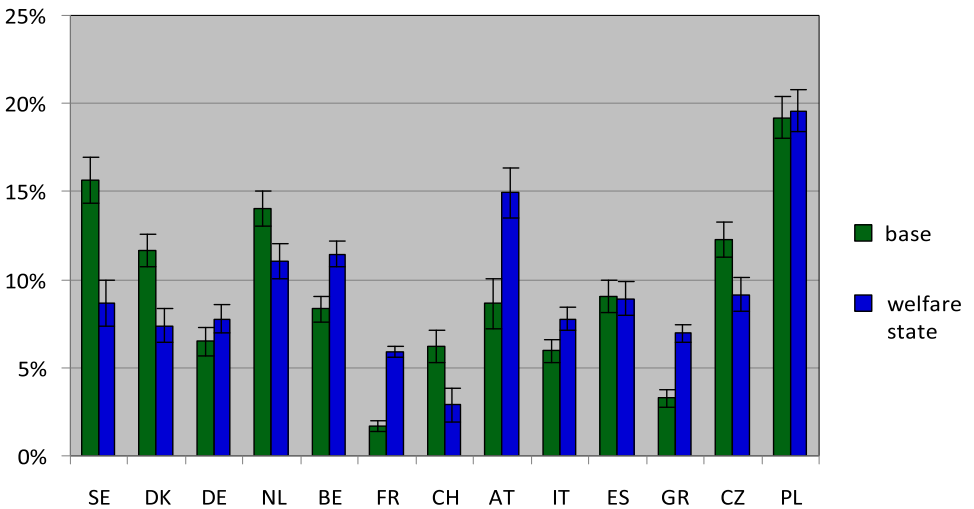

Fig. 11 Welfare state generosity.
Note: Based on linear regression specification in Table 3. Brackets denote standard errors

The life-course health variables show a clear picture. All life-course indicators describing long-term health show the expected direction. Moreover, these variables are highly significant jointly but also each for itself as it can be seen in the table above. This result is robust over all three specifications. The variable describing childhood health is not significant.

Among the other life-course variables, the only significant ones are the subjective physical demand of work, the number of jobs and the binary variable describing if some-

one has been already divorced. Higher physical demand of the work leads to a higher probability of receiving benefits while an increase in the number of jobs leads to a decline in the reception of DI benefits. Suffering from at least one divorce increases the probability of being eligible.

The OECD indicators describing the generosity of the welfare system regarding DI and alternative pathways vary only across countries. They are nevertheless jointly significant and have, besides the replacement rate, the expected direction: the more generous the DI, the higher the probability of receiving the benefits. The broader the job range of vocational assessment, the less likely is the receipt of DI benefits. Strict eligibility rules and a low replacement rate of the unemployment insurance, a possible alternative pathway to retire early, increase the likelihood of receiving DI benefits.

We now employ the counterfactual simulation method already used in Sect. 4, now equalizing the life-course health and other life-course variables available in the third wave of SHARE. Figure 10 presents the results. They are unambiguous: adding life-course health variables to the already broad but only contemporal set of health variables does not turn the conclusions from the previous sections around. Not a single difference is statistically significant.

Moreover, and following from this result, equalizing all variables that describe the generosity of the DI system and potential alternative pathways, such as unemployment insurance, while taking account of life-course health and other life-course variables, yields a similar pattern as in Fig. 4: Fig. 11 shows that actual and simulated now diverge considerably. Except for Switzerland and Poland, the simulated recipiency rates of DI benefits are much more equal across countries when we assume the same institutional framework in every country.

Most importantly and as opposed to Fig. 10, the three countries in the EU15 in which benefit recipiency rates were particularly high in 2007—Sweden, Denmark, and the Netherlands—now exhibit much smaller DI rates when the generosity of their DI systems is reduced to the average level across the 13 included countries.

6 Discussion and conclusions

We do not find any convincing case for a causal role of health in explaining the striking cross-national differences in disability insurance enrolment. There is no significant correlation with objective health measures. The weak correlation with self-rated health may be influenced by "justification bias", i.e., the desire by respondents to motivate their entrance into disability insurance by reporting a subjectively felt worse health status.

Institutional features, in turn, have a very large explanatory power. Coverage, minimum disability level required to receive benefits, benefit generosity, medical and vocational assessment explain more than three quarters of the cross-national variation in enrolment rates. These results are robust insofar as they hold for contemporaneous, intertemporal and life-course specifications of health.

In assessing our results, it is important to distinguish individual level variation from cross-national variation. Since we have more than 10 000 observations and only 13 countries, our regression results are dominated by the within-country variation. Here, both current and life-course health variables are highly significant both jointly and each for itself at the individual level. This shows that these variables are reliable measures of health, and they indeed contribute to about 85% of the overall explained variation across individuals. Variables describing the welfare state, however, especially the generosity of the DI system, cannot determine within a country if someone receives DI benefits because all individuals face the same DI system.

In our counterfactual simulations (Figs. 2, 3, 4, 10 and 11), we only see the cross-national variation. At this level, the roles of health and DI system generosity switch completely. Neither current nor life-course health can be identified as a source of cross-national variation in the DI recipiency rates, while variables describing the generosity of the DI system have strong explanatory power. This explanatory power is driven by the large differences in DI generosity across countries as described by the OECD indicators.

This leads to a threshold interpretation (Croda and Skinner 2009): Our broad set of health variables ranks individuals well by health within each country. The thresholds, however, beyond which DI benefits are granted, are country-specific and have almost no relation to health. They are products of institutional characteristics such as minimum benefit levels and assessment requirements.

The most influential variable is the strictness by which vocational considerations, if any, are applied. This variable alone explains more than 60% of the cross-national variation. It seems to be the most powerful policy variable when countries such as the Netherlands, Denmark and Sweden want to bring their disability insurance enrolment rates closer to the average European and US level.

The paper has concentrated its analysis on variables describing the disability insurance systems in the SHARE countries. The generosity of disability insurance, however, is only one factor representing national circumstances. Early retirement pathways work like commuting pipes: If one pathway lacks generosity, other pathways become more likely. Short of modelling all alternatives—which is beyond the scope of this paper—readers should keep this caveat in their minds and interpret generosity in a relative manner with respect to the generosity of other early retirement institutions.

Executive summary

Disability insurance—the insurance against the loss of the ability to work—is a substantial part of social security expenditures in many countries. The benefit recipiency rates in disability insurance vary strikingly across European countries and the US. This paper investigates the extent of, and the causes for, this variation, using econometric analyses based on new data from SHARE, ELSA and HRS.

We show that even after controlling for differences in the demographic structure and health status, these differences remain. This holds for a broad set of objective and subjective physical and mental health measures as well as for contemporal, intertemporal and life-course specifications of health, including measures of childhood health.

In turn, indicators of disability insurance generosity explain 75% of the cross-national variation. We conclude that it is not health but the country-specific design of early retirement and labour market institutions, and especially disability insurance rules, which explain the observed cross-country variation in the receipt of disability benefits.

Kurzfassung

Erwerbsminderungsrenten – eine Versicherung gegen den frühen Verlust der Fähigkeit, am Erwerbsleben teilzunehmen – stellen in vielen Ländern einen beträchtlichen Teil der Sozialversicherungsausgaben dar. Die Anteile derjenigen Menschen im erwerbsfähigen Alter, die Erwerbsminderungsrenten erhalten, zeigen ganz erstaunliche Unterschiede innerhalb Europas und den USA. Dieser Beitrag beschreibt das Ausmaß dieser Unterschiede und verwendet ökonometrische Verfahren, sie auf Basis der europäischen SHARE- und ELSA- sowie der US-amerikanischen HRS-Daten zu untersuchen.

Wir zeigen, dass diese Unterschiede auch nach einer Korrektur um die landesspezifischen Unterschiede in der demographischen Struktur und dem Gesundheitszustand bestehen bleiben. Dies gilt, obwohl wir eine sehr breite Palette von Variablen einsetzen, um die Gesundheits der Individuen in den Stichproben zu beschreiben – sowohl objektive als auch subjektive Maße, sowohl physische als auch psychische Gesundheitsmaße, und Gesundheit sowohl kontemporale als auch verzögert und über den gesamten Lebenszeitraum einschließlich der frühesten Kindheit messen.

Im Gegensatz dazu erklären Indikatoren, welche die institutionelle Ausgestaltung der Erwerbsminderungsrentensysteme beschreien, z. B. deren Großzügigkeit und Zugänglichkeit, 75 % der internationalen Querschnittsvariation. Wir schließen daraus, dass nicht Gesundheit, sondern primär die landesspezifische Ausgestaltung der Frühverrentungsmöglichkeiten und Arbeitsmarktsysteme, speziell die institutionellen Details der Erwerbsminderungsrenten, die beobachtete internationale Variation des Bezugs von Erwerbsminderungsrenten erklären.

Acknowledgements I am grateful to Stephanie Stuck for generating the SHARE data extract, to Fabian Terner for merging ELSA and HRS data to it, and to Christian Goldammer who collected additional institutional data. Section 6 is co-authored with Henning Roth. All provided outstanding research assistance. I thank an anonymous reviewer, Monika Bütler, Angus Deaton, Dana Goldman, Martin Prince, Susann Rohwedder, David Weir and Bob Willis for their helpful comments on previous versions. Financial support by the Deutsche Forschungsgemeinschaft, the Land of Baden Württemberg, the Gesamtverband der deutschen Versicherungswirtschaft, and the National Institute on Aging through Grant 5 P01 AG022481-04 are gratefully acknowledged. The findings and conclusions expressed are solely those of the author and do not represent the views of any agency of the German and US Governments, the NBER, the RAND Corporation, or any other sponsor. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life) and through the 6th framework programme (projects SHARE-I3, RII-CT-2006-062193, COMPARE, CIT5-CT-2005-028857, and SHARELIFE, CIT4-028812). 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, IAG BSR06-11, OGHA04-064) and national funding through the Austrian Science Foundation, the Belgian Science Policy Administration, the French CNAM, CNAV, COR, Drees, Dares, Caisse des Dépôts et Consignations, and the Commissariat Général du Plan, and the Swiss OFES.

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Prof. Axel Börsch-Supan Ph.D. is Professor of Macroeconomics and Public Policy, Founding and Executive Director of the Mannheim Research Institute for the Economics of Aging (MEA) at Mannheim University, Germany. He is also a Research Associate at the National Bureau of Economic Research (NBER, Cambridge, Massachusetts) and Adjunct Researcher at the RAND Corporation (Santa Monica, California).