CHAPTER 3

Social Insurance and Health

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Abstract

This chapter reviews the existing empirical evidence on how social insurance affects health. Social insurance encompasses programs primarily designed to insure against health risks, such as health insurance, sick leave insurance, accident insurance, long-term care insurance, and disability insurance as well as other programs, such as unemployment insurance, pension insurance, and country-specific social insurance programs. These insurance systems exist in almost all developed countries around the world. This chapter discusses the state-of-the-art evidence on each of these social insurance systems, briefly reviews the empirical methods for identifying causal effects, and examines possible limitations to these methods. The findings reveal robust and rich evidence on first-stage behavioral responses (“moral hazard”) to changes in insurance coverage. Surprisingly, evidence on how changes in coverage impact beneficiaries’ health is scant and inconclusive. This lack of identified causal health effects is directly related to limitations on how human health is typically measured, limitations on the empirical approaches, and a paucity of administrative panel data spanning long-time horizons. Future research must be conducted to fill these gaps. Of particular importance is evidence on how these social insurance systems interact and affect human health over the life cycle.

Keywords: Social insurance; health; causal effects; microeconometrics; reduced-form methods; structural methods
3.1. Introduction

This chapter reviews the state-of-the-art empirical research in the field of “Social Insurance and Health.” The chapter will discuss a subset of (subjectively chosen) papers to summarize the empirical evidence. It will also comment on the methods used for identification and highlight unresolved research questions as well as gaps in the application of methods. The focus of the chapter will be on how social insurance systems — primarily those designed to insure health shocks — causally affect beneficiaries’ health.¹

There is no sharp and unambiguous definition of “social insurance.” Loosely speaking, all insurance schemes that are not provided by the private market but “by the government” could be considered social insurance. Most economists would agree that social insurance is in place either when the benefits are directly provided by the government using tax revenues or when beneficiaries receive tax-funded subsidies. Most economists would also agree that heavy state regulation of private insurers alone — for example, through an individual mandate, guaranteed issue, or community-rated premiums — would not be sufficient to label the insurance scheme as social insurance (Baicker & Chandra, 2008).

While tax funding can stem from rather regressive sales or value-added taxes, most European countries charge social contribution rates to fund their social insurance systems. Contribution rates are payroll taxes, charged in percentage points of an individual’s gross salary and paid by the employee, the employer, or both. For most OECD countries, the classic social insurance schemes include (i) health insurance, (ii) short- and long-term sick leave insurance, (iii) disability insurance, (iv) accident insurance, (v) long-term care insurance, (vi) unemployment insurance, (vii) pension insurance, and (viii) other social insurances such as means-tested welfare programs. The structure of this chapter follows this categorization. The institutional details and generosity of these social insurance programs naturally differ across countries, which is why all findings ought to be interpreted in the context of the time period, country, and social insurance studied.

When discussing the impact of specific social insurance programs on health, one research strand that is of relevance for all subchapters asks the question: “How does income affect health?” Many of the social insurance systems discussed below provide monetary insurance benefits (e.g., paid sick leave and disability benefits or unemployment benefits). However, because social insurance often kicks in as a result of a person’s health shock and inability to work, in addition to receiving monetary benefits, individuals

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¹ Chetty and Finkelstein (2013) provide an excellent overview on the theoretical social insurance literature. They focus on adverse selection as the motivation for social insurance and optimal benefit design.
experience a change in health and labor supply status. This complicates the empirical identification of underlying channels and the separation of the various effects. Therefore, studies trying to estimate the direct effect of money on health are important complements to understanding the effect of social insurance on health. These studies have been using lottery winnings, variation in the US Earned Income Credit, or the US Social Security Notch as exogenous identifying variation (Cesarini, Lindqvist, Östling, & Wallace, 2016; Evans & Garthwaite, 2014; Hoynes, Miller, & Simon, 2015; Snyder & Evans, 2006). However, the findings have been inconclusive, probably due to differences in how the Local Average Treatment Effect (LATE) is identified in each study.

After a brief review of empirical methods, the next section briefly discusses methods to empirically measure human health. Then, the evidence on specific social insurance systems is summarized.

3.2. Social insurance and health: the health econometric evidence

3.2.1. A brief review of the empirical methods

Over the last two decades, research in economics has experienced remarkable advancements in the design and application of microeconometric methods. These advancements have spread to all microeconomic subfields, including health economics. Based on the framework of potential outcomes as formalized in Heckman, Lalonde, and Smith (1999), the “credibility revolution in empirical economics” (Angrist & Pischke, 2010) was triggered by researchers who identified “natural experiments” that allowed them to mimic the randomized-controlled lab experiments of natural sciences to draw causal inference from observed behaviors in natural environments.

Many of the early seminal natural experiment papers were based on simple difference-in-difference (DD) designs, where a quasi-experimental setting would naturally form quasi-random treatment and control groups whose outcomes could be observed over time (Card, 1990; Meyer, Viscusi, & Durbin, 1995). Difference-in-Difference-in-Difference (“triple differences”) (DDD) (Gruber, 1994), Regression Discontinuity (RD) (Card, Dobkin, & Maestas, 2008; Hahn, Todd, & Van der Klaauw, 2001), Regression Kink (RK) (Card, Lee, Pei, & Weber, 2015) and the Synthetic Control Group Method (SCGM) (Abadie, Diamond, & Hainmueller, 2010) have been further additions to the toolkit of the applied reduced-form microeconomist. Combining these methods, for example, matching

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2 While matching has been a popular empirical tool in the labor market evaluation literature (Caliendo & Kopeinig, 2008; Heckman, Ichimura, & Todd, 1997; Lechner, Miquel, & Wunsch, 2011), it never became as popular as the reduced-form methods outlined above. In the field of health economics, Lechner (2009) provides evidence of positive well-being and labor market effects of exercising.
with DD (Imbens & Wooldridge, 2009) or SCGM with DD (Bassok, Fitzpatrick, & Loeb, 2014), refines the basic methods to further increase the credibility of the research design.

The last quarter century has also witnessed theoretical and applied microeconometric discussion of Instrumental Variable (IV) methods (Heckman & Vytlacil, 1998; Imbens & Angrist, 1994). However, as the standards for publishing empirical reduced-form papers in top journals have risen substantially, the difficulty of graphically illustrating evidence on the validity of instruments, or applying clear-cut and broadly accepted testing procedures in IV has slowed its use. On the other hand, more and more researchers combine graphical evidence — for example, on discontinuities in an exogenous running variable — with IV estimation. An alternative, extremely credible, application of IV methods is to instrument when clear random assignment is readily available, for example, through lotteries, and when the researcher intends to scale up intent-to-treat (ITT) estimates to full exposure estimates (Finkelstein et al., 2012 provide an excellent example for an application).

The last decade of empirical economic research has also seen an impressive upswing of randomized-controlled field experiments (Banerjee & Duflo, 2009; Björkman & Svensson, 2010; Duflo, Dupas, & Kremer, 2015). Field experiments allow the researcher to design and exert control over the randomization, yet study the diffusion of the treatment and changes in participants’ behavior under “natural” real world conditions. Policymakers have begun to understand the value of such field experiments for designing public policies (Levitt & List, 2009; List & Metcalfe, 2014). Field experiments combine the advantages of natural experiments and lab experiments, but they require high up-front investments and the involvement of many stakeholders.

By contrast, a broad use of laboratory experiments has been an integral part of the empirical toolkit for much longer. While the first lab experiments were conducted in the early 1950s and had their origin in game theory (Smith, 1992), only in the last couple of years have health economists begun to carry out lab experiments more systematically (Brosig-Koch, Hennig-Schmidt, Kairies-Schwarz, & Wiesen, 2017; Hennig-Schmidt, Selten, & Wiesen, 2011). Some of the most innovative papers at the forefront of empirical health economic research replicate and combine natural experiments with lab experiments (Bhargava, Loewenstein, & Sydnor, 2017).

Although substantial advancements have been made in structural estimation, policy evaluation is currently quantitatively dominated by reduced-form research — both within and outside of health economics. Advantages of structural estimation are the close connection between theory and empirics, the ability to explicitly model supply and demand sides of a market, and the possibility of conducting “ex-ante” policy evaluations, and the opportunity to simulate the effects of alternative policies.
and parameters other than the LATE, such as the Average Treatment Effect (ATE) (Keane, 2010). For reduced-form traditionalists, disadvantages of actual applications include a lack of transparency and overly strong (hidden functional form) identification assumptions. Structural papers also require more time for the reader to digest, and the computation can be burdensome. A lack of introductory textbooks — such as Angrist and Pischke (2009) for reduced-form research — additionally hinders the diffusion of structural models into mainstream applied health econometrics. However, several structural papers on the US health insurance market have been recently published by IO health economists in top journals (Handel & Kolstad, 2015; Ho & Lee, 2016). Some of the best and most innovative health economists also combine reduced-form and structural estimation in their work, exploiting the benefits of both approaches (Aron-Dine, Einav, & Finkelstein, 2013; Autor, Duggan, Greenberg, & Lyle, 2016). While these can be interpreted as early signs of a backlash against the “atheoretical” empirical revolution (Keane, 2010), a reintegration of theory and empirical estimation will also depend on the ability of researchers to adapt such methods and educate their graduate students accordingly.

In addition to these basic empirical methods that researchers in other microeconomic fields routinely use, the subfield of “health econometrics” has also emerged. This subfield studies empirical issues that are specific to health economics research, such as how to model distributional properties of health care use and expenditures appropriately (Deb & Trivedi, 2002; Winkelmann, 2012), how to test and correct for reporting biases in self-assessed health measures (Jones, Rice, d’Uva, & Balia, 2013; Lindeboom & van Doorslaer, 2004), how to model spatial dependencies in health spending and outcomes (Eibich & Ziebarth, 2014; Moscone, Knapp, & Tosetti, 2007), how to elicit quality-related health or happiness measures correctly (Wisløff et al., 2014), how to assess the value of a statistical life (Doucouliagos, Stanley, & Giles, 2012), or how to estimate inequality in health (Erreygers & Van Ourti, 2011; Jagger et al., 2009).

3.2.2. Measurement of health

It has been acknowledged that “health” constitutes a multidimensional concept and is not merely the absence of disease. The standard and widely accepted WHO (1948) definition reads, “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” For the health econometrician, the crucial question is how to quantify the three dimensions of physical, mental, and social well-being.

The most widely used health measures in empirical health economics can be divided into five categories: (a) subjective self-reported health measures, (b) “quasi-objective” quality-of-life-related (generic) health measures, (c) health vignettes, (d) noninvasive objective health measures, and
(e) invasive objective health measures (Ziebarth, 2010a). None of these measures are perfect, and each has advantages and disadvantages. More research is needed to identify easy-to-collect, robust, and comprehensive measures of physical, mental, and social health.

3.2.2.1. Subjective self-reported health measures
Subjective health measures are still the dominant form of health measures, especially the five-category self-assessed health (SAH) measure which asks survey respondents: “In general, would you say that your health is excellent, very good, good, fair, or poor?” Other self-reported health measures elicit worries about health, satisfaction with one’s health, and SAH scaled by continuous generic health measures (Frick & Ziebarth, 2013; Jones et al., 2013). One main advantage of these subjective health measures is that they are cheap and easy-to-collect. Another advantage is the comprehensiveness of these indicators — they have been shown to be very good predictors of true health (McGee, Liao, Cao, & Cooper, 1999; Wu et al., 2013).

Subjective health measures have drawbacks that directly impede empirical researchers’ ability to identify changes in health status based on subjective health measures. One drawback is these are coarse measures with an inherent amount of noise (Crossley & Kennedy, 2002). This means that a significant population share has to experience a significant change in health before it will be mapped onto a higher or lower self-reported SAH category.

Another issue is nonclassical measurement error, which is also called “state dependent reporting bias” or “scale of reference bias.” Semantic or cultural differences may lead to systematic differences in response behavior that are unrelated to true health differences (Bago d’Uva, O’Donnell, & van Doorslaer, 2008; Jürges, 2007). While these are challenges for cross-country comparisons, the phenomenon of differential reporting also exists within countries when samples are stratified by education, age, gender, or income. For example, older people tend to judge their health more mildly (Bago d’Uva et al., 2008; Jürges, 2008). Lindeboom and van Doorslaer (2004) named the non-separability of true health differences from index shifts a fundamental identification problem. Index shifts occur when all SAH thresholds are shifted in parallel for certain subpopulations. Cut-point shifts, which shift specific SAH cut-off points, occur if certain subpopulations value a specific health state differently. The standard convention in the literature is to control for age, gender, and education, but this only accounts for some forms of reporting heterogeneity, making it challenging to identify changes in sub-population’s health.

3.2.2.2. Objective health measures
Examples of noninvasive objective health measures are blood pressure, height and weight, grip strength, mortality, and specific diagnoses. Invasive
health measures include mainly blood or saliva samples. Except for when these measures are already included in administrative data, the main drawback of collecting them in surveys is their expensiveness, which typically results in low sample sizes. Another problem is a high and selective rate of survey nonresponse, especially with invasive measures. Finally, the majority of these objective health indicators only measure very narrowly defined physical health aspects without considering quality-of-life aspects.

3.2.2.3. Quality-related life measures and vignettes

A very promising “third way” between cheap, easy-to-collect subjective health measures and expensive, narrowly defined objective measures are health vignettes and quality-of-life-related (or “generic”) health measures. Examples of these measures include the SF12, the EQ5 HUIII, or the 15D. The basic idea behind these indicators is that responses to several health questions can be summarized into continuous quasi-objective health measures via an algorithm. For example, the German Socio-Economic Panel Study (SOEP) elicits the SF12 every other year (Andersen, Mühlbacher, Nübling, Schupp, & Wagner, 2007).

Health vignettes also have the purpose of reducing reporting biases in self-reports and yet exploiting comprehensive measures of mental and physical health by relying on respondents’ self-reports. The basic idea of vignettes is to ask respondents to rate the health of a fictitious person, whose described health is invariant over all respondents, and then to subtract respondents’ subjective evaluation bias by benchmarking their own health assessment with that of the fictitious person (Salomon, Tandon, & Murray, 2004). One main barrier to including vignettes more systematically in surveys is their relatively high cost due to the need to include many questions.

3.2.3. Health insurance and health

The best evidence on the relationship between health insurance coverage and health comes from the United States. While the RAND Health Insurance Experiment was a designed and expensive field experiment, the Oregon Health Insurance Experiment was a natural experiment, although the identifying variation was also true randomization via a lottery.

3.2.3.1. RAND Health Insurance Experiment

The RAND Health Insurance Experiment (RAND HIE) randomly assigned families at six different sites in the United States to 14 different health plans. The assignment happened between 1974 and 1976 and participants were observed for 3–5 years (Keeler & Rolph, 1988; Manning, Newhouse, Duan, Keeler, & Leibowitz, 1987). One main objective was to estimate the price elasticity of demand for health care. Although the non-linear budgets of private health plans require assumptions and extrapolation, the RAND HIE price elasticity findings were relatively clear: health
care demand is downward sloping but inelastic, with an average elasticity of around $-0.2$ (Aron-Dine et al., 2013). To date, these findings have been the gold standard when it comes to estimating the price elasticity of demand for medical care.

However, the findings for health were less clear. Although several objective and subjective health measures were elicited (blood pressure, cholesterol, a mental and a general health index), the statistical tests could not reject the null hypothesis that there were no differences in these health measures between the groups that were assigned to different health plans and consumed different amounts of health care. Does this mean there is no empirical evidence that health insurance improves health?

First, some positive health effects were found for specific subsamples. For example, the 20% with the highest blood pressure who were assigned to the free care plan without any cost-sharing experienced a significant reduction in their blood pressure (Keeler & Rolph, 1988). Second, there are several explanations for the absence of health effects. To begin with, the field experiment was underpowered and substantial improvements (or decreases) in health could not be excluded with 90% statistical certainty. Also, the experiment had been criticized on methodological grounds due to lower refusal and attrition rates in the most comprehensive health plan (Aron-Dine et al., 2013). Third, the time-horizon may have been too short to identify significant health improvements. This could be due to ineffective treatments or because the human body is able to compensate for a lack of treatment before health effects manifest — especially when enrollees had more generous coverage before or after the experiment. Fourth, as discussed above, the health measures that were taken may not have been powerful enough to map changes in health status into changes in these health measures.

3.2.3.2. Oregon health insurance experiment

Due to a budgetary shortfall, the state of Oregon closed enrollment in its Medicaid (public insurance for the poor) program in 2004. At the beginning of 2008, Oregon announced that it had enough funding to cover another 10,000 people. Because the number of applicants exceeded the number of available spots in the program, the state decided to run a lottery. The roughly 35,000 lottery winners could then apply for the state Medicaid program. Although 40% of lottery winners did not submit the necessary paperwork and 30% were not eligible, the remaining 30% successfully enrolled. Finkelstein et al. (2012) probabilistically matched them via their full names, date of birth, and zip code to hospital admission data, mortality data, and data from a consumer credit database. In addition, the research team contacted all participants multiple times to carry out three different surveys that included several health and health care utilization measures.

The findings show that winning the lottery increased the likelihood of obtaining Medicaid coverage significantly. The probability of outpatient
and inpatient visits increased by about 30%. While there is no evidence of reductions in short-term mortality, the SAH measures suggest significant health improvements. In addition, fewer newly insured people screened positive for depression and the number of days in good mental health in the past 30 days increased by 2. However, even two years after Medicaid enrollment, no effects on hypertension or high cholesterol level were found (Baicker et al., 2013). Overall, the patterns suggest that the improvements in self-reported health kicked in rather quickly after coverage began, and that most of the effects are driven by improvements in mental health and well-being.

3.2.3.3. Other evidence

Card, Dobkin, and Maestas (2009) exploit the automatic Medicare (US public health insurance for the elderly) enrollment rules at age 65 in a sharp RD design. They provide evidence that, conditional on being hospitalized, Medicare beneficiaries receive more services and have a lower 7-day mortality rate. Because the pre-Medicare insurance status is unobserved, an implication of the findings could be that moving from a mix of different insurance schemes to a federal single payer system may save lives. However, papers that estimate the mortality impact of the Medicare introduction in the 1960s remain inconclusive (Chay, Kim, & Swaminathan, 2012; Finkelstein & McKnight, 2008).

Courtemanche and Zapata (2014) use DD models and cross-sectional BRFSS data to elicit evidence for SAH improvements after Massachusetts covered more uninsured. Using the same data, but using DDD models and variation from several states that expanded Medicaid under the Affordable Care Act, Courtemanche, Marton, Ukert, Yelowitz, and Zapata (2017) find no impact on risky behavior or SAH for the full sample. Huh and Reif (2017) find that Medicare Part D (prescription drug program for the elderly) reduced elderly mortality by 2.2% annually.

Using a sharp RD design, Shigeoka (2014) exploits cost-sharing decreases after age 70 in Japan. He finds increases in health care utilization but no evidence for significant mortality and self-reported health effects in the short-run. Chandra et al. (2010) find significant increases in hospital admissions after an increase in copayments for prescription drugs in the United States and call these “offset effects” (which were absent in the RAND HIE). In contrast, Ziebarth (2010b) does not find any evidence that a decrease in rehabilitation treatments (triggered by increases in copayments) decreased SAH significantly in the short-run.

A key shortcoming of all studies just cited is the lack of evidence on long-term health effects of insurance coverage and health care use. The workhorse model of Grossman (1972) clearly suggests a trade-off between health investments today and health outcomes in the future. In one of the few existing papers about long-term health effects, Brown, Kowalski, and Ithai (2017) find that exposure to Medicaid expansions in childhood is
linked to lower mortality in adulthood. While these studies investigate Medicaid expansions, primarily in the early 1980s, Goodman-Bacon (2016, 2018) exploits the introduction of Medicaid in the 1960s, state-level variation in generosity, a cohort-level measure of cumulative childhood Medicaid eligibility, and aggregated state-year level data. He finds significant reductions in nonwhite infant and child mortality by 20%, and in 20-year white adult (non-AIDS) mortality by 20%.

The reasons for the lack of more empirical evidence on how health insurance affects health are plentiful. They range from the difficulty of collecting appropriate health measures, to data availability and security concerns when linking data at the individual level over long-time horizons, to ethical issues that prevent broader applications of field experiments. In addition, systemic barriers do not allow researchers to study the health effects of insurance coverage in the lab.

### 3.2.4. Sick leave insurance and rehabilitation

“Sick leave insurance,” “sickness insurance,” “sick pay,” or “medical leave” is a workplace insurance against wage losses due to short- or medium-term job-unrelated sickness. This implies that (the overwhelming majority of) people on sick leave are actively employed and in the labor force. Every OECD country except the United States, Canada, and Japan provides universal access to sick leave (Heymann, Rho, Schmitt, & Earle, 2010).

Most evidence stems from the first-stage relationship between variation in sick leave generosity and sick leave behavior. For example, from July to December 1998, a large-scale randomized experiment in Gothenburg relaxed the monitoring requirements for some employees, which increased sick leave episodes and triggered peer effects (Hesselius, Johansson, & Vikström, 2013). Another experiment randomized the invitation to “information meetings” for employees on sick leave with their case workers. Johansson and Lindahl (2013) find significant short-term effects on exiting the sickness spell, but no long-term effects.

Despite rich evidence on first-stage labor supply effects, there exists very little evidence on the impact of taking (more) sick leave on health. Two papers, which both use DD approaches to examine variation in the short-term sick leave replacement rate from 100% to 80% in Germany, find strong and significant first-stage effects but no evidence that self-

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3 Studies have also investigated the impact of probation periods (Ichino & Riphahn, 2005), culture (Ichino & Maggi, 2000), gender (Gilleskie, 2010; Ichino & Moretti, 2009), spousal peer effects (Olsson & Skogman Thoursie, 2015), income taxes (Dale-Olsen, 2013), unemployment (Pichler, 2015), and part-time sick leave (Andrén, 2014).
reported health changed significantly (Puhani & Sonderhof, 2010; Ziebarth & Karlsson, 2014). In contrast, Halla, Pech, and Zweimüller (2015) use Austrian administrative data and policy variation in replacement rates as an instrument to estimate that more sick leave would reduce health care expenditures of employees. This finding indirectly suggests that (too) many employees would go to work sick. Pichler and Ziebarth (2017) also study the phenomenon of presenteeism — going to work while being sick — and the trade-off between shirking and “contagious presenteeism” (presenteeism with a contagious disease). Using Google Flu data and conventional DD methods, they find that population-level influenza-like illness rates decreased by about 5% when US cities mandated employers to provide sick pay.

As Figure 3.1 shows, the bridge between short-term sick leave and disability insurance is long-term sick leave (also called “Temporary Disability Insurance” in the United States). Long-term sick leave typically includes rehabilitation treatments and, while the exact definition varies by the institutional setting, in general it covers severe diseases or injuries that last longer than several weeks but may not result in permanent work disability (Andrén, 2007; Fevang, Hardoy, & Røed, 2017; Ziebarth, 2013).

There are unexplored research opportunities to better understand how providing long-term sick leave and rehabilitation — while keeping those sick employees employed — causally affects employees’ health, labor market outcomes, the likelihood to stay in the labor market, and the likelihood to not receive disability benefits in the long run. In addition to structural research designs, field experiments are an important element for making significant progress in this research area, given that the few existing natural experiments do not provide sufficiently large and powerful first-stage effects (cf. Ziebarth, 2013).

**Figure 3.1. Health-related social insurance and labor force participation**

<table>
<thead>
<tr>
<th>In labor force</th>
<th>Out of labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sickness Insurance (SI)</strong></td>
<td><strong>Disability Insurance (DI)</strong></td>
</tr>
<tr>
<td>Short-term sick leave</td>
<td>Long-term sick leave</td>
</tr>
<tr>
<td>~50% of employees</td>
<td>~5% of employees</td>
</tr>
<tr>
<td><strong>Workers’ Compensation (WC)</strong></td>
<td></td>
</tr>
<tr>
<td>~5% of employees</td>
<td>~5% of working-age population</td>
</tr>
</tbody>
</table>

*Source: Ziebarth (2013), the affected shares of employees refers to Germany but are roughly generalizable to other countries.*
3.2.5. Accident insurance (“workers compensation”)

Statutory Accident Insurance, called “Workers’ Compensation” (WC) in the United States, is a mix of health and sickness insurance for work-related sickness absence and medical costs (Figure 3.1). In the United States, WC is a state-level social insurance program that replaces wage losses and covers medical bills due to work-related accidents or sickness (Butler & Gardner, 2011). The first Statutory Accident Insurance Bill was implemented in Germany in 1884. However, the relevance of this social insurance program has sharply decreased in the last decades because of improvements in workplace safety, better worker training, and the dramatic shift in the industry structure of OECD countries from manufacturing to service sector jobs. Between the 1950s and 1980s, the workplace fatality rate per 100,000 workers decreased from above 20 to below 10 in several OECD countries (OECD, 1989). In 2014, the Bureau of Labor Statistics (BLS, 2016) reported 4,821 fatal workplace injuries (per 140 million employees) in the United States.

Probably due to its decreasing relevance, along with difficulties in accessing and harmonizing the various state-level datasets in the United States, economic research on WC has not flourished in the past two decades. While it was a relatively popular field in the 1980s and early 1990s (Butler & Worrall, 1985; Krueger & Burton, 1990) few new empirical findings have been published since then. Fortin and Lanoie (2000) and Butler and Gardner (2011) provide excellent literature overviews and Kangas (2001) provides an institutional overview of statutory accident insurance schemes in 18 OECD countries.

Two recent studies with very credible research designs provide health estimates. Levine, Toffel, and Johnson (2012) use the natural experiment of workplace safety inspections by the US Occupational Safety and Health Administration (OSHA), where the randomly selected establishments were matched to similar control establishments. They find that injury rates decreased by about 10% among 409 randomly inspected establishments in California. Interestingly, the effect did not dissipate but became even stronger over the entire four-year postinspection period.

Powell and Seabury (2014) also use a natural experiment in the Californian WC system that implemented utilization reviews and caps on chiropractic care, physical therapy, and occupational therapy. The policy changes disproportionally affected lower back injuries. Using a DD design, Powell and Seabury (2014) find reductions in usage of these therapies but also lower earnings. The decrease in earnings resulted from both an increase in injury duration and a lower work productivity due to less hours worked for those who returned to work. These findings are among the very few that directly suggest deteriorated health as a result of less generous social insurance and medical care.
3.2.6. Disability insurance

While institutional details vary over time and across countries, the main objective of Disability Insurance (DI) is to provide a safety net in case of permanent work disability. Benefits typically replace a fraction of former gross wages. An open yet crucial research question is how health care, short- and long-term sick leave, and rehabilitation treatments are causally related to work disability over the life cycle and in the long run.

The empirical DI literature in economics is very rich, both in terms of empirical methods and published papers. It contains structural life cycle models (Low & Pistaferri, 2015) as well as standard reduced-form evidence (Kostol & Mogstad, 2014). It includes studies on the United States as well on Australia and European countries (e.g., Autor & Duggan, 2003 for the United States; Staubli, 2011 for Austria; Oshio & Shimizutani, 2011 for Japan; Jönsson, Palme, & Svensson, 2011 for Sweden; García-Gómez, Jiménez-Martín, & Castelló, 2011 for Spain; Burkhauser, Daly, & Ziebarth, 2016 for Germany; Banks, Blundell, & Emmerson, 2015 for the United Kingdom; McVicar & Wilkins, 2013 for Australia; Koning & Lindeboom, 2015 for the Netherlands).

The most clean and causal reduced-form research surrounds the question: “How much higher would the employment rate be without the existence of a public DI system?” Various researchers used quasi-random variation in assignment of cases to examiners and found that employment rates are 15–30% points higher among marginally rejected relative to marginally accepted applicants (Bound, 1989; Kostol & Mogstad, 2014; Maestas, Mullen, & Strand, 2013). However, clear and clean direct causal evidence on the effects of DI enrollment on beneficiaries’ health is missing; identification is complicated by the intertwined impact of DI receipt on labor force participation, earnings, provision of DI services, and — in case of the United States — possibly changes in health care access and insurance. One exception is Gelber, Moore and Strand (2018) who exploit a RK design and find that higher DI benefits reduce mortality.

Although they do not primarily study health effects, three additional studies are worthwhile to discuss: Dahl, Kostol, and Mogstad (2014) use the random assignment of judges to initially denied cases in Norway to provide evidence for family peer effects in DI claiming behavior: the likelihood of an adult child becoming a DI beneficiary within the next 10 years increases by 12% points when their parent gets accepted on the DI system. Using the same source of variation and combining it with a structural welfare model, Autor, Kostol, Mogstad, and Setzler (2017) find that single and unmarried individuals value DI benefits more than married individuals. Interestingly, household consumption by married beneficiaries is not substantially lower for denied applicants due to benefit substitution from other social insurance programs and spousal earnings. Finally, using a field experiments where 2 out of 26 Dutch regions were treated, de Jong, Lindeboom, and van der Klaauw
(2011) conclude that stricter application screening reduces the number of applications and improves targeting efficiency.

### 3.2.7. Long-term care insurance

Essentially all OECD countries provide long-term care as an explicit or implicit part of their social insurance system; see Karlsson, Mayhew, and Rickayzen (2007) and Colombo, Llena-Nozal, Mercier, and Tjadens (2011) for overviews. For example, although the United States provides no explicit tax-funded long-term care program, the means-tested state-level Medicaid program for the poor covers long-term care services.

In the future, public long-term care insurance will become a major policy talking point in OECD countries because the demand for long-term care will increase due to increasing life expectancy as well as changing family structures and labor supply of women (European Commission, 2012). Already today, 4% of the population above 65 in OECD countries receive long-term care in a nursing facility and 8% receive home health care (OECD/EU, 2013).

Economic research on long-term care is relatively rich in the analysis of the market structure, but relatively limited when it comes to beneficiaries and their well-being. The empirical evidence on those who need long-term care is limited because they are less likely to participate in surveys. Administrative data on the long-term care population is also scarce.

What is well documented is that private markets for long-term care insurance seem to suffer from relatively strong adverse selection (Kessler, 2008; Oster, Shoulson, Quaid, & Dorsey, 2010) as well as selective lapsing of “good risks,” that is, healthier policyholders (Finkelstein, McGarry, & Sufi, 2005). There is also evidence that the inclusion of long-term care in means-tested safety net programs may crowd out the demand for private policies (Brown & Finkelstein, 2008; Sloan & Norton, 1997). Economists have also investigated the impact on the labor supply of caregivers using structural models (Geyer & Korfhage, 2015) and modeled the long-term care market from a theoretical perspective (Kuhn & Nuscheler, 2011; Lakdawalla & Philipson, 2002).

The following studies specifically examine health effects on both caregivers and recipients. Using claims data from a German health insurer, Schmitz and Stroka (2013) find that working full time and providing informal care is associated with a higher consumption of antidepressants. Schmitz and Westphal (2015) use German SOEP household panel data and propensity score matching to show that female caregivers who provide informal care incur a short-term negative mental health effect. Using US Medicare Current Beneficiary Survey data and DD methods, McKnight (2006) exploits variation in Medicare reimbursement caps for home health care. She finds significant decreases in home health care use for the least healthy beneficiaries. Kim and Lim (2015) use
administrative data from South Korea and a sharp RD design (based on a needs assessment score) to show that subsidies increase formal long-term care use significantly. However, their estimated mortality effect is imprecise. Finally, Barnay and Juin (2016) use characteristics of adult children as instruments and find evidence that informal care reduces the risk of depression for the dependent elderly.

3.2.8. Unemployment insurance

OECD countries provide Unemployment Insurance (UI) as part of their social insurance schemes (Esser, Ferrarini, Nelson, Palme, & Sjöberg, 2013; Ozkan, 2014). Although specifics of how UI benefits are funded differ from country to country, most countries require employers (and sometimes also employees) to pay a payroll tax as a share of employees’ gross earnings. Eligibility typically kicks in when employees lose their job through no fault of their own. Most schemes allow beneficiaries to receive unemployment benefits up to one year but require job-seeking efforts. Benefits are typically tied to previous earnings but the level varies greatly between countries — according to Schindler and Aleksynska (2011), benefits vary from an average of 10% of previous income in Georgia up to 70% in the Netherlands.

There exists a very rich economic literature investigating the impact of UI benefits on benefit duration, job search, job finding rates, and subsequent job quality; Tatsiramos and van Ours (2014) summarize the findings. Other literatures study interaction effects of UI with pension, disability, and public assistance programs (Burns & Dague, 2017; Inderbitzin, Staubli, & Zweimüller, 2016; Leung & O’Leary, 2015; Mueller, Rothstein, & von Wachter, 2016).

Health effects of UI benefit receipt are typically not directly studied. However, using mass lay-offs and plant closures as exogenous variation, the impact of becoming unemployed on well-being and health has received a lot of attention in the reduced-form literature. While some studies estimate imprecise coefficients on SAH, there is solid evidence that unemployment significantly increases mortality and decreases well-being, particularly mental health and particularly for those who were already in poor health (Deb, Gallo, Ayyagari, Fletcher, & Sindelar, 2011; Marcus, 2013; Schiele & Schmitz, 2016; Sullivan & von Wachter, 2009). Because the health effects of unemployment are assessed in the context of existing UI systems, it remains unclear to which degree UI helps mitigate negative health effects of job loss.

3.2.9. Statutory pension insurance

The main purpose of statutory pension insurance is to provide a permanent income flow — a pension — for people who have exceeded the
“working age” after decades of work, traditionally 45 years. Again, the institutional details differ across countries. The traditional retirement age has been 65, but is steadily increasing due to increasing life expectancy. Economists have empirically studied many aspects of pension systems, from labor supply effects to interaction effects with other social insurance systems (cf. Staubli & Zweimüller, 2013).

A rich stream of reduced-form papers have studied the impact of retirement on self-reported health, mortality, health behavior, and subjective well-being (Charles, 2004; Coe & Zamarro, 2011; Heller-Sahlgren, 2017; Mazzonna & Peracchi, 2017). The majority of papers exploit the age thresholds of early or regular retirement possibilities in a sharp or fuzzy RD design, sometimes in combination with an IV strategy. Although the studies’ findings have been inconclusive, the majority of studies find improvements in subjective well-being and self-reported mental health following retirement. One of the underlying mechanisms seems to be a healthier lifestyle, through more sleep and exercise and less tobacco consumption (Eibich, 2015; Insler, 2014; Kämpfen & Maurer, 2016).

Studies that examine (early) retirement effects on mortality using administrative data find decreases in mortality (Hallberg, Johansson, & Josephson, 2015 for Sweden and Bloemen, Hochguertel, & Zweerink, 2017 for the Netherlands) as well as no effects (Hernaes, Markussen, Piggott, & Vestad, 2013 for Norway) or even increases in mortality (Kuhn, Wuellrich, & Zweimüller, 2010 for Austria and Fitzpatrick & Moore, 2018 for the United States). Explanations for the inconclusive findings include differences in institutional details, culture, effect heterogeneity, interaction effects with other social insurances, and LATE effects at different margins.

3.3. Discussion and conclusion

This chapter reviewed the empirical evidence on how social insurances causally affect the health of beneficiaries. In addition to summarizing the main findings, the health econometric methods used in the different studies have been briefly outlined.

Although, or maybe precisely because, most social insurances protect against the risk of a health shock, studies that specifically aim at identifying the effectiveness of social insurance programs with respect to health are rare. One factor that complicates the empirical identification is certainly that changes in health status are correlated with reductions in labor supply and income. Another challenge is the empirical measurement of the complex multidimensional concept of human health.

Most efforts to causally identify the effect of social insurance on health have been carried out in the context of health insurance. In this domain, it has been surprisingly difficult to identify (the intuitively plausible) positive health effects of having health insurance. The evidence primarily suggests
short-term well-being effects when covering the uninsured, in addition to long-term mortality reductions. The scarcity of evidence may be due to how health is commonly measured. Most studies rely on self-reported health data and short-term variation in the demand for health care, short- or medium-term sick leave, or work disability leave. They typically fail to identify significant health effects.

In addition, the popularity of standard reduced-form methods complicates the identification of health effects to the degree that these effects evolve slowly and cumulatively over time. Reduced-form methods are well-suited for the identification of sharp, abrupt, and significant dose–response relationships, but require a lot of statistical power for the identification of very small cumulative effects. The combination of structural, theory-based methods with reduced-form approaches of high internal validity may be a promising pathway for the identification of medium- to longer-term cumulative health effects of social insurance. To date, credible, causally identified and clean evidence on how (the interaction of various) social insurance systems affect human health in the long run, over decades and across the human life cycle, is very sketchy.

In light of the econometric toolkit that has been substantially improved and extended in the last two decades, and the substantial increase in the quality and quantity of available data, the future for health econometricians looks promising. Making groundbreaking progress will, however, depend on the ability of researchers to integrate different econometric approaches and to apply them thoroughly. Advances in survey methodology — particularly on how to measure health comprehensively and in a socially and ethically acceptable manner — will also be required.

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