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The effects of private versus public health insurance on health and labor market outcomes

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IAB-DISCUSSION PAPER

Articles on labour market issues

3|2021 The effects of private versus public health insurance on health and labor market outcomes

Christine Dauth

The effects of private versus public health insurance on health and labor market outcomes

Christine Dauth (IAB)

Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

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Contents

1	Introduction	7
2	Related literature	8
3	Institutional background of health insurance in Germany	9
4	Data and sample restriction.....	10
5	Empirical approach	14
5.1	Identification strategy	14
5.2	Assumptions.....	15
6	Causal estimates of private health insurance on health and employment	20
6.1	First stage results	20
6.2	Reduced form results.....	22
6.3	Two stage least squares results.....	23
6.4	Sensitivity Checks	25
7	Summary and conclusion	27

Figures

Figure 1:	Regression discontinuity plots of monthly earnings for predetermined covariates	19
Figure 2:	Density test of the forcing variable around the cutoff	20
Figure 3:	First stage effects: bin scatter plots of private health insurance (PHI) rates below and above the compulsory insurance threshold	21
Figure 4:	Reduced form estimates for the impact of private health insurance (PHI) on ... over nine years.....	23

Tables

Table 1:	Mean sample statistics for workers in private health insurance (PHI) and public statutory health insurance (SHI) in base year $t \in [2003,2006]$	13
Table 2:	Mean sample statistics for workers above and below the compulsory insurance threshold	17
Table 3:	OLS and 2SLS estimates of private health insurance (PHI) on health and labor market outcomes	21
Table 4:	OLS and 2SLS estimates with control variables of private health insurance (PHI) on health and labor market outcomes.....	24
Table 5:	OLS and 2SLS estimates with control variables of private health insurance (PHI) and labor market outcomes over 9 years	26

Abstract

Among health care systems with both public and private elements (such as in the US and Germany), an important question is whether the type of health insurance exerts an impact on workers' careers. We exploit the unique German case of a two-tier health care system to analyze whether opting out of public statutory health insurance and into private health insurance affects the specific health and employment outcomes of employed workers over a period of nine years. We exploit administrative registers and apply a fuzzy regression discontinuity design. We do not find any evidence that the type of health insurance affects employed workers' outcomes in the medium or long run. This suggests that even though private health insurance entails more comfortable healthcare conditions, public health insurance does not come with heavy health impairments or detrimental employment outcomes.

Zusammenfassung

In Gesundheitssystemen mit gesetzlichen und privaten Krankenversicherungen (so wie beispielsweise in den USA oder in Deutschland), stellt sich die Frage, ob die Art der Krankenversicherung die Arbeitsmarktkarrieren der Versicherten beeinflusst. Wir untersuchen, ob der Wechsel von der gesetzlichen in die private Krankenversicherung bestimmte Gesundheits- und Beschäftigungsvariablen über einen Zeitraum von neun Jahren beeinflusst. Wir nutzen administrative Prozessdaten und verwenden ein Fuzzy Regression Discontinuity Design um kausale Effekte zu identifizieren. Wir finden keinerlei Hinweise auf einen mittel- oder langfristigen Einfluss der Art der Krankenversicherung auf lange Krankheitsepisoden oder den Arbeitsmarkterfolg von Beschäftigten. Dies deutet darauf hin, dass eine Mitgliedschaft in der privaten Krankenversicherung zwar mit mehr Annehmlichkeiten verbunden ist, aber nicht mit gravierenden Nachteilen bei der Gesundheit oder dem Arbeitsmarkterfolg.

JEL classification

I13, J21, J30

Keywords

Employment, fuzzy RDD, health instrumental variables, labor market outcomes, private health insurance, public health insurance

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1 Introduction

Health care systems around the globe are very differently organized and therefore hard to compare. Most European systems provide universal public primary health care with complementary health care coverage from private insurers (Paris et al. 2010, Tuohy et al. 2004). The United States, by contrast, organizes health care predominantly privately, except for older individuals (Medicare) and deprived workers (Medicaid) (Brown 2003). Whether individuals' health and employment outcomes depend on the institutional organization of health care is uncertain.

The German case provides an ideal setup to explore whether private or public health insurance affects worker outcomes differently. Health care in Germany is organized in a two-tier system. Private health insurance (PHI) is open only to specific workers, i.e., government officials, self-employed workers, and employees with high incomes. The remaining 87 percent of all workers in the labor force have public statutory health insurance (SHI) (Statistisches Bundesamt 2016).¹ One important difference between private and public health insurance is that private insurance companies compensate physicians more generously than public health insurance funds (Walendzik et al. 2008).² PHI companies reimburse physicians approximately 2.3 times higher on average for the same type of treatment, reimburse longer time slots to treat patients, reimburse more consultations for the same illness, and reimburse a larger set of health care services as well as more expensive medication and therapies (Stauder and Kossow, 2017). Consequently, physicians treat patients with SHI and PHI differently. For example, SHI patients wait approximately three times as long for outpatient appointments than PHI patients (Lüngen et al. 2008) and approximately 19 percent longer for appointments at acute care hospitals (Kuchinke et al. 2009).

The relationship between the type of health insurance and the use of health care services in Germany is uncertain. Some studies do not find any correlation between the type of health insurance and the number of appointments at hospitals or physicians (Geil et al. 1997; Pohlmeier and Ulrich 1995; Riphahn et al. 2003). Others find that workers with PHI visit the doctor more often than SHI members (Jürges 2009) and that privately insured men visit specialists more often than publicly insured men (Gruber and Kiesel 2010).

The purpose of this paper is to analyze whether the type of health insurance affects employed workers' health and labor market outcomes over a period of nine years. We assume that the main underlying mechanism is differences in patients' treatment by physicians, who respond to the financial incentives that emerge from differences in payment generosity. Potentially resulting health effects will subsequently reflect upon employment, because bad health lowers employment probability (Frijters et al., 2014; García-Gómez et al. 2013, Zimmer 2013) and earnings (Halla and Zweimüller 2013). To identify causal effects, we apply a fuzzy regression discontinuity design and exploit that in Germany, employees' earnings must exceed a certain income threshold for them to become eligible to opt out of public SHI. This allows us to control for the selection of specific worker types in PHI. Moreover, we exploit extremely rich and precise register data covering all German employees.

¹ Among employees, i.e., excluding civil servants and self-employed workers, 96 percent have SHI and four percent have PHI.

² This is similar to the US, where private insurers reimburse at higher rates than Medicaid (Alexander and Schnell, 2019).

In sum, we find no evidence of any impact of PHI on employees' long-term health status or mortality or on their cumulative employment or job position. Thus, PHI seems to provide better amenities for insurance users but does not directly affect workers' health status or career.

The paper is organized as follows: Section 2 summarizes the related literature and section 3 the institutional background. Section 4 describes the data and section 5 the methodological approach. Section 6 presents the results, and section 7 concludes.

2 Related literature

Because there is no universal health insurance coverage in the US, a considerable amount of literature focuses on whether health insurance coverage itself increases the use of health care services and improves the health outcomes of insured individuals. On the one hand, workers covered by health insurance potentially have better access to information about the risks of unhealthy behavior and are more likely to receive ambulatory and inpatient care (Davis and Rowland 1983). On the other hand, insured workers might increase their risky behavior due to moral hazard. Moreover, workers are treated for emergency conditions also when non-insured. In sum, findings regarding the impact of health insurance coverage on health outcomes and mortality depend on the context and are ambiguous (see Goldin et al. 2021). However, several important studies based on randomized controlled trials and natural experiments have found a positive impact of health insurance coverage on the use of health services, health outcomes, and mortality (Baicker et al. 2013, Card et al. 2008, Currie and Gruber 1996a/b, Finkelstein et al. 2012, Sommers et al. 2012).

A smaller body of literature deals with disparities in reimbursement generosity and their role in differences in patients' treatment and their health outcomes. It has conclusively been shown that reimbursement rates drive physician behavior. The most recent literature for the US is predominantly concerned with comparing workers publicly insured by Medicaid and workers privately insured by their employer. Higher Medicaid reimbursement rates improve access to health care, increase self-reported health, and reduce school absenteeism (Alexander and Schnell, 2019). Moreover, publicly insured children are less likely to be admitted to hospitals than privately insured children, especially during flu season, when hospital beds are in high demand. However, this does not seem to affect children's health outcomes, which indicates that in general, children might be overtreated (Alexander and Currie 2017). The findings from Gruber et al. (1999) provide additional supportive evidence that higher relative reimbursement rates might coincide with needlessly intensive treatment of patients. The higher fee differentials between cesarean and normal childbirth in Medicaid than in private health insurance explain over half of the difference between Medicaid and private cesarean delivery rates.

In addition to the literature on Medicaid, Clemens and Gottlieb (2014) examine exogenous shocks to Medicare physician payments. They find that a two percent increase in reimbursement rates leads to a three percent increase in health care services. While relatively elective services show the strongest response, less discretionary services respond little to the change in payment rates. Focusing solely on private health insurance, Coey (2015) shows that physicians choose more costly

heart attack treatments when insurance plans reimburse them at higher rates than alternative treatments.

While Medicaid covers only workers with low income, German workers covered by SHI have characteristics that are representative of the average population. Therefore, the German case is ideal to verify whether the type of health insurance affects individuals' health outcomes in the long run with a different, more representative subset of workers.

To date, three studies have analyzed the causal health effects of the German two-tier system. Applying a fuzzy regression discontinuity design to survey data, Hulleger and Klein (2010) show that the type of insurance does not affect the number of nights stayed in a hospital. However, PHI members less often consult a physician and report better health. Petilliot (2017) focuses on young individuals still in the school system. He assumes that for them, the type of health insurance is exogenous, because most students' parents decide on the type of health insurance at birth. Using survey data, he does not find any differences in self-reported health status or health satisfaction between those with PHI and those with SHI. Stauder and Kossow (2017) apply an individual fixed effects approach to survey data. They find that with every year on PHI, workers can significantly improve their physical component summary scale score compared to workers on SHI. Together, the previous studies report differing findings regarding the effect of insurance type on health outcomes, which is certainly related to differences in data, methodologies, and samples.

Our study makes important contributions to the literature. First, compared to the existing studies that evaluate the German setting and rely predominantly on survey data, we are the first to exploit comprehensive register data that authorities systematically collect to calculate employees' social security contributions. We can draw on data from all German employees at the daily level. Second, we do not rely on self-reported but objective health measures. The register data allow us to identify when workers interrupt or end employment due to severe sickness or death. Third, we close a gap in the literature and analyze how PHI affects workers' employment outcomes via health status. Assuming that health is an important driver of workers' careers, we analyze how the insurance type affects cumulative employment and workers' job position. With US data, this is hardly feasible, as it is the employer that commonly organizes private health insurance in the US. Thus, health care coverage itself is an important incentive to stay employed, irrespective of health status. Fourth, we follow individuals over a period of nine years, and this study is therefore unique in presenting long-term evidence.

3 Institutional background of health insurance in Germany

In Germany, SHI is mandatory for employees whose regular earnings fall below the *Compulsory Insurance Threshold* (CIT). In 2019, the annual CIT was 60,750 euros. As the average income from work was 47,928 euros³, this implies that only high-earning employees can choose between SHI

³ Federal Statistical Office 2021, <https://www.destatis.de/DE/Themen/Arbeit/Verdienste/Verdienste-Verdienstunterschiede/verdienste-branchen.html>.

and PHI. Regular earnings comprise monthly earnings plus regular bonuses. When a worker's regular earnings exceed the monthly CIT and will also exceed the threshold the following year, he can opt out of SHI and buy PHI at the beginning of the new year.

In addition to differences in eligibility, PHI and SHI differ with respect to the insurance premiums workers need to pay and with respect to the insurance benefits. The 110 German nonprofit health insurance funds that supply SHI generally offer the same standard package of health care services with slight deviations (Gesetzliche Krankenversicherung (GKV)-Spitzenverband 2018). By contrast, private for-profit health insurance companies usually offer different combinations of health care services at different prices. The cheapest package must cover the same services as SHI at the same prices.

Health premiums under SHI depend on labor earnings. This implies that up to a certain earnings ceiling (56,250 euros in 2019), the premium amounts to approximately 15 percent of a worker's earnings. By contrast, health premiums under PHI are risk-related. In both cases, the employer covers approximately half of the health premium. Private insurers classify workers and set the premiums when workers enroll in PHI. The most relevant risk factors are age and health condition and, before 2013, gender (women paid more). Health contracts are life-long, and private insurers can neither adjust nor cancel the contract in response to health shocks once they have closed a health contract.

When individuals choose between SHI and PHI, the relative price matters. Particularly for young, healthy and high-earning males, PHI offers better health care services at lower premiums. Indeed, the literature has largely confirmed that workers with PHI are younger, have higher earnings and are more likely to be male. This selection is the consequence of better risks opting out of SHI (Bünings and Tauchmann 2015) and worse risks opting back into SHI (Grunow and Nuscheler 2014). However, Panthöfer (2016) shows that relative prices explain only approximately one third of the selection into PHI. Polyakova (2016) finds only limited evidence for better risks enrolling in PHI. She argues that individuals with a preference for convenience (shorter appointment waiting times, better hospital rooms) in particular chose PHI.

The coexistence of both systems has repeatedly been the focus of public debate because many consider it unjust. PHI is open only to specific workers, i.e., government officials, self-employed workers, and employees with high earnings. Moreover, PHI attracts healthier workers because the insurance premiums are health-dependent. This lowers the costs and premiums in PHI and weakens the principle of solidarity in public SHI.

4 Data and sample restriction

We exploit administrative records provided by the Institute for Employment Research of the German Federal Employment Agency. These data comprise information on all employed workers, such as the date and duration of employment, earnings, individual characteristics, and job characteristics. Because all of this information is process-generated, it has daily precision and is highly reliable (Antoni et al. 2019).

Our analysis relies on the full sample of the Employment History (BeH) dataset, which comprises employment data for all German employees. We focus on workers liable to social security contributions. To identify employees with SHI or PHI, we rely on a key that identifies to which of the four social security insurances workers contribute, i.e., health insurance, nursing insurance, pension insurance, or unemployment insurance. Workers with full PHI contribute to pension and unemployment insurance but do not contribute to health and nursing insurance. Workers with SHI contribute to all four insurances.

We construct a yearly panel for the years 2000 to 2017. Earlier observations do not report contributions to the social security insurances. We focus on workers whose yearly gross earnings vary closely around the CIT by a maximum of 2,500 euros between 2003 and 2006. In January 2003, the government substantially raised the CIT to increase the proportion of workers with SHI and to secure SHI revenue (Verband der privaten Krankenversicherung 2004). This implies that between 2000 and 2002, the CIT was much lower, which is why we exclude these years from our observation period. We also exclude the years after 2006 because between 2007 and 2010, the eligibility criteria changed again: workers had to cross the CIT for at least three years in a row to qualify for PHI.

Annual earnings are the key determinant for workers to become eligible for PHI. Therefore, we condition on workers who have been continuously employed and liable to social security contributions for the three years before we measure annual earnings. Conditioning on stable employment for a period this long should exclude workers with serious health limitations. Unhealthy workers might sooner or later be forced to register as disabled and interrupt their employment spell. Moreover, only healthy workers are potential compliers who might opt out of SHI once their earnings exceed the CIT. As noted above, health status, in addition to age and gender, is an important determinant for insurance premiums when workers close a health insurance contract with a private insurance company. We furthermore focus on workers between age 25 and 45 in the years 2003 to 2006 because the majority of workers opt out of SHI within this age span. We limit the analyses to men because for women, we cannot disentangle maternity benefits from sickness benefits.

We are interested in workers who have not yet taken the opportunity to opt out of SHI. Consequently, we condition our analyses on workers who were not privately insured in the three preceding years. Then, in base year $t \in [2003, 2006]$, some of these workers' earnings exceed the CIT, and they can opt out of SHI. We measure the type of health insurance in year $t + 2 \in [2005, 2008]$, i.e., two years after we measure workers' earnings relative to the CIT. Therefore, we account for the time it might take workers to decide on PHI and to complete the administrative process to change their health insurance type.

We are able to observe all workers' outcomes for up to nine years. The register data allow us to measure both health effects and employment effects. Regarding employment outcomes, we want to know whether the type of health insurance affects the cumulative days workers are employed and subject to social security contributions and the cumulative days they are no longer in the social security registers. The latter indicate periods in which workers left the labor force, became self-employed or entered civil service. If employees plan to change to self-employment or civil service in the future, they might be more likely to opt into PHI while still employed. Exploring the "nonregistered" outcome, we can investigate whether such anticipation is relevant in our setting. Moreover, the data contain information on workers' job position, i.e., if workers are unskilled,

skilled, specialists, or experts. Another outcome is therefore the probability that workers have the job position of a specialist or expert after five and nine years.

Regarding health outcomes, we can identify whether workers end or interrupt their employment spell due to sickness lasting several weeks or due to death. The reason is that employers have to report to the social security authorities if workers interrupt employment and no longer receive a salary. There are different keys to describe why workers no longer receive a salary. We code an employment termination due to death if employers report key 49 (deregistration due to death). We code an employment interruption due to sickness if employers report that an employment spell ended due to key 51. This key most commonly implies that workers receive sickness benefits or maternity benefits (relevant to women only). Note, however, that this allows us to identify only those sickness spells with a minimum duration of 10 weeks. The employer must not report shorter sickness periods.⁴ Thus, the interruptions we observe imply severe health problems, which are more likely to affect future employment outcomes than sickness periods of only a few days. Moreover, observing outcomes for employed workers, but not for workers who have already left the labor force implies that we probably observe only a few mortality outcomes, because it is likely for very sick people to drop out of the labor force when they face death.

Control variables are measured in January of base year t . Table 1 reports some sample statistics.

⁴ If workers report sick to the employer for several weeks, usually, the employer must continue salary payments for the first six weeks of the sickness. Starting in week seven, the employer stops paying the salary, and health insurance disburses sickness benefits. Employers report an employment interruption due to sickness benefits only if sickness benefits are paid for a full calendar month and the employer therefore must not pay the salary for a full calendar month.

Table 1: Mean sample statistics for workers in private health insurance (PHI) and public statutory health insurance (SHI) in base year $t \in [2003,2006]$

	PHI	SHI	difference	p-value
PHI	1.00	0.00	1.00	0.00
Age	34.48	37.54	-3.06	0.00
Age squared	1212.36	1433.61	-221.25	0.00
Foreign	0.03	0.06	-0.03	0.00
Part-time	0.01	0.01	0.00	0.48
Job level: unknown	0.00	0.01	0.00	0.00
Job level: unskilled	0.00	0.01	0.00	0.00
Job level: skilled	0.52	0.67	-0.16	0.00
Job level: specialist	0.21	0.16	0.05	0.00
Job level: expert	0.27	0.15	0.12	0.00
Without vocational training	0.01	0.05	-0.04	0.00
In-company voc. training/traineeship/external (on-school) voc. training	0.51	0.69	-0.18	0.00
Technical school (voc. training)	0.02	0.01	0.01	0.00
Technical school (advanced voc. training)	0.13	0.07	0.06	0.00
University of applied sciences (FH)	0.11	0.07	0.04	0.00
University	0.14	0.07	0.08	0.00
Vocational training info missing	0.07	0.04	0.03	0.00
Farmers (agriculture, horticulture, forestry), animal breeders, fishermen	0.00	0.00	0.00	0.01
Miners, mineral quarries	0.00	0.00	0.00	0.00
Stone preparers, building material makers	0.00	0.00	0.00	0.18
Ceramics workers, glass makers	0.00	0.00	0.00	0.02
Chemical workers, plastics processors	0.01	0.03	-0.03	0.00
Paper makers, printers	0.01	0.01	-0.01	0.00
Wood preparers, wood product makers and related occupations	0.00	0.00	0.00	0.01
Metal producers, metal molders, metal workers	0.01	0.05	-0.04	0.00
Locksmiths, mechanics and related occupations	0.04	0.13	-0.09	0.00
Electricians	0.02	0.05	-0.03	0.00
Assemblers and metal workers (no further specification)	0.01	0.04	-0.03	0.00
Textile makers, processors and finishers	0.00	0.00	0.00	0.19
Leather makers, leather and fell processors	0.00	0.00	0.00	0.07
Occupation in food production and processing	0.00	0.01	0.00	0.02
Building occupations	0.01	0.01	0.00	0.00
Building finishers, room equippers, upholsterers	0.00	0.00	0.00	0.00
Carpenter, model maker	0.00	0.00	0.00	0.00
Painters, lacquerers and related occupations	0.00	0.01	-0.01	0.00
Goods examiners, dispatchers	0.01	0.01	-0.01	0.00
Assistants (no further specification)	0.00	0.01	0.00	0.00
Machinists and related occupations	0.00	0.02	-0.02	0.00
Engineers, chemists, physicists, mathematicians	0.11	0.06	0.06	0.00
Technicians, technical specialists	0.14	0.14	0.00	0.11
Wholesale and retail traders	0.09	0.04	0.04	0.00
Service agents and related occupations	0.15	0.07	0.08	0.00
Transport and communication occupations	0.02	0.04	-0.02	0.00
Management, administration, and office occupations	0.30	0.19	0.11	0.00
Safety, security, and legal occupations	0.01	0.01	-0.01	0.00
Journalists, interpreters, librarians, artists	0.01	0.01	0.00	0.00

	PHI	SHI	difference	p-value
Health occupations	0.00	0.01	-0.01	0.00
Social and educational occupations, occupations in humanities or science (no further specification)	0.04	0.03	0.00	0.00
Other service occupations	0.00	0.01	0.00	0.00
Workforce not further specified	0.00	0.00	0.00	0.76
Disabled, in rehabilitation	0.00	0.00	0.00	0.61
Occupation missing	0.00	0.00	0.00	0.77
Cumulative days receiving welfare benefits in base year t	0.00	0.03	-0.03	0.08
Number of welfare benefit spells in base year t	0.00	0.00	0.00	0.08
Aggregate earnings in three years prior to base year t	148508.44	146358.03	2150.41	0.00
Cumulative tenure with interruption in three years prior to base year t	927.55	988.34	-60.80	0.00
Cumulative tenure without interruption in three years prior to base year t	923.08	985.50	-62.43	0.00
Number of recalls in three years prior to base year t	0.01	0.01	0.00	0.00
Average number of establishments in three years prior to base year t	1.35	1.21	0.14	0.00
Average daily wage in three years prior to base year t	117.10	117.88	-0.78	0.00
State missing	0.00	0.00	0.00	0.88
State Schleswig-Holstein	0.02	0.02	0.00	0.00
State Hamburg	0.03	0.03	0.00	0.01
State Niedersachsen	0.07	0.09	-0.02	0.00
State Bremen	0.01	0.02	-0.01	0.00
State Nordrhein-Westfalen	0.22	0.24	-0.02	0.00
State Hessen	0.10	0.09	0.00	0.35
State Rheinland-Pfalz	0.05	0.05	0.00	0.04
State Baden-Württemberg	0.19	0.20	-0.02	0.00
State Bayern	0.18	0.17	0.01	0.00
State Saarland	0.01	0.02	-0.01	0.00
State Berlin	0.04	0.03	0.02	0.00
State Brandenburg	0.01	0.01	0.01	0.00
State Mecklenburg-Vorpommern	0.01	0.01	0.00	0.00
State Sachsen	0.04	0.02	0.02	0.00
State Sachsen-Anhalt	0.01	0.01	0.01	0.00
State Thüringen	0.01	0.01	0.01	0.00
Base year t=2003	0.41	0.26	0.15	0.00
Base year t=2004	0.24	0.25	-0.02	0.00
Base year t=2005	0.23	0.24	-0.02	0.00
Base year t=2006	0.12	0.24	-0.12	0.00
N	28068	1268945		

Source: BeH V10.02.01. Own calculations.

5 Empirical approach

5.1 Identification strategy

The main challenge when analyzing the causal effects of private health insurance on workers' outcomes is that specific types of workers select into private health insurance. Privately insured employees have higher earnings by design, which again correlate with better health and better future

labor market outcomes (e.g., Zagorsky and Smith 2020). However, we do not observe data on individuals' work motivation or health status or information such as health awareness, eating habits, or drug consumption. To avoid omitted variable bias, we therefore estimate the effect of PHI using a fuzzy regression discontinuity design (fuzzy RDD), assuming that characteristics are similar for individuals close around the cutoff point (Hahn et al. 2001; Imbens and Lemieux 2008).

The possibility of opting out of SHI and buying into PHI is a discontinuous function of a worker's earnings. If his regular earnings exceed the CIT, he has the ability to opt out of SHI and buy into PHI. If his regular earnings are below the CIT, he must use SHI. Unlike in a sharp RDD setting, the cutoff does not deterministically define whether workers have PHI. On the one hand, not all individuals who cross the CIT in year t opt out of SHI at year $t + 2$ (never-takers). On the other hand, some individuals' earnings might still be below the CIT in year t , but they have opted into PHI at year $t + 2$ nevertheless (always-takers).

In our empirical approach, first, we compare the probability of having PHI in year $t + 2$ for workers either slightly below or slightly above the CIT in year t . Second, we compare the long-term outcomes at $t + 7$ and $t + 11$, i.e., five and nine years after we observe the health insurance status of workers either slightly below or slightly above the CIT in year t . Implementing this, in an initial step, we estimate the following first-stage equation:

$$PHI_{it+2} = \alpha_0 + \alpha_1 I(\text{earnings}_{it} \geq CIT_t) + \alpha_2 I(\text{earnings}_{it} \geq CIT_t) * \text{earnings}_{it} + \alpha_3 \text{earnings}_{it} [+ \alpha_4 X_{it}] + \varepsilon_{it} = \widehat{PHI}_{it+2} + \varepsilon_{it}. \quad (1)$$

PHI_{it+2} is the treatment indicator, which takes the value 1 for individual i who buys into PHI in year $t + 2$. earnings_{it} comprises a worker's annual earnings from employed work in year t . X_{it} is a vector of individual characteristics—such as age, vocational degree, occupation, and employment history in the previous three years—and regional controls for the 16 states. We include these controls to increase the precision of the estimates.

For the reduced form equation, we estimate

$$Y_{it+2+9} = \beta_0 + \beta_1 I(\text{earnings}_{it} \geq CIT_t) + \beta_2 I(\text{earnings}_{it} \geq CIT_t) * \text{earnings}_{it} + \beta_3 \text{earnings}_{it} [+ \beta_4 X_{it}] + \sigma_{it} = \widehat{Y}_{it+2+9} + \sigma_{it} \quad (2)$$

With Y_{it+2+9} as individual i 's health or employment outcome (such as cumulative employment and earnings). β_1 identifies the discrete change in subsequent health and labor market outcomes for workers earning above the CIT, controlling for their earnings and other observable characteristics.

To obtain our fuzzy RDD estimates, we apply two-stage least squares (2SLS) estimation. Thus, for the second stage, we estimate

$$Y_{it+2+9} = \gamma_0 + \gamma_1 \widehat{PHI}_{it+2} + \gamma_2 \text{earnings}_{it} + \gamma_3 X_{it} + v_{it}. \quad (3)$$

γ_1 identifies the local average treatment effect (LATE) for compliers. Compliers are workers whose regular earnings exceed the CIT in year t , who have not had PHI in the preceding three years, and who in year $t + 2$ have the opportunity to opt out of SHI.

5.2 Assumptions

The validity of this approach hinges on several assumptions (Hahn et al. 2001; Imbens and Lemieux 2008, Lee and Lemieux 2010). First, our setting must meet the monotonicity assumption. This implies that we must exclude the possibility that some workers are more likely to buy PHI once they cross the threshold, while others reject PHI once they cross the threshold. The assumption holds

by design, because workers below the CIT are generally ineligible for PHI. Moreover, the data clearly show that the probability of buying into PHI increases with earnings (see Figure 3).⁵

Second, the exclusion restriction requires that earnings above the cutoff affect outcomes only by increasing the probability of buying into PHI, not directly. This assumption should hold because we chose small bandwidths around the cutoff and therefore look at workers whose annual earnings differ by small amounts. It is unlikely that these small differences influence employment or health outcomes differently.

Third, individuals must be unable to precisely control earnings around the threshold (Lee and Lemieux 2010). On the one hand, workers with a strong preference for PHI might try to increase their earnings to exceed the CIT. However, employed workers usually have limited opportunities to influence their regular earnings. Even if workers qualify for a one-time bonus, social insurance will not take into account this type of irregular income. On the other hand, workers with families are more likely to continue to use SHI (Bünnings and Tauchmann, 2015). The reason is that without any additional costs, SHI, unlike PHI, uniquely covers the health insurance for an employee's children and nonemployed spouse. However, SHI is available for all employees, and thus, workers with families have no incentive to manipulate their earnings.

If this assumption holds, both observable and unobservable characteristics should be balanced around the threshold. Table 2 presents the observable characteristics of workers just above and below the threshold. The differences in characteristics are statistically significant in most cases, but often, the economic importance is negligible. Additionally, Figure 1 displays the distribution around the cutoff of the selected observable characteristics age, foreign origin, expert job status, secondary education with a vocational degree, earnings over the three years before t , and tenure in days over the three years before t . Overall, there are no statistically significant jumps at the cutoff. However, Figure 1 c) and d), which capture workers' qualifications, seem somewhat discontinuous. To rule out any unnecessary bias, we will condition our main analyses on observable characteristics, in particular for measures of qualifications.

⁵ In Figure 3, some observations below the threshold have PHI. The reason is that we measure the running variable in year t , while we measure PHI in year $t+2$, i.e., two years later. Thus, there are workers whose earnings are below the threshold in year t but whose earnings have crossed the threshold in year $t+2$, making them eligible for PHI in year $t+2$.

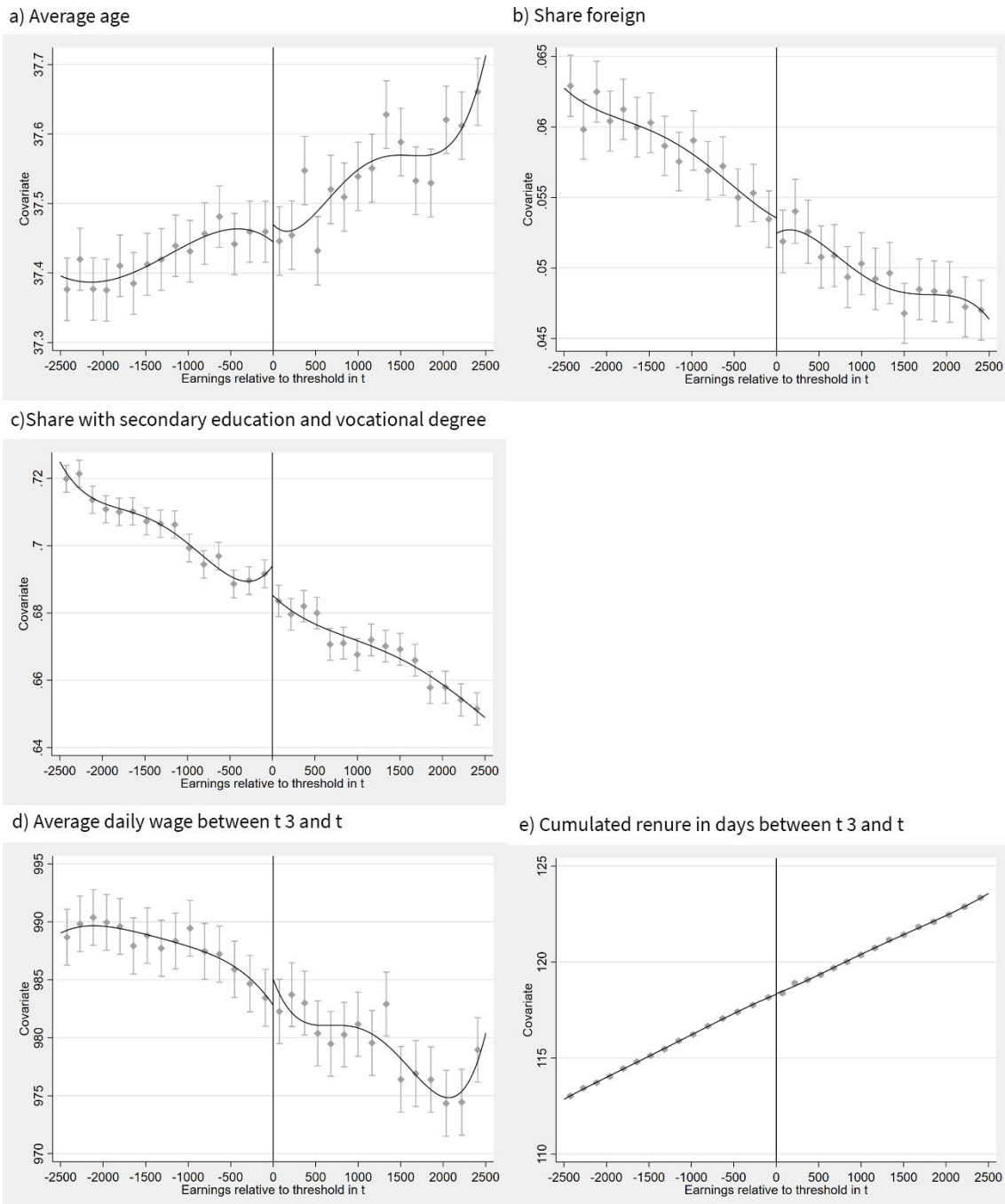
Table 2: Mean sample statistics for workers above and below the compulsory insurance threshold

	above CIT	below CIT	difference	p-value
PHI	0.03	0.01	0.02	0.00
Age	37.54	37.42	0.12	0.00
Age squared	1433.38	1425.22	8.15	0.00
Foreign	0.05	0.06	-0.01	0.00
Part-time	0.01	0.01	0.00	0.00
Job level: unknown	0.01	0.01	0.00	0.00
Job level: unskilled	0.01	0.01	0.00	0.00
Job level: skilled	0.64	0.70	-0.06	0.00
Job level: specialist	0.18	0.15	0.03	0.00
Job level: expert	0.17	0.14	0.03	0.00
Without vocational training	0.04	0.06	-0.01	0.00
In-company voc. training/traineeship/external (on-school) voc. training	0.67	0.70	-0.04	0.00
Technical school (voc. training)	0.01	0.01	0.00	0.00
Technical school (advanced voc. training)	0.08	0.07	0.01	0.00
University of applied sciences (FH)	0.08	0.06	0.02	0.00
University	0.08	0.06	0.02	0.00
Vocational training info missing	0.05	0.04	0.00	0.00
Farmers (agriculture, horticulture, forestry), animal breeders, fishermen	0.00	0.00	0.00	0.00
Miners, mineral quarries	0.00	0.00	0.00	0.00
Stone preparers, building material makers	0.00	0.00	0.00	0.00
Ceramics workers, glass makers	0.00	0.00	0.00	0.00
Chemical workers, plastics processors	0.03	0.04	-0.01	0.00
Paper makers, printers	0.01	0.01	0.00	0.00
Wood preparers, wood product makers and related occupations	0.00	0.00	0.00	0.00
Metal producers, metal molders, metal workers	0.04	0.05	-0.01	0.00
Locksmiths, mechanics and related occupations	0.12	0.14	-0.02	0.00
Electricians	0.05	0.05	0.00	0.00
Assemblers and metal workers (no further specification)	0.03	0.04	-0.01	0.00
Textile makers, processors and finishers	0.00	0.00	0.00	0.01
Leather makers, leather and fell processors	0.00	0.00	0.00	0.56
Occupation in food production and processing	0.01	0.01	0.00	0.00
Building occupations	0.01	0.01	0.00	0.00
Building finishers, room equippers, upholsterers	0.00	0.00	0.00	0.00
Carpenter, model maker	0.00	0.00	0.00	0.00
Painters, lacquerers and related occupations	0.01	0.01	0.00	0.00
Goods examiners, dispatchers	0.01	0.02	0.00	0.00
Assistants (no further specification)	0.00	0.01	0.00	0.00
Machinists and related occupations	0.02	0.02	0.00	0.00
Engineers, chemists, physicists, mathematicians	0.07	0.05	0.02	0.00
Technicians, technical specialists	0.15	0.13	0.03	0.00
Wholesale and retail traders	0.05	0.04	0.01	0.00
Service agents and related occupations	0.08	0.07	0.01	0.00
Transport and communication occupations	0.03	0.04	-0.01	0.00
Management, administration, and office occupations	0.20	0.18	0.03	0.00
Safety, security, and legal occupations	0.01	0.01	0.00	0.00
Journalists, interpreters, librarians, artists	0.01	0.01	0.00	0.00

	above CIT	below CIT	difference	p-value
Health occupations	0.01	0.01	0.00	0.00
Social and educational occupations, occupations in humanities or science (no further specification)	0.03	0.04	0.00	0.05
Other service occupations	0.00	0.01	0.00	0.00
Workforce not further specified	0.00	0.00	0.00	0.81
Disabled, in rehabilitation	0.00	0.00	0.00	0.18
Occupation missing	0.00	0.00	0.00	0.81
Cumulative days receiving welfare benefits in base year t	0.02	0.03	-0.01	0.01
Number of welfare benefit spells in base year t	0.00	0.00	0.00	0.08
Aggregate earnings in three years prior to base year t	150668.84	143031.56	7637.29	0.00
Cumulative tenure with interruption in three years prior to base year t	982.36	990.72	-8.37	0.00
Cumulative tenure without interruption in three years prior to base year t	979.34	987.96	-8.61	0.00
Number of recalls in three years prior to base year t	0.01	0.01	0.00	0.00
Average number of establishments in three years prior to base year t	1.22	1.20	0.02	0.00
Average daily wage in three years prior to base year t	120.78	115.55	5.23	0.00
State missing	0.00	0.00	0.00	0.26
State Schleswig-Holstein	0.02	0.02	0.00	0.00
State Hamburg	0.04	0.03	0.00	0.00
State Niedersachsen	0.09	0.09	0.00	0.00
State Bremen	0.01	0.02	0.00	0.00
State Nordrhein-Westfalen	0.24	0.24	0.00	0.00
State Hessen	0.10	0.09	0.00	0.00
State Rheinland-Pfalz	0.05	0.05	0.00	0.00
State Baden-Württemberg	0.20	0.20	0.00	0.00
State Bayern	0.17	0.17	0.00	0.97
State Saarland	0.02	0.02	0.00	0.00
State Berlin	0.03	0.03	0.00	0.00
State Brandenburg	0.01	0.01	0.00	0.85
State Mecklenburg-Vorpommern	0.01	0.01	0.00	0.14
State Sachsen	0.02	0.02	0.00	0.24
State Sachsen-Anhalt	0.01	0.01	0.00	0.54
State Thüringen	0.01	0.01	0.00	0.83
Base year t=2003	0.26	0.26	-0.01	0.00
Base year t=2004	0.25	0.25	0.00	0.05
Base year t=2005	0.24	0.24	0.00	0.28
Base year t=2006	0.24	0.24	0.01	0.00
N	572826	724187		

Source: BeH V10.02.01. Own calculations.

Figure 1: Regression discontinuity plots of monthly earnings for predetermined covariates



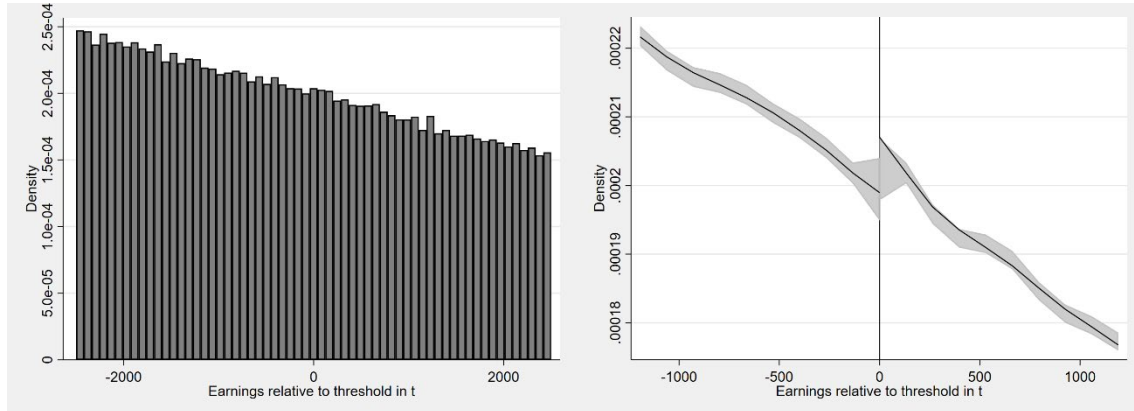
Source: BeH V10.02.01. Own calculations.

Notes: The figures show the distribution of exemplary covariates around the compulsory insurance threshold. The solid lines represent fourth-order global polynomial fitted values following Cattaneo et al. (2019).

Following Cattaneo et al. (2018), we further test whether there is any discontinuity in the density of the forcing variable (earnings) around the threshold based on a local polynomial density estimator. Figure 2 shows that there is some bunching around the threshold, indicating that the number of observations just above the threshold is higher than that just below. However, with a t-value of 0.913 and a p-value of 0.3612, the test does not reject the null hypothesis that the density of

earnings is uniformly distributed around the cutoff. This suggests that there is no statistical evidence of workers' manipulation of earnings at the threshold.

Figure 2: Density test of the forcing variable around the cutoff



Notes: The left graph displays a histogram of earnings around the cutoff. The right figure displays the density test suggested by Cattaneo et al. (2018) using a local-polynomial density estimator.

Source: BeH V10.02.01. Own calculations.

6 Causal estimates of private health insurance on health and employment

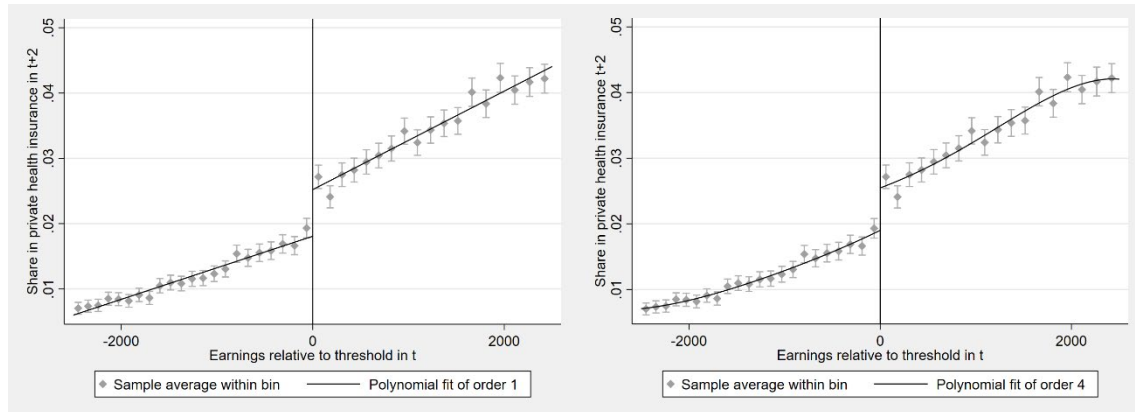
In the following, we present the first stage and reduced form results and estimate the 2SLS coefficients. For a comprehensive overview, the following tables are structured such that we present in line (1) the coefficients from the OLS regressions for reference and in line (2) the coefficients of interest from the 2SLS regressions. Line (3) and line (4) present the results from the reduced form and first stage regressions, respectively.

6.1 First stage results

To apply the fuzzy RDD, we need a valid first stage, i.e., a clear jump in the probability of buying into PHI at the earnings cutoff. We recode the running variable earnings relative to the CIT with the value 0 directly at the cutoff. Figure 3 plots the shares of privately insured workers by earnings around the cutoff using quantile-spaced bins (Calonico et al. 2014). The dots depict the mean values of both variables within the bins. The solid lines represent first- and fourth-order global polynomial fitted values. As we already know, 96 percent of all employees have SHI, and only 4 percent have PHI. Given this number, the jump at the cutoff is quite pronounced. Directly below the cutoff, approximately 1.9 percent of all employees have PHI. These are individuals whose earnings did not yet exceed the CIT in base year $t \in [2003, 2006]$ but who had opted out of SHI by $t + 2 \in [2005, 2008]$. The share of workers with PHI directly above the cutoff is approximately 2.6 and thus approximately 40 percent higher. Additionally, line 4 of Table 3 presents the first stage estimates of an unconditional linear regression and confirms this result: workers above the threshold have a

0.7-percentage-point higher probability of being privately insured. Moreover, the Kleibergen-Paap test statistic is above the conventional threshold of 10. Overall, this demonstrates that the share of PHI workers is discontinuous around the cutoff and that we have a valid first stage with sufficient explanatory power.

Figure 3: First stage effects: bin scatter plots of private health insurance (PHI) rates below and above the compulsory insurance threshold



Notes: The figures show discontinuities in the share of PHI around the compulsory insurance threshold. The solid lines represent first- and fourth-order global polynomial fitted values following Cattaneo et al. (2019).

Source: BeH V10.02.01. Own calculations.

Table 3: OLS and 2SLS estimates of private health insurance (PHI) on health and labor market outcomes

	Sickness	Mortality	Employment	Non-registration	Expert level
Over 5 years					
1) OLS	-0.049*** (0.001)	-0.002*** (0.000)	-58.854*** (3.447)	61.685*** (2.981)	0.090*** (0.003)
2) 2SLS	-0.151 (0.119)	-0.024 (0.029)	162.082 (176.200)	150.715 (129.326)	0.356** (0.157)
3) Reduced form	-0.002* (0.001)	-0.000 (0.00)	2.096 (1.436)	-0.112 (1.063)	0.004*** (0.001)
Over 9 years					
1) OLS	-0.078*** (0.002)	-0.003*** (0.00)	-145.044*** (6.280)	127.524*** (5.616)	0.129*** (0.003)
2) 2SLS	-0.155 (0.153)	0.006 (0.041)	-173.929 (317.168)	384.917 (246.340)	0.183 (0.167)
3) Reduced form	-0.002* (0.001)	0.000 (0.00)	2.403 (2.587)	0.090 (2.017)	0.002 (0.001)
4) First stage: α_1	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
α_2	0.000*** (0)	0.00*** (0)	0.000*** (0)	0.000*** (0)	0.000*** (0)
Kleibergen-Paap	172.428	172.428	172.428	172.428	172.428
N	1297013	1297013	1297013	1297013	1297013

Notes: The outcome *sickness* (*mortality*) is the probability that the employer deregisters the worker from employment due to a sickness of at least ten weeks (or due to death). The outcome variable *employment* is the cumulative days in fulltime employment, and the variable *non-registration* is the cumulative days that the worker is neither employed nor unemployed over the respective period. The outcome *expert level* is a dummy variable that is 1 if the worker has reached the highest job level status five or nine years after we measure the insurance status. The OLS regressions are based on $Y_{it+11} = \delta_0 + \delta_1 PHI_{it+z} + \pi_{it}$. The 2SLS regressions are as in equation (3), the reduced form regressions are as in equation (2), and the first stage regressions are as in equation (1), all without X_{it} . Bandwidth: [-2500;2500] euros around cutoff. Significance level: ***p<0.01, ** p<0.05, * p<0.1.

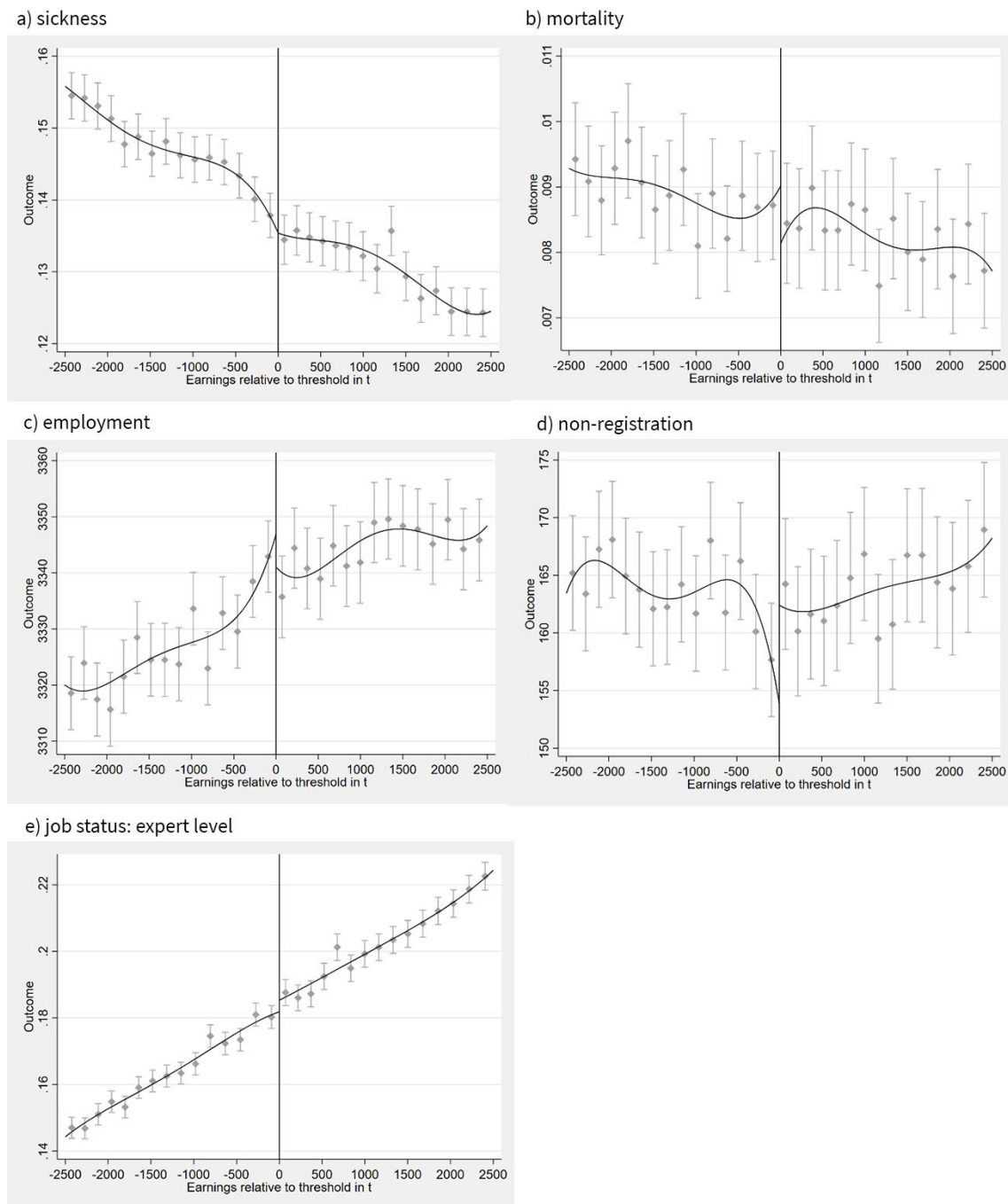
Source: BeH V10.02.01. Own calculations.

6.2 Reduced form results

Figure 4 summarizes the mean outcome values within quantile-spaced bins for workers below and above the contribution threshold. This corresponds to unconditional reduced form estimates. First, the graphs illustrate the general relationship between earnings and each outcome: the probability of being sick long-term decreases with earnings, while the probability of having reached the highest job level, i.e., that of an expert, increases. There is no systematic relation between earnings and the cumulative days workers are not registered in the social security data or the probability of being registered dead.

Second, the five graphs of Figure 4 illustrate that employees on both sides of the threshold are similar in terms of employment stability, time spent nonregistered, or having become an expert. We also do not find any differences in health outcomes on either side of the cutoff. However, running unconditional reduced form regressions as in equation (2), we find that workers above the threshold are approximately 0.2 percentage points less likely to be sick long-term and are 0.4 percentage points more likely to have become experts over the following five years (Table 3). Overall, this indicates that compared to workers with SHI, workers with PHI might profit with respect to both health and career prospects.

Figure 4: Reduced form estimates for the impact of private health insurance (PHI) on ... over nine years



Notes: The figures display potential discontinuities in the outcome variables around the compulsory insurance threshold. The solid lines represent fourth-order global polynomial fitted values following Cattaneo et al. (2019). The outcome *sickness* (*mortality*) is the probability that the employer deregisters the worker from employment due to a sickness of at least ten weeks (or due to death). The outcome variable *employment* contains cumulative days in fulltime employment, and the variable *non-registration* is the cumulative days that the worker is neither employed nor unemployed over the following nine years. The outcome *job status: expert level* is a dummy variable that is 1 if the worker has reached the highest job level status nine years after we measure insurance status.

Source: BeH V10.02.01. Own calculations.

6.3 Two stage least squares results

We now relate the reduced form findings with our first stage results and present the 2SLS coefficients. Table 3 presents raw estimates without any control variables for the outcomes over the five

(nine) years after we measure workers' health insurance status. The results from the OLS regressions suggest that workers with PHI have an approximately five (eight) percentage point lower probability of becoming sick long-term and a 0.2 (0.3) percentage point lower probability of mortality. Over five (nine) years, they are approximately nine (thirteen) percentage points more likely to have reached an expert job level. While they are employed approximately 60 (145) days fewer, they are nonregistered in the social security data approximately 62 (127) days more. The latter result might indicate that some workers select into PHI because they anticipate self-employment or are seeking to become a civil servant. Remember that we observe neither of these latter two employment types in our data, only that workers dropped out of the registers.

However, conditional on the assumption that workers with anticipations are equally distributed around the cutoff, we can control for this kind of selection with our 2SLS approach. We find no causal impact of PHI on health outcomes, employment, or nonregistered days. We do find, however, that privately insured workers are 35 percentage points more likely to have become experts after five years. That effect disappears after nine years.

To improve the precision of our estimates and to control for remaining differences in observable characteristics between workers below and above the threshold, we add a number of control variables. Table 4 shows that adding controls hardly affects the first stage. However, both the coefficients of the OLS and of the reduced form regressions decrease in most cases. Consequently, we no longer find any statistically significant differences between workers above and below the CIT for any outcomes in the reduced form estimations. Thus, all 2SLS coefficients are too imprecisely estimated to allow for conclusions regarding causal relationships between PHI and health and employment outcomes.

Table 4: OLS and 2SLS estimates with control variables of private health insurance (PHI) on health and labor market outcomes

	Sickness	Mortality	Employment	Non-registration	Expert level
Over 5 years					
1) OLS	-0.021*** (0.001)	0.000 (0.00)	-55.852*** (3.402)	47.689*** (2.999)	-0.003 (0.002)
2) 2SLS	-0.142 (0.120)	-0.025 (0.03)	148.180 (170.824)	138.490 (130.325)	0.095 (0.100)
3) Reduced form	-0.001 (0.001)	-0.000 (0.00)	1.999 (1.378)	-0.285 (1.058)	0.001 (0.001)
Over 9 years					
1) OLS	-0.029*** (0.002)	-0.000*** (0.00)	-127.538*** (6.250)	104.662*** (5.646)	0.0390*** (0.003)
2) 2SLS	-0.143 (0.153)	0.005 (0.042)	-174.980 (312.117)	350.147 (248.122)	0.005 (0.148)
3) Reduced form	-0.002 (0.001)	0.000 (0.00)	2.119 (2.517)	-0.228 (2.007)	0.000 (0.001)
4) First stage: $\alpha 1$	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
$\alpha 2$	0.0000*** (0)	0.0000*** (0)	0.0000*** (0)	0.0000*** (0)	0.0000*** (0)
Kleibergen-Paap	172.428	172.428	172.428	172.428	172.428
N	1297013	1297013	1297013	1297013	1297013

Notes: Outcome variables as in Table 3. The OLS regressions are based on $Y_{it+11} = \delta_0 + \delta_1 PHI_{it+2} + \pi_{it}$. The 2SLS regressions are as in equation (3), and the reduced form regressions are as in equation (2). The first stage regressions are as in equation (1). Controls comprise the variables presented in Table 2. Bandwidth: [-2500;2500] euros around the cutoff.

Significance level: ***p<0.01, ** p<0.05, * p<0.1.

Source: BeH V10.02.01. Own calculations.

6.4 Sensitivity Checks

To check if the results above hold when we manipulate the data, we conduct a number of sensitivity checks for the long-term outcomes measured over a period of nine years.

First, we check the sensitivity of the estimates to the choice of bandwidth. We remove observations at the end points of our sample and focus on workers whose earnings vary by 1,250 and 500 euros around the CIT separately. The first stage coefficients shrink in both cases, but are both still valid and highly statistically significant. As above, the reduced form and 2SLS estimates are all statistically insignificant.

Second, we check the sensitivity of our estimates to observations near the cutoff by applying a “donut hole” approach (Cattaneo et al. 2019). In the case that workers manipulated their earnings to become eligible for PHI, potential effects are most likely driven by this group of workers. Assuming that these observations are located close to the threshold, we therefore exclude observations located 50 and 150 euros around the CIT (see panel 3) and 4) of Table 5, respectively). Overall, our findings are robust to these checks: we do not find any differences between workers on either side of the threshold in our reduced form estimates.

In sum, these preliminary findings suggest that even though PHI offers more comfortable health care conditions, such as shorter waiting times or more intensive treatment by specialists, it does not affect employed workers’ overall health status, mortality or employment outcomes over the following nine years.

Table 5: OLS and 2SLS estimates with control variables of private health insurance (PHI) and labor market outcomes over 9 years

	Sickness	Mortality	Employment	Non-registration	Expert level
Bandwidth 1250 euros					
1) OLS	-0.031*** (0.002)	0.0003 (0.001)	-133.985*** (8.308)	111.842*** (7.55)	0.0417*** (0.004)
2) 2SLS	-0.279 (0.275)	-0.003 (0.075)	-785.699 (563.394)	497.583 (445.56)	0.260 (0.270)
3) Reduced form	-0.002 (0.002)	-0.0001 (0)	-3.305 (3.454)	2.009 (2.746)	0.002 (0.002)
4) First stage: α_1	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Kleibergen-Paap	43.679	43.679	43.679	43.679	43.679
N	649554	649554	649554	649554	649554
Bandwidth 500 euros					
1) OLS	-0.0247*** (0.004)	0.0003 (0.001)	-154.239*** (12.770)	129.249*** (11.657)	0.0414*** (0.006)
2) 2SLS	-0.17356 (0.438)	-0.081 (0.121)	-670.056 (899.685)	905.118 (726.596)	0.413 (0.440)
3) Reduced form	-0.0004 (0.003)	-0.0005 (0.001)	-5.860 (5.443)	6.773 (4.329)	0.002 (0.003)
4) First stage: α_1	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Kleibergen-Paap	13.721	13.721	13.721	13.721	13.721
N	260941	260941	260941	260941	260941
Bandwidth 2500 euros with donut hole bandwidth 50 euros					
1) OLS	-0.029*** (0.002)	0.000 (0.001)	-125.331*** (6.266)	102.246*** (5.649)	0.039*** (0.003)
2) 2SLS	-0.125 (0.160)	0.0004 (0.044)	-194.597 (326.426)	388.460 (259.863)	0.010 (0.154)
3) Reduced form	-0.001 (0.001)	0.0001 (0)	1.670 (2.630)	0.265 (2.101)	0.0001 (0.001)
4) First stage: α_1	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Kleibergen-Paap	163.282	163.282	163.282	163.282	163.282
N	1270947	1270947	1270947	1270947	1270947
Bandwidth 2500 euros with donut hole bandwidth 150 euros					
1) OLS	-0.030*** (0.002)	0.000 (0.001)	-124.492*** (6.354)	101.955*** (5.738)	0.039*** (0.003)
2) 2SLS	-0.141 (0.167)	0.019 (0.046)	-135.287 (340.741)	340.215 (270.87)	-0.044 (0.16)
3) Reduced form	-0.001 (0.001)	0.0002 (0)	3.914 (2.875)	-1.149 (2.297)	-0.0003 (0.001)
4) First stage: α_1	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Kleibergen-Paap	158.117	158.117	158.117	158.117	158.117
N	1218204	1218204	1218204	1218204	1218204

Notes: Outcome variables as in Table 3. The OLS regressions are based on $Y_{it+11} = \delta_0 + \delta_1 PHI_{it+2} + \pi_{it}$. The 2SLS regressions are as in equation (3), and the reduced form regressions are as in equation (2). The first stage regressions are as in equation (1). Controls comprise the variables presented in Table 2. Significance level: ***p<0.01, ** p<0.05, * p<0.1.

Source: BeH V10.02.01. Own calculations.

7 Summary and conclusion

In this study, we evaluate whether the type of health insurance affects employees' health and labor market outcomes over a period of nine years. Compared to public health funds, private insurance companies more generously remunerate health care providers for the same services and remunerate a larger set of health care services (Stauder and Kossow 2017). Consequently, privately insured patients are more likely to be offered a doctor's appointment, and they do not have to wait as long for it. To identify causal effects, we exploit the earnings threshold that workers need to cross to become eligible for PHI as an instrumental variable for PHI membership. We exploit extremely rich and precise register data that comprise all German employees.

We find no evidence for any impact of PHI on employees' long-term health status, mortality, employment duration, or job position. Thus, PHI seems to provide more amenities for insurance users (Polyakova, 2016) but does not affect workers' health status.

Our results based on objective health measures thus contrast some of the findings by Alexander and Schnell (2019), Hulleger and Klein (2010), and Stauder and Kossow (2017), who find positive effects of PHI on self-reported health. However, since we do not find any long-term improvements in workers' health due to PHI, our results support findings from the US that indicate that higher reimbursement generosity in PHI is accompanied by the overtreatment of privately insured people (Alexander and Currie 2017, Gruber et al. 1999, Clemens and Gottlieb 2014).

Our results importantly contribute to the recurring German discussion about integrating privately insured workers into the public statutory health care system. Given that privately insured workers are a selection of positive health risks, on the one hand, this would cause additional members with positive health risks to join the public system. Moreover, this would lower the per capita health care expenditure (given the public reimbursement conditions) and the overall health care expenditure. On the other hand, our findings show that such an adjustment would not come with deteriorating health or labor market risks for the privately insured. However, physicians' investment in technical equipment—such as MRI provision—seem positively correlated with higher payment rates (Clemens and Gottlieb 2014). Abolishing the private health care system—and the associated higher payment rates—might therefore imply that medical equipment, which is also available to the publicly insured, will become outdated over time.

Our study is subject to a number of restrictions. First, the external validity of our results is limited to workers with relatively high earnings. This group of workers is already outstandingly healthy, and the type of health insurance might therefore matter less. Moreover, due to the methodological setup, the results apply only to compliers, i.e., workers who chose PHI because their earnings had just crossed the CIT. It is not possible to assess how relevant this group is among all privately insured workers. Thus, even though the type of health insurance does not matter for the high-income workers analyzed in this paper, it might still matter for self-employed workers or civil servants with lower earnings and an overall worse health condition. Second, our outcomes of interest measure only severe illnesses that imply leaves from work that last several months. We cannot detect the impact of insurance type on less severe health problems. Third, we cannot observe whether compliers' behavior responds to changes in health insurance. Changes in health behavior might occur due to copayments and deductibles (more prevention, less risky behavior) or moral

hazard (more risky behavior). Finally, the data do not contain any information on private supplementary insurance, e.g., dental insurance or inpatient hospitalization, among publicly insured employees. These unobserved supplements might bias the health and labor outcomes of the workers with SHI upward and be one reason why we cannot detect statistically significant differences between the groups.

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