The Impact and Incidence of Supplemental Health Insurance: Evidence from Sweden*

Mårten Palme — Stockholm University
David Seim — Stockholm University
Johannes Spinnewijn — London School of Economics
Jens Wikström — Gothenburg University

February 10, 2026

Abstract

This paper studies the prominent, yet under-researched role of supplemental health insurance (SHI) in universal healthcare systems committed to equal access to care. Linking novel data on SHI contracts to rich administrative data from Sweden, we show that SHI enrollment rises steeply with income, even though healthcare needs — as measured by mortality and health spending — are substantially higher among lower-income individuals. Exploiting variation in the timing of employer-sponsored SHI, we find that gaining coverage leads to large and persistent increases in healthcare utilization by about 25 percent. These effects reflect the relaxation of rationing in the public healthcare system, extend to downstream, high-value care, and are largest among lower-income individuals. Focusing on cancer patients, we further find that SHI is associated with earlier diagnosis and lower mortality. While offered by private insurers, SHI mostly increases publicly-funded healthcare and also shortens waiting times within the public system, generating both fiscal and congestion externalities. Overall, the results reveal a central tension in hybrid healthcare systems: supplemental health insurance improves access to care, yet uneven coverage distributes its benefits and costs unequally.

*Palme: Department of Economics, Stockholm U (e-mail: marten.palme@su.se); Seim: Department of Economics, Stockholm U (e-mail: david.seim@su.se); Spinnewijn: LSE (e-mail: j.spinnewijn@lse.ac.uk); Wikström: Department of Economics, Gothenburg U (e-mail: jens.wikstrom@economics.gu.se). We thank Arizo Karimi, Camille Landais, Petra Persson, and David Strömberg, and numerous conference and seminar participants for useful comments. Mohsen Rezazade provided outstanding research assistance. We acknowledge financial support from FORTE and the Jan Wallander and Tom Hedelius Foundation, grant P21-0263 and W23-0007.

I Introduction

Universal healthcare systems are designed to guarantee access to medical care independent of income or wealth. By limiting the role of prices, care is allocated according to medical need rather than willingness to pay (Cutler, 2002), reflecting egalitarian policy objectives. A consequence of low or zero prices, however, is excess demand, which requires non–price allocation mechanisms—such as waiting times or gatekeeping by primary-care physicians—to clear the market. When these mechanisms bind, access to care may become rationed in ways that may be both inefficient and harmful for health. Accordingly, concerns about waiting times and rationed care feature prominently in debates on the performance of universal healthcare systems.

Against this backdrop, many countries with universal healthcare systems have experienced a rapid expansion of privately financed healthcare over the past two decades (OECD, 2022). A key manifestation of this expansion is the growth of private supplemental health insurance (SHI), which facilitates access to care alongside the public system. In countries such as Sweden and Denmark, SHI coverage now reaches approximately 15 and 40 percent of the working-age population, respectively. These contracts are typically marketed as a means of relaxing rationing constraints in the public system, offering, for instance, faster access to both specialists and diagnostic services, elective procedures not covered by the public system, and second opinions.

This expansion has sparked an important policy debate about the role of SHI and its interaction with the public healthcare system (Einav and Finkelstein, 2023). Proponents argue that this market improves efficiency by relaxing rationing constraints and, potentially, by relieving pressure on the public system as some patients shift to private providers. Critics, in contrast, emphasize the risk of a two-tier healthcare system, in which more advantaged individuals obtain better access to care through SHI, potentially at the expense of others, exacerbating health inequalities and undermining the egalitarian foundations of universal healthcare. Reflecting these concerns, some countries have adopted policies that limit the scope for private health insurance (e.g., Canada) or restrict referrals from private to public care (e.g., UK and Germany) (Flood and Thomas, 2001; Department of Health and Social Care, 2017; Busse and Blümel, 2014).

This paper seeks to inform the debate by asking three related questions. First, who enrolls in supplemental health insurance? In particular, how does take-up vary across the income distribution, and how does it relate to underlying health needs? Second, what does SHI do? Does it merely reallocate care across financing sources, or does it relax binding constraints and increase effective access to valuable medical services? Third, what are the

spillovers of SHI on those who remain in the public system? Does SHI relieve pressure on public healthcare, or does it crowd in publicly funded care and exacerbate congestion?

Answering these questions is empirically challenging for two main reasons. First, there is typically no population-wide administrative data identifying individuals covered by SHI. Second, administrative data on healthcare utilization generally record only publicly funded care, while information on privately financed healthcare use is not observed. This separation partly reflects privacy considerations: a key motivation for purchasing private insurance is precisely to avoid having certain episodes of care recorded in public administrative systems. As a result, existing evidence provides only limited insight into who is covered by SHI, how coverage affects healthcare utilization, and how SHI interacts with the public system.

We overcome these challenges using data from Sweden—a country with comprehensive, tax-funded universal healthcare and a rapidly expanding market for SHI. Sweden provides an ideal setting for three reasons. First, through a partnership with the industry association representing Swedish private insurers, we obtained access to novel administrative microdata covering the universe of SHI contracts between 2007 and 2015. Second, we link these contracts to population-wide administrative records on healthcare utilization, prescription drug expenditures, and other individual-level outcomes. Importantly, these data capture both publicly and privately financed care whenever a licensed physician is involved. Third, Sweden's institutional design—universal public coverage combined with the option to purchase private supplemental insurance—is shared by many healthcare systems, and SHI market penetration in Sweden is comparable to that in other European countries (OECD, 2023).

We begin by documenting who enrolls in supplemental health insurance. Following recent work on income gradients in health and mortality (Chetty et al., 2016; Hagen et al., 2025), we show that SHI enrollment rises sharply with income, with particularly steep gradients at the top of the distribution: take-up rates are around 2–3 percent in the bottom income decile but approach 50 percent in the top percentiles. This enrollment pattern contrasts sharply with gradients in health and corresponding healthcare needs. Individuals in the bottom income percentiles face mortality rates nearly four times as high as those in the top percentiles. We document similar income gradients in overall healthcare spending, suggesting that these differences span a broad set of health-related dimensions. These mirror-image gradients raise concerns not only about equity, but also about efficiency: individuals who stand to gain the most from relaxing rationing constraints — those in worse health and with arguably higher expected returns to care — are the least likely to be insured.

In line with this concern, we find that much of the heterogeneity in SHI enrollment is driven by employment and, in particular, by the employer one works for. The Swedish SHI market consists of three contract types—employer-provided (61 percent of contracts), union-provided (21 percent), and individually purchased (18 percent)—and higher-income individuals are substantially more likely to work at firms that offer SHI as a fringe benefit. Because enrollment is largely determined by employers' collective decisions rather than individual choices, the resulting allocation reflects employer-level decisions rather than individual-level healthcare needs.

We further show that the income gradient that remains after accounting for employers is not explained by differences in pre-existing conditions and persists when controlling for a broad set of socioeconomic characteristics as well as cognitive and non-cognitive skills. Instead, the gradient seems to reflect income effects or supply-side factors correlated with income, rather than selection on underlying preferences or demand-side factors. Consistent with this interpretation, we find no evidence of adverse selection into SHI; if anything, enrollment is higher among individuals with lower healthcare needs, even conditional on income. Taken together, these descriptive findings suggest that policies affecting the income distribution—such as taxation or targeted subsidies—can directly influence SHI take-up. To the extent that enrollment gradients are driven by income effects, redistributive policies have the potential to narrow disparities in access to supplemental coverage (Atkinson and Stiglitz, 1976; Ferey et al., 2024).

Because SHI coverage is so unevenly distributed and appears poorly aligned with healthcare needs, it is essential to understand what such coverage actually does. We therefore study the causal effects of SHI on healthcare utilization, exploiting variation in the timing of employer-provided insurance. Comparing workers who receive coverage earlier to otherwise similar workers who receive it later, we find that SHI leads to a large increase in healthcare utilization. Total healthcare expenditures — combining public and private care — increase by approximately 23 percent relative to pre-coverage spending. Importantly, these increases do not reflect short-run retiming of care. The effects are large and persistent over the four-year horizon we study, and they are not driven by employers selectively covering workers based on evolving health trajectories: such selection would generate differential pre-trends, which we do not observe. These results are robust to alternative specifications, including comparisons across firms of different sizes and enrollment shares. Taken together, the evidence indicates that SHI relaxes rationing in the public healthcare system.

To elaborate on this interpretation, we unpack the utilization responses along several margins.

First, SHI coverage increases specialist visits while reducing primary care visits. In the public system, patients typically must first consult a primary-care physician to obtain referrals to specialist or hospital care. If primary care did not function as a binding constraint, obtaining SHI would reduce primary care use without affecting specialist utilization. Instead, we observe a substantial increase in specialist visits, indicating that SHI relaxes a binding gatekeeping constraint by enabling direct access to specialist care.

Second, the increase in specialist visits is complemented with greater use of prescription drugs and more hospital admissions. Effects are present for a broad set of diagnosis codes, with a positive correlation between the relative effects of SHI on specialist visits and hospital admissions. These patterns indicate that SHI expands access to downstream, high-value care rather than merely inducing *flat-of-the-curve* utilization.

Third, we find pronounced heterogeneity across the income distribution. Total healthcare costs increase by more than 50 percent for individuals in the bottom income quartile (measured in the year prior to SHI enrollment), more than twice the corresponding increase for individuals in the top quartile; the difference is statistically significant. The larger response among lower-income individuals reflects higher healthcare needs and operates through distinct utilization margins. For these individuals, SHI primarily increases hospital admissions and prescription drug use. By contrast, among higher-income individuals, higher costs are driven mainly by a reallocation of care from primary care to specialist visits, with only a modest rise in hospital utilization. This pattern is consistent with rationing constraints in the public healthcare system being more binding for lower-income individuals.

We also examine whether the increase in healthcare utilization translates into improvements in health, focusing first on overall mortality. For the full sample of working-age individuals, we find no statistically significant effect of SHI on mortality. However, the estimates are imprecise, and we cannot rule out mortality reductions of up to 20 percent relative to the baseline rate.

More precise effects emerge when focusing on a clinically salient subgroup: individuals diagnosed with cancer. We first show that SHI enrollment increases the likelihood of undergoing screening for conditions such as cancer and receiving cancer-related care. Using data from the national cancer register, we find positive detection effects for both benign and malignant cancers, with the largest effects for malignant cancers, suggesting that SHI does not merely lead to over-diagnosis. We next show that, conditional on a malignant cancer diagnosis, individuals with SHI are diagnosed at an earlier stage compared to those without SHI. The distribution of detection shifts toward earlier diagnoses, and these individuals experience lower subsequent mortality. Specifically, SHI reduces

three-year mortality by 2 percentage points, from a baseline of 18 percent. Notably, we find that having SHI is associated with a higher survival after a cancer diagnosis, but this advantage disappears once we control for cancer site and stage at diagnosis.

Taken together, these findings reinforce the interpretation that access to care is rationed in the public healthcare system and that SHI can unlock valuable care opportunities with meaningful health benefits. They thus confirm the concern that steep income gradients in SHI enrollment may exacerbate existing health inequalities. While these analyses highlight substantial private benefits of supplemental health insurance, we next examine its implications for the public healthcare system, focusing on spillovers through healthcare costs and congestion.

Decomposing total healthcare costs, we find that roughly two thirds of the SHI-induced increase in spending reflects publicly funded care. SHI therefore crowds in utilization within the public healthcare system. As individuals with SHI consume more publicly financed care, this generates a fiscal externality and places additional pressure on public capacity. Moreover, SHI shortens enrollees' waiting times for publicly provided specialist care, hospital treatment, and diagnostic services. On average, waiting times fall by about seven days relative to a baseline of 48 days. These reductions suggest a reallocation of access within the public healthcare system.

In a capacity-constrained system, higher utilization and faster access for SHI enrollees imply longer waits for patients without SHI, highlighting congestion externalities associated with unequal coverage. Several pieces of evidence point in this direction. First, waiting-time reductions for SHI enrollees would not arise unless the public healthcare system were operating close to capacity. Second, diagnoses with longer baseline waiting times—indicative of greater congestion—exhibit larger SHI-induced reductions in waiting times. Third, we show that patients with SHI move more quickly through public-sector queues because of how referrals are processed: referrals for SHI-covered patients are more likely to receive priority review. In particular, higher-income groups experience larger waiting-time reductions and are also more likely to have referrals indicating urgency.

We finally combine the results on the private gains from SHI and the externalities it generates to quantify welfare effects and assess their distributional implications. Using a stylized, hedonic framework, our calculations imply an average annual value of SHI for enrollees of around 2,000 SEK (approximately 224 USD), with roughly 40 percent attributable to reductions in waiting times for both privately and publicly provided care. By comparison, the combined fiscal and congestion externalities imposed on the public healthcare system amount to approximately 900 SEK. Imposing a corresponding annual externality-corrective unit tax on SHI premia would amount to roughly 25 percent of

lower-end market premia.

These average effects mask important heterogeneity across the income distribution. While the overall private value of SHI and the externalities it generates are broadly similar across income groups—with increased healthcare utilization contributing relatively more at the bottom of the distribution and waiting-time reductions playing a larger role at the top—the steep income gradient in SHI enrollment has stark distributional consequences. As a result, individuals in the bottom income quartile experience on average negative net benefits from the existence of the SHI market, while net benefits turn positive from the second quartile onward and are largest for individuals in the top quartile.

Taken together, our findings highlight a central tension in hybrid healthcare systems. Supplemental private insurance can improve access to valuable care by relaxing rationing constraints. Yet when coverage is unequally distributed and interacts with publicly financed healthcare, it can also generate sizable distributional costs. Understanding these trade-offs is essential for designing policies that balance efficiency, equity, and the long-run sustainability of universal healthcare systems.

Related literature This paper contributes to several strands of the literature:

A large theoretical literature studies the welfare properties of mixed public–private insurance systems, focusing on moral hazard, selection, and benefit design. Early work examines private overinsurance and public provision under imperfect information (Pauly, 1974), models of public catastrophic or basic insurance (Besley, 1989; Selden, 1993, 1997; Petretto, 1999), and critiques of uniform benefit design (Blomqvist and Johansson, 1997). More recent contributions emphasize heterogeneity in willingness to pay and the efficiency costs of uniform public coverage (Boone, 2015; Shepard et al., 2019), motivating systems that allow supplemental insurance. While these models provide important insights into insurance design, they typically abstract from non–price rationing and congestion, limiting their ability to speak to how supplemental coverage reshapes access and generates externalities when care is capacity constrained.

Empirically, interactions between public and private insurance coverage play a quantitatively important role in shaping healthcare utilization and spending. Early evidence shows that expansions of public insurance crowd out private coverage and reallocate utilization across payers rather than simply expanding care, highlighting the importance of equilibrium responses in mixed insurance systems (Cutler and Gruber, 1996; Finkelstein, 2007). Subsequent work studying supplemental insurance layered on top of a public baseline emphasizes access and timing as key channels. Besley et al. (1999) shows that waiting times to public care shape demand for supplemental insurance, while Lavaste (2023) finds

that SHI take-up is strongly associated with access to private providers and socioeconomic characteristics rather than public-sector availability alone. Studies of utilization responses find that supplemental insurance increases outpatient care with more limited effects on hospital admissions (Kiil and Arendt, 2017). Consistent with access-based mechanisms, public hospitals in areas with a higher prevalence of supplementary insurance among admitted patients exhibit modestly shorter waiting times (Yang et al., 2024).[1] Most closely related, Cabral and Mahoney (2019) shows that private Medigap coverage substantially increases Medicare utilization and spending—by roughly 22 percent—by undoing public cost-sharing and thereby generating a sizable fiscal externality on the public insurer.

This paper also contributes to a large literature documenting inequality in healthcare access and outcomes even under universal coverage. Equal formal coverage does not guarantee equal realized access, with persistent disparities by income and socioeconomic status (Wagstaff and van Doorslaer, 2000; Danesh et al., 2024; Bensnes et al., 2025) and steep socioeconomic gradients in health and healthcare utilization across countries and over time (Currie, 2009; Cutler et al., 2011; Chetty et al., 2016; Case and Deaton, 2015; Hagen et al., 2025). Insurance expansions improve access on average but generate heterogeneous utilization and health effects reflecting differences in constraints, information, and decision-making (Finkelstein et al., 2012; Finkelstein and McKnight, 2008; Brot-Goldberg et al., 2017; Abaluck and Gruber, 2021; Chandra et al., 2021; Miller et al., 2021; Baicker et al., 2015).[2] From a normative perspective, Shepard et al. (2019) shows that uniform public insurance becomes increasingly inefficient as income heterogeneity rises.

In contrast to much of the insurance literature, which emphasizes individual choice and selection (Fang et al., 2008; Einav et al., 2010; Hackmann et al., 2015; Handel, 2013; Spinnewijn, 2017; Handel et al., 2024), we study a setting in which supplemental coverage is largely shaped by employer decisions over plan availability and generosity. This institutional feature weakens the link between coverage and individual health risk and allows us to study access reallocation and externalities largely orthogonal to individual selection, paralleling features of employer-sponsored insurance markets (Fleitas et al., 2025).

[1] Much of this literature is constrained by data limitations that restrict the margins on which public–private interactions can be studied. Several papers rely on survey data or insurer-specific records that do not observe public-sector utilization, waiting times, or congestion directly (e.g. Kiil and Arendt (2017); Lavaste (2023)), while work using administrative data typically focuses on specific settings and outcomes—such as elective inpatient procedures—and cannot capture upstream access constraints or system-wide spillovers (e.g. Yang et al. (2024)). As a result, existing evidence provides limited scope to trace how supplemental insurance reshapes access, congestion, and public spending across the full care continuum.

[2] A broader literature shows that insurance design affects access and spending through managed care arrangements, non–price rationing, and selection-driven incentives (Layton et al., 2022; Geruso and Layton, 2017; Geruso et al., 2023), while policy-induced changes in subsidies, tax deductibility, and penalties reshape selection and welfare across employer-sponsored and individual insurance markets (Fleitas et al., 2025).

The remainder of the paper is organized as follows. Section II introduces the institutional context and data. Section III analyzes SHI take-up. Section IV presents the research design and main utilization results. Section V studies the interaction between the private SHI market and the public healthcare system. Section VI evaluates consumer surplus and welfare. Section VII concludes.

II Context and Data

Sweden operates a universal, tax-financed healthcare system that provides comprehensive coverage for essential health services with subsidized out-of-pocket payments.[3] Healthcare is organized and delivered semi-autonomously at the regional level (Sweden is divided into 21 regions). Total healthcare spending amounts to approximately eleven percent of GDP (compared with an OECD average of nine percent), with roughly 86 percent financed by the public sector. Access to care is formally allocated on the basis of medical need and urgency rather than ability to pay (OECD, 2021b; Glenngård, 2020; Lindh et al., 2025; Swedish Ministry of Health and Social Affairs, 2017).

Care provision in the public system follows a strict sequencing structure. Patients typically begin with a visit to a primary-care physician, who either resolves the case or issues a referral to a specialist. Specialist care may, in turn, lead to referral for inpatient hospital treatment. Prescription drugs can be prescribed at any stage of this care pathway.

II.A SHI Context

Despite broad coverage, waiting times in the Swedish public healthcare system for non-urgent specialist and hospital care are long. This reflects both institutional design—where access is regulated through waiting-time guarantees that permit substantial delays—and realized waiting times in practice.[4] On average, patients wait approximately 48 days for specialist and hospital care.[5] These waiting times are comparable to those observed in other countries with universal healthcare systems (e.g. Norway, Canada, and the U.K.),

[3] Co-payments for public primary care and outpatient specialist visits typically range from 100 to 300 SEK, subject to an annual cap of approximately 1,200 SEK. Public inpatient hospital care costs 80–150 SEK per night. Prescription drugs are covered under a separate, piecewise-linear schedule: patients pay the full cost up to 900 SEK (in 2010 prices), followed by coinsurance rates of 50, 25, and 10 percent at successive thresholds, until reaching an annual out-of-pocket maximum of 1,800 SEK. Healthcare and drug expenditures are tracked over a rolling 365-day period.

[4] Under the Swedish *vårdgaranti*, patients are guaranteed access to a primary-care physician within three days, a specialist consultation within 90 days, and initiation of treatment within an additional 90 days.

[5] Authors' own calculations based on referral data from Region Stockholm. Official statistics show that 31% of patients do not receive a specialist consultation within the statutory waiting time, while 34% do not initiate treatment within an additional 90 days (Sveriges Kommuner och Regioner , SKR)

but longer than in systems that rely more heavily on private health insurance (e.g. U.S and Switzerland). These access frictions have fueled demand for supplementary private health insurance, which has expanded rapidly since the early 2000s. By 2023, about 780,000 Swedes (8 percent of the population, 15 percent of working-age adults) are enrolled, more than 60 percent through employer-sponsored contracts (Grant Thornton, 2024).

SHI contracts vary in their precise coverage across firms and plans, but they share a set of common core features. Most importantly, SHI provides expedited access to specialist care and elective, non-urgent procedures. Insured patients can typically consult a specialist on short notice—often within seven days—and receive treatment within approximately three weeks. Many plans do not require referral from a primary-care physician. Insurers also operate care-planning units that triage patients and coordinate treatment with affiliated providers. In addition, some plans cover ancillary services such as second opinions, post-operative rehabilitation, mental healthcare, and reimbursements for travel, accommodation, and out-of-pocket expenses incurred within the public system. The plans do not cover emergency services nor highly specialized hospital care (e.g., cancer treatments, neurosurgery, maternity care).

The contracts are signed in three ways: by the employer (61% in year 2015); by the individual through e.g. the union (21%) and by the individual (18%). Insurance premia vary by age. Annual premiums range from roughly 3,600 SEK for individuals under 35 to about 26,000 SEK for those over 65.[6] The premia vary with age but not by pre-existing health conditions. It is typically not possible to enroll beyond retirement age and insurers may require a health declaration at entry and exclude pre-existing chronic conditions from coverage.

Employer-sponsored contracts play a central role in our research design, making it important to describe their key features. Employers can purchase SHI for their employees by submitting employees' personal identification numbers to an insurance company through an online interface. These identifiers contain information on year of birth, which insurers use to compute monthly premiums based on the workforce's age composition.[7] Eligibility requires that employees have full work capacity at the time of enrollment (Kullberg et al., 2019). During the period we study, employer-sponsored SHI premiums were treated as a tax-free fringe benefit.

In Sweden, supplemental health insurance operates alongside the universal public healthcare system rather than as a substitute, creating scope for important interactions

[6]The premium range is constructed from available insurance contracts with published premium information in 2025.

[7]Formally, employee consent is not required for enrollment, although employees are informed about the benefit.

with publicly funded care (OECD, 2004, 2021a). Although SHI is primarily marketed as a means of obtaining faster access to outpatient specialist care—often delivered by private providers (OECD, 2021a; Socialstyrelsen, 2020)—its effects extend beyond the private sector. Physicians treating SHI patients may refer them to publicly funded services when further treatment is required or recommend additional follow-up care within the public system (Socialdepartementet, 2022; Sveriges läkarförbund, 2022). At the same time, SHI may relieve pressure on the public system when patients instead receive care from private providers. These offsetting channels imply that the net impact of SHI on publicly financed care is theoretically ambiguous.[8]

II.B Data

We match several individual-level administrative datasets for this study: (i) proprietary data on nearly all supplementary health insurance contracts during 2006-2015, retrieved through Insurance Sweden, a national industry organization for insurance companies[9]; (ii) the Integrated Database for Labour Market Research (LISA by Swedish acronym); (iii) the Income Tax Register; (iv) the Wealth Tax Register; (v) Register-based Labor Market Statistics (RAMS by Swedish acronym); (vi) Enlistment Records; (vii) National Patient Register; (viii) National Prescribed Drug Register; (ix) care billing data from the Stockholm region; (x) the Cancer Register; (xi) Central Waiting Time Register of the Stockholm region; and (xii) the National Cause of Death Register.

The proprietary data on SHI record all active contracts on December 31 each year at the individual level, together with the start date. We also know whether the insurance is employer-provided (and the firm-ID), individually purchased, or acquired through the union. We use these data to construct an annual panel of SHI membership.

Income Ranks The descriptive analysis of insurance take-up restricts attention to working-age individuals (ages 25-65). For this population, we construct an individual-level measure of income rank following Chetty et al. (2016). We define an individual's equivalized disposable income as the household's total taxable and non-taxable income net of taxes and negative transfers divided by the corresponding household consumption weight.[10] For

[8] An additional interaction of interest concerns physicians' employment choices across public and private providers. Some policy discussions suggest that the expansion of SHI may influence the allocation of physicians between sectors. Our analysis does not address these labor supply responses, which we leave for future research.

[9] Approximately 50 insurance companies are members, together accounting for more than 90 percent of the Swedish insurance market

[10] We employ a modified OECD equivalence scale with weights 1.00 for single adults; 1.51 for cohabiting couples; +0.60 for each additional adult; +0.52 for the first child aged 0–19; and +0.42 for each additional

each year t, we compute average disposable income over the three years $t-3$ to $t-1$ and rank individuals within gender and cohort based on that average. We follow Hagen et al. (2025) and exclude individuals in the bottom decile of the income distribution prior to ranking and those not observed in all three years.[11] We use a similar strategy to rank individuals by average net wealth during 2004-2006, following Nekoei and Seim (2023).

Skill Measures Cognitive ability is measured as a within-cohort rank of the sum of scores from four subtests: synonyms, inductions, metal folding, and technical comprehension. Non-cognitive ability is measured on a 1–5 scale across four traits: social maturity, intensity, psychological energy, and emotional stability; we use these raw scores in the analysis. Enlistment data are used only for men born between 1951-1975, for whom military conscription was mandatory.[12]

Healthcare Utilization We observe all inpatient admissions (hospitalizations) and specialist outpatient visits during 2001-2017 using the National Patient Register (NPR). Reporting to the register is mandatory for all specialist care providers, irrespective of whether the delivered care is privately or publicly funded.[13] The data contain dates of admission and discharge, diagnosis codes (ICD-10), treatment codes, and hospital identifier.

These data lack three important dimensions. First, they do not include primary care visits. Second, they do not report the system cost of care. Third, they do not allow us to distinguish between publicly and privately financed care.[14] To address these limitations, we obtained access to supplementary healthcare data from Stockholm—the largest of Sweden's 21 healthcare regions covering roughly 30% of the SHI market. These data record all invoices submitted by both public and private providers to the public funder, Stockholm. Importantly, they include primary care invoices, thereby resolving the absence of primary care utilization in the baseline data.

Second, the data record invoice amounts, which we use to infer system costs. We compute mean costs for each diagnosis–procedure–year cell using the Stockholm data and assume that these costs are representative of those in other regions and for privately

child aged 0–19.

[11]This avoids atypical reporting due to periods abroad, tax-exempt income, or other irregular income patterns.

[12]For further details on the enlistment data, see Lindqvist and Vestman (2011) and Hermo et al. (2022).

[13]Socialstyrelsen (2022) documents some under-reporting of healthcare utilization, particularly among private providers. As a result, our estimates of the impact of SHI on healthcare consumption may be biased downward, potentially to a greater extent for privately provided care.

[14]While the data indicate whether care was delivered by a private provider, this information is insufficient for our purposes, as privately delivered care may be financed either publicly or privately.

funded care.[15]

Third, we use these data to decompose total healthcare costs into publicly and privately financed components. For all Stockholm residents in year t, we match each visit recorded in the National Patient Register to the corresponding invoice in the Stockholm billing data using individual identifiers, service dates, and provider identifiers.[16] Matched visits are interpreted as publicly funded care, while unmatched visits are classified as privately financed.[17]

Prescription Drugs The National Prescribed Drug Register contains complete records of all prescription drugs dispensed at pharmacies in Sweden since July 2005. It includes detailed information on each dispensation, including the date, the Anatomical Therapeutic Chemical (ATC) code, the dosage, and the number of defined daily doses (DDD). We also observe both the shelf price and OOP price of each prescription.

Cancer Records Using the Swedish National Cancer Register, we observe all newly diagnosed malignant tumors, all carcinoma in situ (CIS) as well as a subset of benign tumors, in Sweden between 2003 and 2015. The data contain information on the tumor site, date of diagnosis, clinical stage, and treatment plan. They are based on reports by the treating clinician, and in case the pathology laboratory deviates from the initial clinical diagnoses, the registers are updated to reflect the confirmed pathology.

Waiting Times We obtain data on waiting times for publicly funded care from the Stockholm region's Central Waiting Time Register (CVR) during 2008-2015. The unit of observation is a referral for either *treatment* or *sample collection*. We measure waiting time in days as the interval between the referral submission date and the date on which care is completed. Referring physicians can indicate urgency by checking a designated box on the referral form, and we observe whether the referral was marked as urgent. The data also include detailed care codes identifying the type of treatment provided.

[15]Costs may vary within diagnosis–procedure–year cells, but such heterogeneity introduces classical measurement error that may reduce statistical power while leaving estimates of the impact of SHI unbiased and consistent, since costs enter only as the dependent variable. Appendix Figure A.1 provides an out-of-sample validation of the imputation procedure within Stockholm. Using an independent 20 percent holdout sample, imputed prices closely track observed prices for both specialist visits and hospitalizations, with estimated slopes close to unity, indicating that the procedure accurately recovers both the level and ranking of service prices.

[16]When multiple visits occur on the same day, we use ICD codes to distinguish between them.

[17]If Stockholm residents receive publicly funded care outside the region, such visits would not appear in the Stockholm invoice data, implying that our measure of privately financed care may be overstated.

In addition to these measures, we rely on auxiliary data sources. From the LISA database, we obtain demographic and socioeconomic information and define our baseline population of Swedish residents. We observe dates and causes of death using the National Cause of Death Register.

III SHI Enrollment: Income Gradient

The market for SHI in Sweden has expanded rapidly over time. Among the working-age population, SHI coverage more than doubled—from roughly 4 percent to over 10 percent—between 2006 and 2015 (Appendix Figure B.1a). The share of employer-sponsored contracts remained broadly stable over this period. Enrollment exhibits a pronounced inverted U-shaped age profile: take-up rises with age, peaks around age 50, and then declines sharply thereafter, in part reflecting age-related increases in premiums.

Importantly, enrollment in SHI is highly unequal. Panel (a) of Figure 1 reveals that only around 2-3 percent of working-age individuals in the bottom percentiles of the disposable income distribution are covered by SHI of any form (employer-provided; group or individual).[18] Take-up rises sharply with income and approaches 50 percent among individuals at the very top of the distribution.[19]

This pattern stands in sharp contrast to gradients in health outcomes and healthcare needs. Panel (b) of Figure 1 shows how mortality rates and total healthcare expenditures decline monotonically with income. In other words, the income profile of SHI enrollment is almost a mirror image of the income profile of health: individuals with the highest mortality risk and the greatest healthcare utilization are the least likely to hold supplemental insurance. This raises concerns about both equity and efficiency - those who seem to benefit most from SHI are the least likely to be insured.

What factors can account for the strongly heterogeneous take-up rates across the income distribution? Table F.3 investigates this question by regressing SHI take-up on disposable income quintiles and subsequently adding control variables across specifications to see how the gradient responds. The first column in Panel (a) shows that, at baseline, there is a roughly 17 percentage point difference in SHI enrollment between the bottom twenty percent and the top twenty percent.

One potential explanation for the income gradient is that lower-income individuals are in worse health to begin with and therefore face effective barriers to SHI coverage. Although premiums do not depend on health histories and insurers do not formally ex-

[18] Section II.B provides the details on how the income ranks are constructed.

[19] The overall growth in enrollment over years is disproportionately driven by high-income individuals. Appendix Figure B.1b shows that the income gradient in take-up has become more pronounced as a result.

clude applicants based on prior conditions, the value of SHI may nevertheless be lower for these individuals because coverage typically excludes pre-existing conditions. Column (2) of Panel (a) shows that controlling for 22 indicators of pre-existing chronic conditions—defined as drug prescriptions in two consecutive years for selected conditions following Danesh et al. (2024)—does not attenuate the income gradient in SHI take-up, despite chronic conditions being strongly correlated with income.[20]

The third column of Panel (a) in Table F.3 adds controls for employer fixed-effects, including a separate indicator for unemployed. This has a large impact on the gradient; the conditional difference in take-up between the top and bottom quintiles falls by almost half, from 16.2% to 8.4%. This reflects both that SHI is predominantly provided through employers and that higher-income individuals are considerably more likely to work at firms offering SHI as a fringe benefit. The central role of employers in shaping SHI enrollment raises efficiency concerns. When access to insurance is largely determined by employer choices rather than individual demand, the allocation of coverage is difficult to reconcile with optimal insurance, as it weakens the link between health needs and access.

Even after accounting for employers, however, substantial heterogeneity in take-up across the income distribution remains. To shed light on whether this residual gradient reflects differences in preferences or decision-making ability, we turn to a subsample of men for whom we observe detailed measures of cognitive and non-cognitive skills from military enlistment records. Sequentially adding controls for socio-economic status and skills-which proxy for preferences, information, and ability-does little to reduce the income gradient in SHI enrollment, as seen in columns (1)-(3) of Panel (B) in Appendix Table F.3. Income remains a strong predictor of take-up even among individuals with similar skills, health, education, and employers.[21]

Finally, we find that enrollment in SHI is advantageously selected: individuals with SHI have lower mortality and lower healthcare utilization prior to enrollment than those without SHI, even conditional on income (Appendix Table F.3). Healthier individuals are more likely to be insured at every point in the income distribution, a pattern that has also been documented in other insurance settings (Fang et al., 2008).

Taken together, the evidence in this section documents a strong and growing income gradient in SHI enrollment that is not explained by health needs, chronic conditions, preferences, or skills. Access to SHI is instead largely mediated by employers and income

[20] See Appendix Table F.1 for the exhaustive list of chronic diseases and their corresponding prescription drug code (ATC-code).

[21] A natural interpretation is that a part of the income gradient in take-up is directly due to *income effects*. Under this view, a more equitable allocation of SHI could be achieved through income redistribution, echoing the logic of classic results in optimal taxation (Atkinson and Stiglitz, 1976; Ferey et al., 2024).

itself, resulting in an allocation that is poorly aligned with underlying healthcare needs. Whether this misalignment ultimately exacerbates health inequality depends on how valuable SHI is in practice. We turn to this question next by estimating the causal effects of SHI on healthcare utilization and health outcomes.

IV SHI Impact: Design and Results

This section estimates the causal effects of SHI on a range of healthcare outcomes. We first describe the empirical design, then present the main estimates and assess their robustness. We conclude by unpacking the underlying mechanisms to provide intuition for the baseline results.

IV.A Empirical Design

In our baseline strategy, we compare individuals who obtain employer-provided SHI for the first time in year t with otherwise similar individuals who obtain such insurance in year $t + \delta$. Similarity is defined along observable dimensions – gender, birth cohort, and labor earnings – and the design exploits quasi-random variation in the timing of employer-provided insurance coverage, following the logic in e.g. Nekoei and Seim (2023) and Fadlon and Nielsen (2021).

The identification strategy relies on two key assumptions. First, conditional on observables, employers' decisions about the timing of SHI are unrelated to employees' health trajectories within δ years.[22] Second, an exclusion restriction: the initiation of employer-provided SHI should not coincide with other contemporaneous events that directly affect healthcare utilization.

Appendix Figure C.1 illustrates the research design. Panel (a) plots SHI enrollment over time for cohorts that first receive employer-provided SHI in 2008, 2011, and 2014, restricting attention to individuals without any prior insurance coverage.[23] After the mechanical increase in coverage at enrollment, SHI take-up declines gradually over time, reflecting retirement, job mobility, and other exits.

Panel (b) plots average hospital visits for the same enrollment cohorts. The series display similar levels and trends prior to enrollment, suggesting comparable healthcare

[22] Importantly, the design allows for selection into SHI based on health *levels*, but not on differential health trends.

[23] Due to data limitations and the structure of the design, we use a longer pre-enrollment insurance-free period for the control (later-treated) group than for the treated group. We do not view this asymmetry as a major concern, as SHI market penetration was limited prior to 2005, the first year of our data.

trajectories before SHI take-up. Following enrollment, hospital visits increase sharply and persistently across the cohorts.

Panel (c) plots the difference in mean hospital visits between the 2008 enrollment cohort and several alternative control groups who receive SHI between 2010 ($\delta = 2$) and 2015 ($\delta = 7$). Two patterns stand out. First, pre-treatment differences are flat and close to zero across all comparisons, indicating aligned pre-trends. Second, post-treatment differences are similar across all values of δ, implying that estimated treatment effects are largely insensitive to the choice of control cohort within this seven-year window.

Taken together, this evidence suggests that individuals who receive employer-provided SHI within a seven-year horizon follow similar healthcare trajectories absent treatment. To exploit this feature and to maximize statistical power, our baseline analysis therefore focuses on individuals who receive employer-provided SHI between 2007 and 2010. For each treatment cohort, we define the control group as individuals who receive SHI five or more years later. For example, the control group for individuals enrolling in 2007 consists of workers who receive SHI between 2012 and 2015. The black solid line in Panel (c) of Appendix Figure C.1 illustrates the difference in hospital visits between the 2008 cohort and its corresponding control group.

To ensure comparability between treated and later-treated individuals, we impose symmetric sample restrictions. Individuals must be aged 25–63 at event time $k = 0$, employed in both $k = -1$ and $k = 0$, have no history of disability insurance prior to $k = 0$, and be Swedish residents throughout the window $k = -5$ to $k = 5$.[24] These restrictions implicitly require both treated and control individuals to be alive at $k = \delta$.[25]

We further improve balance by reweighting the comparison group to match the joint distribution of covariates in the treated group in $k = -1$, following DiNardo et al. (1996). Specifically, we reweight on gender (2 bins), age (4 bins), labor income decile (10 bins), and job tenure (6 bins), yielding 480 cells. The reweighting is done within each treatment and control group pair (e.g., we reweight $C = 2012$–2015 to match $T = 2008$). The resulting weights have mean 1 and range from 0.03 to 20.11, with 98% lying between 0.23 and 2.71. Table F.4 reports summary statistics for the main analytic sample after reweighting and shows close balance between treated and control groups. We demean our outcome variables with the control-group mean so that each individual's outcome $\hat{y}_{i,t} = y_{i,t} - \hat{y}^c_t$, where $\hat{y}^c_t$ is the control-group mean at time t. We estimate dynamic treatment effects using

[24]The age restriction reflects the typical upper eligibility age of 67 in SHI schemes, i.e. that dynamic effects are not confounded by ineligibility to SHI. The employment and disability restrictions ensure full work capacity and eligibility for employer-provided SHI.

[25]In Section IV.E, we employ an alternative research design that matches SHI recipients to individuals who never receive SHI and show that SHI has no statistically significant effect on mortality.

the following event-study specification:

$$\hat{y}_{it} = \alpha + \sum_{k=-4}^{4} \beta_k \cdot \mathbf{1}\{t - T_i = k\} + \mu_T + \varepsilon_{it}, \tag{1}$$

T_i is the year of SHI enrollment, and μ_T denote treatment-year fixed effects. The coefficients β_k trace the evolution of outcomes relative to the year of SHI take-up ($k = 0$), with $k = -1$ omitted as the reference period. We estimate equation (1) using OLS, clustering standard errors at the individual level. We coarsen this analysis to a simple pre-post difference-in-differences design:

$$\hat{y}_{it} = \alpha + \beta \cdot \mathbf{1}\{t - T_i > 0\} + \mu_T + \varepsilon_{it}. \tag{2}$$

We also follow Callaway and Sant'Anna (2021) and implement an alternative difference-in-differences design that uses never-treated and all not-yet-treated individuals as controls.[26] This approach improves statistical power, which is particularly important for our analysis of waiting times, where outcomes are observed over fewer years and are inherently sparse, as waiting times are only recorded for specialist care following a referral. All specifications condition on care codes, type of referral (treatment or sample collection), income, age, gender, and tenure.

IV.B Main Results

Using our empirical strategy, Panel (a) of Figure 2a presents dynamic estimates of the effect of employer-provided SHI on total healthcare costs around the time of enrollment. Total costs aggregate all privately and publicly funded healthcare visits involving a physician, all primary care visits, and prescription drug expenditures.[27] Gaining SHI induces a large and persistent increase in healthcare utilization. Three years after take-up, annual healthcare costs rise by approximately 1,000 SEK, corresponding to a 23 percent increase relative to the pre-treatment mean.[28]

Before turning to the sources of this utilization response, we assess the validity of the

[26] In our baseline design, the control group for each treated cohort is held fixed over time, ensuring that estimated dynamic treatment effects are not mechanically driven by changes in control group composition. The estimator of Callaway and Sant'Anna (2021) instead allows the composition of the control group to vary over time by incorporating not-yet-treated units, thereby increasing the size of the control group at each event time.

[27] Primary care effects are estimated using data from Stockholm. We combine these estimates with nationally estimated coefficients for the remaining outcomes and compute standard errors using the delta method. Appendix Figure D.6a shows similar patterns for other outcomes when restricting the sample to Stockholm.

[28] The first-stage take-up coefficient is approximately 0.65, implying an IV estimate of roughly 35 percent.

identifying assumptions underlying these estimates. Our design yields nonparametric dynamic treatment effects, allowing for a direct examination of pre-treatment trends.[29] The pre-treatment coefficients show no evidence of differential trends prior to SHI enrollment: costs do not rise before take-up, nor do we observe declining pre-trends that would be expected if firms selectively insured healthier workers whose health subsequently regressed toward the mean.

Panel (b) of Figure 2b unpacks the composition of the utilization response. Hospitalizations, specialist visits, and prescription drug use all increase following SHI enrollment. In contrast, primary care costs fall sharply. This pattern aligns closely with institutional features of SHI contracts, which allow patients to bypass general practitioners and access specialists directly.

Figure 3a illustrates the relative magnitudes of these changes by scaling the period-3 coefficients by each outcome's pre-treatment mean. If general practitioners did not function as gatekeepers, SHI would be expected to reduce primary care visits without affecting specialist utilization—simply accelerating the care pathway. Instead, specialist costs rise by roughly the same proportion as primary care costs fall, consistent with primary care acting as a binding gatekeeper for specialist services in the public system.

Crucially, the increase in specialist care is not the end point of the utilization response. If SHI merely encouraged low-severity patients to seek specialist opinions, the effects would be confined to that margin. Instead, we observe substantial downstream responses: prescription drug use increases, and hospitalizations rise markedly. These patterns indicate that individuals are rationed not only at the point of specialist access, but also at subsequent stages of diagnosis and treatment. A decomposition of hospitalizations shows that the response operates along both the extensive and intensive margins, as well as through higher costs per day. Moreover, SHI leads to more surgical procedures, and these effects are persistent over time rather than reflecting short-run retiming.

These effects are broad-based across medical conditions. Figure 3b plots diagnosis-specific effects (measured at the ICD chapter level), with specialist visit responses on the x-axis and hospitalization responses on the y-axis. Diagnoses exhibiting larger increases in specialist care also tend to show larger increases in hospitalizations. Appendix Figure D.2 provides further detail at the three-digit ICD level, where the largest relative increases are observed for mental and behavioral disorders—including stress- and depression-related conditions—and for musculoskeletal disorders such as back and joint pain.

[29] Appendix Figure D.3 shows corresponding estimates for the number of visits and prescription drug purchases. The close correspondence with the cost results indicates that effects are driven largely by the extensive margin—more visits rather than more costly treatment per visit.

The magnitude, composition, and persistence of the utilization response suggest that changes in financial incentives alone are unlikely to account for the observed effects. To formalize this argument, it is useful to distinguish price effects from access effects. At the aggregate level, approximately 86 percent of healthcare spending in Sweden is publicly financed (OECD, 2021b), with the remaining share paid privately. For individuals without SHI, this private share largely translates into out-of-pocket payments for care not fully covered by the public system. Gaining SHI shifts most of these private payments from the individual to the insurer. Under the conservative assumption that these aggregate shares are representative at the individual level, acquiring SHI therefore reduces an individual's effective out-of-pocket price of care by at most about 16 percent.

If SHI affected utilization solely through this price channel, standard estimates of moral-hazard elasticities (around –0.2 in Manning et al. (1987) and Finkelstein et al. (2012)) would predict only a modest increase in utilization—approximately 3 percent, since $0.2 \times 0.16 \approx 0.03$. Instead, we estimate that gaining SHI is associated with roughly 23 percent higher healthcare utilization. This gap is far too large to be explained by changes in financial incentives alone. The natural interpretation is that SHI primarily operates by relaxing non–price rationing constraints—such as waiting times and gatekeeping in the public healthcare system—rather than by lowering out-of-pocket prices.

Taken together, the evidence points to a consistent interpretation: SHI does not merely reallocate care or induce marginal, low-value utilization. Instead, it substantially expands access to downstream treatments—medications, surgeries, and hospital care—that appear constrained in the public system. The resulting utilization increases reflect care that matters.

IV.C Robustness

We probe the robustness of our findings along several dimensions, focusing on potential concerns related to comparability, selection, and endogenous employer behavior.

Reweighting In the baseline estimation strategy, we reweight observations in the control group by gender, age, labor income, and tenure to match the treated group, following DiNardo et al. (1996). Panel (a) of Appendix Figure D.1 shows how the estimated effect of SHI on total healthcare costs changes under alternative weighting strategies. Even without reweighting, the estimated effects are very similar to those in the baseline specification, suggesting that treated and control individuals are broadly comparable along observable characteristics and that our results are not driven by residual imbalance in basic demographics.

Selection into SHI Although the dynamic difference-in-differences estimates in Figure 2a do not exhibit pre-trends, a remaining concern is that employers may selectively enroll particular employees into SHI based on underlying health. Panel (b) of Appendix Figure D.1 addresses this concern by splitting the sample into SHI events in which a large majority of employees without SHI are enrolled simultaneously with the focal individual. In such cases, coverage decisions are more likely to reflect firm-level choices rather than individual selection. The estimated effects of SHI on healthcare costs are very similar across the two groups, suggesting that our results are unlikely to be driven by selective enrollment.

Employee bargaining power In smaller firms, individual employees may exert greater bargaining power and influence the employer's decision to provide SHI. To assess whether this channel drives our findings, Panel (c) of Appendix Figure D.1 further splits the sample by firm size. The estimated effects of SHI on healthcare costs are very similar across firms of different size, providing no evidence that our results are driven by individual employees inducing SHI provision.

Selection into firms A related concern is that employees may sort into firms based on whether they offer SHI. In practice, this concern is mitigated by the availability of individually purchased SHI. Nevertheless, Panel (d) of Appendix Figure D.1 reports estimates for healthcare costs (excluding primary care) by tenure at the time of SHI enrollment. We find no meaningful differences between individuals who joined the firm several years prior—who are unlikely to have selected based on future SHI provision—and those who received SHI around the time of firm entry. This suggests that sorting into firms based on SHI availability is unlikely to explain our results.

IV.D Income Heterogeneity

Figure 4 examines heterogeneity by household disposable income, defined in the year prior to SHI enrollment as described in Section II.B. The increase in total healthcare costs—measured relative to the pre-treatment mean—is largest in the bottom income quartile (53 percent) and declines monotonically across quartiles, falling below 19 percent in the top quartile.[30]

[30] Appendix Figure D.5 shows that this gradient is not driven by differential take-up dynamics across income groups. If anything, the implied IV estimates display an even steeper gradient, as the first stage is slightly stronger among higher-income households.

This pattern is consistent with SHI relaxing binding access constraints and generating the largest utilization responses among individuals who are furthest from care and have the greatest unmet needs. In this sense, SHI delivers the greatest private value to lower-income households by enabling access to care that appears rationed in the public system.

Panel (b) sheds light on the underlying mechanisms. Lower-income households experience particularly large increases in hospitalizations, with hospitalization costs rising considerably more in the bottom quartile. Although starting from lower baseline levels, prescription drug spending exhibits a similar declining gradient across income groups. Together, these patterns suggest that the higher value of SHI for poorer households reflects expanded access to downstream treatments—hospital care and medications—rather than marginal or low-intensity utilization.

IV.E Cancer and Mortality

A natural question is whether the substantial increase in healthcare utilization induced by SHI translates into measurable health improvements. We begin by examining all-cause mortality. Estimating mortality effects is not possible in our baseline design with a later-treated control group. We therefore adopt a framework that uses all not-yet-treated individuals as controls, including never-treated individuals, implementing the estimator of Callaway and Sant'Anna (2021). Specifically, we estimate dynamic treatment effects on one-year mortality hazards, defined as the probability of dying in year $t+1$ conditional on being alive in year t and observed in $t=0$.

Panel (a) of Appendix Figure E.1 shows that the average treatment effect of SHI on all-cause mortality is close to zero, although imprecisely estimated. This lack of precision is not surprising. The study population consists primarily of working-age individuals in good health, where baseline mortality rates are low. Even with a large sample, statistical power to detect plausible mortality effects is therefore limited.[31]

[31] In event time $t = 3$, we observe $n = 231{,}852$ at-risk person-years in the treatment group and a baseline one-year mortality hazard of $\hat{p}_0 = 0.0010869$ (i.e., 0.10869%). For a difference in one-year mortality hazards between treated and comparison units, the standard error is approximately $\mathrm{SE}(\hat{p}_T - \hat{p}_C) \approx \sqrt{\frac{p(1-p)}{n_T} + \frac{p(1-p)}{n_C}} \approx \sqrt{\frac{p}{n_T} + \frac{p}{n_C}}$, where the last approximation uses that p is small. Under the conservative assumption that the treated and control effective sample sizes are similar in this cell—due to reweighting of the not-yet-treated group—($n_T \simeq n_C \simeq n$), $\mathrm{SE} \approx \sqrt{\frac{2\hat{p}_0}{n}} = \sqrt{\frac{2\times 0.0010869}{231{,}852}} = 9.68 \times 10^{-5}$. For a two-sided test at the 5% level with 80% power, the minimal detectable effect (MDE) is $(z_{0.975} + z_{0.80}) \times \mathrm{SE} = (1.96 + 0.84) \times \mathrm{SE} = 2.80 \times \mathrm{SE}$, implying $\mathrm{MDE} \approx 2.71 \times 10^{-4}$, or 0.027 percentage points. Relative to the baseline hazard, this corresponds to a change of approximately 25%. As an optimistic lower bound, if the control group were effectively infinite so that its sampling variance is negligible, the MDE corresponds to a 17.6% change relative to baseline. Scaling by the first-stage take-up rate of approximately 0.65 implies detectable effects on mortality per covered individual on the order of 27–38% in relative terms.

We therefore turn to a population experiencing a sudden health shock, with substantially higher baseline mortality and where improved access to care is plausibly more likely to affect survival: individuals diagnosed with cancer. Cancer outcomes depend critically on stage at diagnosis, timeliness of treatment, and treatment intensity—margins that SHI may plausibly affect by relaxing access constraints.[32]

Panel (a) of Figure 5 presents evidence on the effect of SHI on cancer-related outcomes using our main, pooled difference-in-differences design (equation 2). The leftmost bar shows that SHI significantly increases health screening activity, defined as specialist or hospital encounters with an ICD-10 code in Z00–Z04 or Z10–Z13. These codes capture health checks, preventive examinations, and screening-related visits — visits where suspicion of cancer is commonly formed. The second bar shows that cancer-related visits increase following SHI enrollment. These healthcare encounters include both planning for, and treatments of, cancer and are captured with ICD-10 codes in C00–C99, D00–D10, and D37–D48 (malignant neoplasms, carcinoma in situ, and neoplasms of uncertain or unknown behavior, respectively).

Using data from the National Cancer Register, Panel (b) shows that SHI increases cancer detection. Three years after enrollment, the annual probability of receiving a new cancer diagnosis rises by 36 percent, with the largest relative increase for malignant tumors. We also observe increases in diagnoses of carcinoma in situ (abnormal cells that look like cancer but have not yet spread) and benign tumors, consistent with increased detection rather than changes in underlying disease incidence.

Panels (c) and (d) complement the event-study analysis by exploiting cross-sectional variation among individuals diagnosed with cancer. This approach maximizes statistical power—important given the rarity of cancer diagnoses—and allows us to explore mechanisms and potential health implications among diagnosed individuals.

Specifically, for individuals diagnosed with cancer, we estimate the following regression:

$$y_i = \alpha + \beta \, \text{SHI}_i + X_i'\gamma + \varepsilon_i, \tag{3}$$

where y_i denotes either cancer stage at diagnosis (Panel (c)) or an indicator for three-year all-cause mortality (Panel (d)), SHI_i is an indicator for having any supplementary health insurance (employer; group or individual) in the year prior to diagnosis, and X_i includes a rich set of control variables (e.g. year, age, gender, region of residence, education and household disposable income percentile rank dummies). Our OLS-sample includes all individual who have their first cancer diagnosed between 2007 and 2015, are between the

[32] Appendix Figure E.2 motivates the focus by showing higher average mortality rates in this population, in particular among individuals diagnosed with late stage cancer.

ages of 27 and 63 at the time of diagnosis, and who worked in the year prior to diagnoses.

Panel (c) of Figure 5 first examines cancer stage at diagnosis. The estimates indicate that individuals with SHI are more likely to be diagnosed at earlier stages and less likely to be diagnosed at advanced stages. This is consistent with SHI facilitating earlier detection through improved access to diagnostic services.

Panel (d) examines three-year all-cause mortality among cancer patients. The leftmost bar reveals β-coefficients from equation (3). Having SHI is associated with a mortality reduction of almost two percentage points, from a baseline mortality of 18%, conditional on various individual-level characteristics. We then sequentially add controls for chronic conditions, cancer site, and stage at diagnosis. Adding controls for cancer site reduces the estimated effect by roughly half, indicating heterogeneity in the types of cancers diagnosed among individuals with and without SHI. Once controlling for stage at diagnosis, mortality differences become small and statistically indistinguishable from zero at conventional levels, with magnitudes comparable to those observed for benign tumors and carcinoma in situ (where mortality rates are generally low at baseline). We interpret this pattern as evidence that the association between SHI and cancer survival operates primarily through earlier detection rather than improved survival conditional on stage.[33]

As a robustness, Table F.5 and F.6 compare the OLS-estimates with an instrumental-variable approach. We instrument for SHI enrollment using the leave-one-out mean of firm-level SHI coverage. Specifically, for individual i employed at firm f, the instrument is defined as $Z_{if} = \frac{1}{N_f - 1} \sum_{j \neq i,\, j \in f} \text{SHI}_j$, capturing variation in employer-provided SHI driven by co-workers' coverage rates rather than individual health. The instrument is constructed using employer-provided SHI only. Our first stage is strong, with F-statistics well above conventional thresholds. The 2SLS estimates control for a rich set of characteristics—including year of diagnosis, age, and gender—and yield coefficients that are very similar in magnitude to the OLS estimates. While the exclusion restriction cannot be tested directly, the close correspondence between OLS and IV results is consistent with the descriptive evidence presented earlier, which shows no adverse selection into SHI and, if anything, selection on more advantageous characteristics. These patterns mitigate concerns that our estimates are driven by unobserved health-based selection into SHI.

Taken together, the results point to a clear mechanism. SHI increases screening and diagnostic activity, leading to higher detection rates and a shift toward earlier-stage cancer diagnoses. While we find no detectable effects on all-cause mortality in the main sample, and limited power to detect survival effects even among cancer patients, the fact that mortality differences vanish once conditioning on stage indicates that any survival advantage

[33] Appendix Figure E.4 shows that this pattern is robust across one- through five-year mortality horizons.

associated with SHI operates primarily through earlier detection rather than improved survival conditional on diagnosis. Where health benefits arise, they therefore reflect more timely access to diagnostics.

V SHI Externalities on Publicly Funded Care: Healthcare Costs and Waiting Times

The evidence so far shows that SHI substantially expands access to valuable healthcare, particularly for individuals who appear most constrained in the public system. How these private gains map into the public healthcare system, however, is not obvious ex ante. One possibility—often emphasized by proponents of SHI—is that increased utilization reflects substitution away from publicly funded care toward privately financed providers, thereby alleviating pressure on the public system. An alternative possibility is that SHI relaxes access constraints in ways that also increase utilization within the publicly funded system, generating spillovers through higher public expenditures or congestion in shared queues. Distinguishing between these channels is central to assessing the broader welfare implications of SHI. We turn to this question next.

V.A Cost Externalities

We begin by estimating how the effect of SHI on total healthcare costs varies by funding source. For individuals residing in Stockholm, we observe publicly funded care using administrative data from Stockholm County. These data record all healthcare services—provided by both public and private providers—that are invoiced to the public payer (see Section II.B). For the same individuals, we also observe all physician-based healthcare encounters through the National Patient Register, which includes both publicly and privately financed care.

This data structure allows us to cleanly separate publicly funded from privately funded utilization. Our measure of public-sector healthcare costs is comprehensive and precisely observed. By contrast, our measure of privately funded care associated with SHI should be interpreted as a lower bound, as SHI contracts may also cover services not involving a physician—such as physiotherapy, second opinions, or other ancillary services—which are not captured in the National Patient Register. This limitation is irrelevant for our estimation of the effects of SHI on publicly funded care, which is the object of interest in this section.

Figure 6 reports estimates of the effect of SHI on healthcare costs at event time $t = 3$, scaled by the pre-treatment mean and decomposed by funding source.[34] We find that

[34] Appendix Figure shows dynamic estimates of SHI on privately funded healthcare costs, focusing on

approximately 70 percent of the total cost increase is borne by the public sector. In levels, individuals who receive employer-provided SHI consume an additional 759 SEK per year in publicly funded care relative to those who receive SHI later.

This increase reflects offsetting responses along the care pathway. SHI reduces publicly funded primary care costs, consistent with patients bypassing general practitioners. However, these savings are more than offset by higher spending on specialist visits, prescription drugs, and hospitalizations. Taken together, the results show that SHI crowds in publicly funded care. On net, the recent expansion of SHI generates cost externalities within the public healthcare system.

These results highlight that privately financed and publicly financed healthcare should not be viewed as operating in isolation. While SHI directly substitutes for publicly funded primary care, it can simultaneously increase publicly funded utilization through its effects on patient pathways and physician behavior. One mechanism is diagnostic intensity: SHI patients may receive earlier or more comprehensive medical evaluations, including screening and specialist assessments, which increase the probability that underlying conditions are identified and subsequently treated within the public system. A second mechanism reflects coverage boundaries. Even when initial consultations occur within the private sector, physicians may recommend follow-up diagnostics, prescription drugs, or hospital treatments that are financed publicly because they fall outside the scope of SHI contracts. In both cases, privately insured patients may generate additional demand for publicly funded care downstream.

Allowing such interaction between private and public systems involves an inherent trade-off. On the one hand, integration ensures that patients who obtain private access—but nonetheless require costly or complex treatment—can receive appropriate care within the public system. From this perspective, interaction promotes continuity of care and guards against under-treatment of privately insured patients whose conditions exceed the scope of SHI. On the other hand, when access to private consultations accelerates diagnosis or referral into publicly funded treatment, privately insured patients may consume public resources at the expense of others, potentially exacerbating congestion and fiscal pressure in the public system. Our results suggest that the recent expansion of SHI operates through both margins, with important implications for the allocation of public healthcare resources.

hospitalizations and specialist visits separately.

V.B Waiting Times

The previous section shows that SHI leads to a substantial increase in healthcare utilization, much of which occurs within the publicly funded system. An immediate question is whether individuals with SHI also receive publicly provided care faster. This question is central for understanding the implications of SHI for those who rely exclusively on public healthcare. By increasing demand in a capacity-constrained system, the expansion of SHI may raise pressure on the public sector and lengthen queues for patients without SHI. At the same time, SHI may alter how access is allocated within the public system, allowing some patients to move more quickly through existing queues. In this section, we focus on this latter margin by studying waiting times conditional on receiving the same treatment for the same diagnosis.

We begin with descriptive evidence on waiting times in publicly funded care. Using referral-level data from the Stockholm region's Central Waiting Time Register, we compare waiting times between individuals with and without SHI. Appendix Figure F.1 shows clear and economically meaningful differences: on average, individuals with SHI wait 5.7 days less for specialist visits, hospital treatment, and diagnostic procedures. While these raw gaps are informative, they may reflect selection or differences in care-seeking behavior, motivating a causal analysis.

Applying the estimator in Callaway and Sant'Anna (2021), Panel (a) of Figure 7 shows that SHI reduces waiting times in publicly funded care.[35] Conditional on receiving care and conditional on the type of care (diagnosis codes and treatment type), individuals experience an immediate and persistent waiting-time reduction due to enrolling in SHI. The effects are economically and statistically significant: 3 years after enrollment, the waiting time is 7.4 days shorter, compared to a baseline of 48 days. These results reflect changes in queue position for comparable care rather than differences in case mix or care-seeking behavior.

These average effects are driven by a substantial increase in the likelihood of receiving care within seven days and reduces the incidence of long waits of three to five months, as displayed in Panel (b) of Figure 7. In other words, SHI primarily reduces the probability of experiencing long delays in care, rather than marginally shortening already short waits.

Panel (c) of Figure 7 shows that waiting-time effects vary systematically with baseline congestion. Reductions in waiting times are largest for diagnoses with longer baseline waits and are small or absent for conditions with little congestion. While we do not directly observe how one individual's enrollment in SHI affects the waiting times faced by other

[35] Appendix Figure F.2 replicates the analysis in Panel (a) using our baseline research design and shows that effects are very similar.

patients, this pattern is informative. In a capacity-constrained system, faster access for some patients must come at the expense of longer waits for others, holding supply fixed. The concentration of waiting-time reductions in the most congested parts of the system is therefore difficult to reconcile with explanations based on excess capacity or efficiency gains and instead points to congestion externalities arising from the expansion of SHI.[36]

We next examine the mechanism through which SHI affects waiting times. In the public system, access to specialist and hospital care is mediated through referrals, and referring physicians can flag referrals for priority review. Using referral-level data, we find that patients with SHI are significantly more likely to have their referrals reviewed for priority (Panel (b) of Appendix Figure). Moreover, income group and diagnoses that experience larger waiting-time reductions are also more likely to receive prioritized referrals. These results suggest that individuals with SHI advance through public-sector queues because their referrals are more likely to be prioritized.

Two empirical concerns merit discussion. First, SHI might appear to reduce waiting times simply because individuals seek care more readily once access improves. We address this concern by conditioning on diagnosis codes and treatment types, thereby holding medical need fixed. Waiting-time reductions persist within narrowly defined conditions, ruling out a pure demand-response explanation. Second, SHI may allow individuals to substitute from publicly funded care to privately provided treatment, mechanically reducing observed waits in the public system. If this channel dominated, estimated effects would reflect selective use of faster public treatments rather than genuine queue advancement. We address this concern in Appendix Figure F.3 by restricting the analysis to diagnoses and treatments that are provided exclusively within the public system, where such substitution is not possible. The waiting-time effects remain quantitatively similar.

In sum, SHI affects not only the quantity of healthcare utilization but also the speed at which publicly funded care is delivered. Individuals with SHI both consume more public healthcare and receive it faster for a given diagnosis and treatment. In a system operating close to capacity, this combination implies a reallocation of access within public-sector queues and, consequently, congestion externalities for patients without SHI. These results show that waiting times are a key channel through which the expansion of SHI reshapes access to care in universal healthcare systems.

[36]Under excess capacity or broad efficiency gains, waiting-time reductions would be expected to be more uniform across diagnoses; instead, we find that effects are concentrated in the most congested parts of the system.

VI SHI Incidence: Consumer Surplus and Welfare

This section aggregates our empirical estimates and quantifies the consumer surplus and externalities generated by SHI. To do so, we develop a stylized framework, which also emphasizes that, in a capacity-constrained public healthcare system, SHI not only expands care, but also reallocates access, generating both private gains and social spillovers. We then study how these effects differ across income groups to evaluate the distributional consequences of SHI.

VI.A Conceptual Framework

We first provide a framework which helps quantifying the consumer surplus and externalities that SHI generates. Our framework is stylized and assesses welfare through healthcare utilization and waiting times and how these change when enrolling in SHI.

Individual Preferences Let individual utility be given by $u(q, w, z)$, where q denotes total healthcare consumption, w the associated waiting time, and z out-of-pocket expenditures. We assume quasi-linearity in expenditures and that the marginal value of healthcare depends on waiting times:

$$\frac{\partial u}{\partial q} = v'(q) + \lambda(\tilde{w} - w),$$
$$\frac{\partial u}{\partial w} = -\lambda q.$$

The parameter $\lambda > 0$ captures the marginal disutility of waiting, while $\tilde{w}$ denotes a reference waiting time at which the marginal value of care equals $v'(q)$. The marginal value of healthcare is higher when waiting times are shorter, and the marginal value of reducing waiting times is increasing in healthcare utilization. We also normalize $\frac{\partial u}{\partial z} = -1$.

Healthcare can be consumed in the public ($j = 0$) or private ($j = 1$) sector, with corresponding quantities q^j and waiting times w^j, where $q = q^0 + q^1$. We assume

$$\frac{\partial u}{\partial q^j} = v'(q) + \lambda(\tilde{w} - w^j), \qquad \frac{\partial u}{\partial w^j} = -\lambda q^j.$$

We normalize the waiting time in the public healthcare sector, w^0, as the reference waiting time for expressing the value of care, implying $\tilde{w} = w^0$. Under this normalization, the willingness to trade off publicly provided healthcare for reductions in waiting time is

given by

$$\frac{\partial u/\partial w}{\partial u/\partial q} = \frac{\lambda q}{v'(q)},$$

which we interpret as the willingness to give up healthcare in the public sector to reduce waiting time by one unit.

Healthcare Costs and Capacity Constraints Public healthcare is produced at cost $C(Q^0, w^0)$, where Q^0 denotes aggregate public healthcare utilization and w^0 the average waiting time. We assume

$$\frac{\partial C}{\partial Q^0} = \zeta'(Q^0) + \mu(\bar{w} - w^0),$$
$$\frac{\partial C}{\partial w^0} = -\mu Q^0,$$

where μ captures the capacity constraints of the public healthcare system. The higher μ, the more costly it is to reduce waiting times. Similarly, the higher μ, the more costly it is to expand care, while keeping waiting times constant. Indeed, we assume that the cost of expanding care reflects direct resource costs (e.g., treatments and drugs) as well as the costs borne to keep average waiting times constant (e.g., additional staff or equipment). By analogy to the individuals' preferences, we assume a reference waiting time $\bar{w}$ at which the system could expand care and keep the waiting time constant at zero extra cost. Hence, it seems reasonable to assume that $\mu > 0$ and $\bar{w} > w^0$. This structure implies that SHI-induced changes in utilization and waiting times generate social costs that are not internalized by enrollees.

Welfare Effects of SHI Enrollment in SHI affects welfare through three channels: increased utilization, reduced waiting times, and changes in out-of-pocket payments. The welfare gain for SHI enrollees can be approximated by

$$\Delta u_S \approx v'(q)\Delta q_S - \Delta z_S - \lambda q^0 \Delta w_S^0 + \lambda(w^0 - w^1)\Delta q_S^1, \tag{4}$$

where subscript S denotes SHI enrollment. We interpret this utility gain, expressed in monetary units, as consumer surplus. The first term captures the value of additional care, the second the reduction in out-of-pocket payments, and the remaining terms the gains from reduced waiting times in public care and substitution toward faster private care. We will assume that the marginal value of a dollar of care equals a dollar and use prior estimates of willingness-to-pay for reductions in waiting from Russo (2023).

Enrollment in SHI also generates externalities. First, increased public utilization raises costs borne by the public provider:

$$\Delta C \approx \zeta'(Q^0)\Delta Q_S^0 + \mu(\bar{w} - w^0)\Delta Q_S^0, \tag{5}$$

which we refer to as the *cost externality*. These costs are driven by the expansion of care, but also include the costs to keep average waiting times constant. Second, reduced waiting times for SHI enrollees imply longer waiting times for non-enrollees, keeping healthcare resources constant. That is, $dC = 0$ requires

$$-\mu q_S^0 S \Delta w_S^0 - \mu q_{noS}^0 (1 - S)\Delta w_{noS}^0 = 0,$$

where S denotes the aggregate SHI enrollment rate. Hence, the corresponding loss in surplus for non-enrollees is

$$\Delta u_{noS} \approx \lambda \frac{S}{1 - S} q_S^0 \Delta w_S^0, \tag{6}$$

which we refer to as the *congestion externality*.

In principle, the public healthcare system could also absorb the increased utilization by SHI enrollees by allowing waiting times for non-SHI enrollees to rise. In that case, we would have

$$\begin{aligned} \Delta C &\approx \zeta'(Q^0)\Delta Q_S^0, \\ \Delta u_{noS} &\approx \lambda \frac{S}{1 - S} \left[q_S^0 \Delta w_S^0 - (\bar{w} - w_S^0)\Delta q_S^0 \right]. \end{aligned}$$

These expressions do no longer depend on μ, but still depend on $\bar{w} - w_S^0$. We propose the normalization $(\bar{w} - w_S^0)/w_S^0 = 1$, which implies that absorbing a one-percent increase in utilization is as costly as absorbing a one-percent reduction in waiting times.

VI.B Consumer Surplus and Externalities

We now quantify annual measures of the private benefits and externalities defined in the conceptual framework.

Following equation 4, the average consumer surplus associated with SHI equals the sum of three terms. First, SHI induces additional healthcare utilization, measured using estimated $t = 3$ changes in healthcare expenditures attributable to SHI coverage (see Figure 2b). We evaluate this change in monetary terms (i.e., $v'(q) = 1$). Second, SHI converts a portion of privately financed care that existed prior to coverage into insured care,

mechanically raising surplus by eliminating out-of-pocket payments on inframarginal utilization. Third, SHI reduces waiting times for both publicly and privately funded care, which we then monetize using willingness-to-pay estimates in three steps.

We first measure the change in waiting times associated with SHI. Publicly funded care experiences a reduction of $\Delta w_0 = -7.4$ day, as estimated in **??**. For privately funded care, we assume that SHI reduces waiting times from an average of 46 days - 43 days for specialist or hospital care plus 3 days for GP referral - to the advertized 7 days under SHI, implying $w_1 - w_0 = -39$ days. We then map waiting time changes into monetary values using the willingness-to-pay estimate from Russo (2023), who find that patients are willing to pay $2.5 to reduce waiting by one day. We translate this into a willingness-to-pay per dollar of healthcare cost of $\lambda = 2.5/186 \approx 0.014$, 186 is the mean total cost of a GP visit in the US (Agency for Healthcare Research and Quality , AHRQ). Waiting time changes are then scaled by observed specialist and hospital expenditures at $t = 3$ in the public and private sectors, respectively.

Figure 8 reports the results. The average consumer surplus adds up to about 2000 SEK per year. The dominant source of private surplus arises from the extra healthcare (about 53 percent), but the reductions in waiting times are substantive as well, especially for publicly funded care. In contrast, surplus from insurance coverage itself is modest (about 7 percent), reflecting the comprehensiveness of baseline public insurance.

In addition to these private benefits, SHI generates externalities on the public healthcare system. The cost externality reflects the increased publicly funded healthcare induced by SHI coverage, Δq_0, as estimated in 3. This amounts to 436 SEK per year. The congestion externality arises from the shorter waiting times for SHI enrollees in the public system, which need to be absorbed and amount to 470 SEK per year. We monetized the congestion externality using the same willingness-to-pay parameter λ.

Comparing the two, SHI generates sizeable and comparable cost and congestion externalities that together offset 47 percent of the private gains. From a welfare perspective, this creates a wedge between the private and social value of SHI that could, in principle, be internalized through corrective taxation or subsidy reform. Notably, SHI contracts in Sweden have historically been subsidized, further amplifying this wedge.

VI.C Distributional Analysis

We next examine how consumer surplus gained and externalities borne vary across the income distribution. We partition individuals into quartiles of disposable income measured

prior to SHI enrollment.[37]

Figure 9 shows how consumer surplus and externalities vary across the income distribution. While total consumer surplus is broadly similar across income groups (Panel (a)), its composition differs markedly. For higher-income individuals, reduced waiting times account for the majority of the surplus generated by SHI, whereas for lower-income individuals, increased healthcare utilization is the primary driver of value. These patterns are mirrored in the income-specific externalities shown in Panel (b). As discussed before, this heterogeneity reflects different margins of adjustment. Lower-income individuals primarily use SHI to increase access to care, consistent with being more tightly rationed in the public system. In contrast, higher-income individuals mainly use SHI to obtain faster treatment, consistent with a higher opportunity cost of waiting for publicly provided care.

To assess the aggregate incidence per income group, we combine the estimated average consumer surplus and the borne externalities with the appropriate SHI coverage rates. That is, aggregate consumer surplus for income group g is

$$CS_g = S_g \cdot \Delta u_{g,S}, \tag{7}$$

where S_g is the group-specific coverage rate. In contrast, congestion externalities are assumed to be borne by the uninsured and allocated across income groups in proportion to healthcare utilization among uninsured individuals. Let $q^0_{g,\text{noS}}$ denote total healthcare use among uninsured individuals in income group g and Δu_{noS} the congestion externality for the average individual without SHI. The congestion burden borne by group g is

$$X^w_g = \frac{(1 - S_g)\, q^0_{g,\text{noS}}}{\sum_{h=1}^{4} (1 - S_h)\, q^0_{h,\text{noS}}} \cdot \Delta u_{noS}. \tag{8}$$

We finally assume that cost externalities are shared equally across the population,

$$X^q_g = S \cdot \Delta q_0, \tag{9}$$

where S is the overall SHI enrollment rate and Δq^0 is the per-insured public cost externality.

The strong income gradient in group-specific coverage rates S_g (and the complemen-

[37] For each income group g, we compute average consumer surplus $E[\Delta u_S]$, allowing the following components to vary by income: (i) SHI-induced healthcare utilization; (ii) changes in waiting times for publicly funded care; (iii) the value of public and private specialist and hospital expenditures; and (iv) the amount of pre-SHI privately funded care that becomes insured. The willingness-to-pay parameter λ is held fixed across income groups. We consider robustness analysis in Table 2, allowing λ to vary by income group and considering alternative valuations using the daily compensation paid by insurance companies when statutory waiting-time guarantees are not met (SEK 300 per day).

tary shares $1-S_g$) are shown again in Panel (c). Panel (d) then combines the heterogeneous surplus and externality components with the income gradients in SHI enrollment to calculate the net value of SHI for each income group:

$$\Delta W_g = CS_g - (X_g^w + X_g^q). \tag{10}$$

This illustrates the incidence effects of SHI across income groups, abstracting from premium payments. Net welfare effects are even negative for the lowest income quartile, as few enrollees enjoy the consumer surplus and many non-enrollees bear the congestion externality. The net welfare effects are rapidly increase and substantial for the highest income quartile.

Table 2 explores how the distributional patterns documented in Figure 9 changes for alternative valuation assumptions and counterfactual coverage regimes. Net values remain substantially higher for the top income quartile than for the bottom quartile for alternative assumptions. Allowing willingness-to-pay for waiting-time reductions to vary by income attenuates congestion externalities for low-income individuals, improving their net values, but at the same time increases net gains at the top, leaving the overall incidence regressive. Using statutory waiting-time compensation as an alternative valuation further increases magnitudes but not rankings. Counterfactual expansions of SHI coverage illustrate the drivers of the distributional differences: equalizing enrollment shares mostly equalizes the incidence of SHI across income groups. However, further increase the overall enrollment to the rate of 20 percent, but keeping the same relative income gradient substantially raise net gains for high-income groups and generate negative net values for low-income groups due to amplified congestion. Overall, the unequal incidence of SHI reflects difference in enrollment rather than specific valuation assumptions.

Taken together, the results indicate that while SHI generates substantial private value, it allocates this value regressively and imposes socially meaningful externalities on individuals who remain reliant on the public healthcare system.

VII Conclusion

This paper studies the role of supplemental health insurance in a universal healthcare system, focusing on how private coverage interacts with non–price rationing in publicly financed care. Using linked administrative data from Sweden that identify SHI contracts and healthcare utilization across public and private providers, we document a steep income gradient in SHI enrollment that runs counter to gradients in healthcare needs. Exploiting variation in the timing of employer-sponsored SHI, we show that coverage leads

to large and persistent increases in healthcare utilization. These effects are concentrated in specialist visits, hospital admissions, and prescription drugs and are difficult to reconcile with standard estimates of price-based moral hazard (Manning et al., 1987; Finkelstein et al., 2012). Instead, the magnitude and composition of the responses point to SHI relaxing binding non–price access constraints—such as waiting times and gatekeeping—in the public system, consistent with access and rationing as central margins through which top-up insurance affects utilization (Einav and Finkelstein, 2023).

The effects of SHI extend beyond privately insured individuals. In a system with formally uniform public benefits but binding capacity constraints, SHI operates primarily as an access-shifting device rather than simply an additional layer of private financing. We show that SHI increases utilization largely within the publicly funded system and is associated with shorter waiting times for comparable public services, particularly in more congested settings. This implies that even when benefits and prices are uniform on paper, access is not: private coverage creates de facto non-uniformity by allowing some individuals to bypass non–price rationing mechanisms such as queues and priority rules.

These access shifts generate externalities that differ from those emphasized in much of the existing insurance literature. Rather than operating mainly through enrollment decisions or coverage generosity, the externalities documented here arise through congestion and priority within the public system. SHI holders do not merely consume more care; they move ahead in public queues, increasing waiting times and crowding for those without supplemental coverage. As a result, private insurance choices affect others even when public benefits, provider payments, and prices remain unchanged. This access-based channel complements existing analyses of fiscal spillovers and crowd-out in mixed insurance systems (Cutler and Gruber, 1996; Cabral and Mahoney, 2019) and provides empirical content to concerns about the efficiency of uniform public provision in the presence of heterogeneous demand and scarce capacity (Shepard et al., 2019).

From a policy perspective, these findings underscore that evaluations of supplemental insurance in universal systems cannot be limited to private benefits or fiscal accounting alone. When publicly financed services are rationed by non–price mechanisms, private access channels can reshape the effective allocation of public resources in ways that are neither transparent nor neutral. Policies governing supplemental coverage—such as its tax treatment, its integration with public provision, or restrictions on its use for publicly funded services—therefore have direct implications for equity, congestion, and system performance. More broadly, the results highlight a general feature of public programs with a public–private mix: when access to publicly financed services is capacity constrained, private options can stratify access through queues, priority, or timing rather than prices,

generating spillovers that matter for both efficiency and distribution even when public benefits are formally uniform.

References

Abaluck, Jason and Jonathan Gruber, "Choice Inconsistencies among the Elderly: Evidence from Plan Choice in the Medicare Part D Program," *American Economic Review*, 2021, *111* (6), 1915–1947.

Agency for Healthcare Research and Quality (AHRQ), "Health Insurance Coverage: Findings from the Medical Expenditure Panel Survey, Statistical Brief #517," Medical Expenditure Panel Survey (MEPS), U.S. Department of Health and Human Services 2024. Accessed February 5, 2026.

Amin, Mahul B., Stephen B. Edge, Frederick L. Greene, David R. Byrd, Robert K. Brookland, M. K. Washington, Jeffrey E. Gershenwald, Carolyn C. Compton, Kenneth R. Hess, Daniel C. Sullivan, John M. Jessup, James D. Brierley, Laura E. Gaspar, Richard L. Schilsky, Charles M. Balch, David P. Winchester, Evans A. Asare, Michael Madera, Donna M. Gress, and Lisa R. Meyer, eds, *AJCC Cancer Staging Manual*, 8 ed., New York: Springer, 2017.

Atkinson, Anthony B. and Joseph E. Stiglitz, "The Design of Tax Structure: Direct versus Indirect Taxation," *Journal of Public Economics*, 1976, *6*, 55–75.

Baicker, Katherine, Sendhil Mullainathan, and Joshua Schwartzstein, "Behavioral Hazard in Health Insurance," *Quarterly Journal of Economics*, 2015, *130* (4), 1623–1667.

Bensnes, Simon, Ingrid Huitfeldt, and Victoria Marone, "The Distributional Effects of Cost-Sharing in a Universal Healthcare System," 2025. NBER Working paper.

Besley, Timothy, "Publicly provided disaster insurance for health and the control of moral hazard," *Journal of Public Economics*, 1989, *39* (2), 141–156.

_ , James Hall, and Ian Preston, "The Demand for Private Health Insurance: Do Waiting Lists Matter?," *Journal of Public Economics*, 1999, *72* (2), 155–181.

Blomqvist, Åke and Per-Olov Johansson, "Economic efficiency and mixed public/private insurance," *Journal of Public Economics*, 1997, *66* (3), 505–516.

Boone, Jan, "Basic versus supplementary health insurance: Moral hazard and adverse selection," *Journal of Public Economics*, 2015, *128*, 50–58.

Brot-Goldberg, Zarek, Amitabh Chandra, Benjamin R. Handel, and Jonathan T. Kolstad, "What Does a Deductible Do? The Impact of Cost-Sharing on Health Care Prices, Quantities, and Spending Dynamics," *Quarterly Journal of Economics*, 2017, *132* (3), 1261–1318.

Busse, Reinhard and Miriam Blümel, "Germany: Health System Review," *Health Systems in Transition*, 2014, *16* (2), 1–296.

Cabral, Marika and Neale Mahoney, "Externalities and taxation of supplemental insurance: A study of Medicare and Medigap," *American Economic Journal: Applied Economics*, 2019, *11* (2), 37–73.

Callaway, Brantly and Pedro HC Sant'Anna, "Difference-in-differences with multiple time periods," *Journal of econometrics*, 2021, *225* (2), 200–230.

Case, Anne and Angus Deaton, "Rising Morbidity and Mortality in Midlife among White Non-Hispanic Americans in the 21st Century," *Proceedings of the National Academy of Sciences*, 2015, *112* (49), 15078–15083.

Chandra, Amitabh, Jonathan Gruber, and Robin McKnight, "The Value of Health Insurance: Evidence from the Medicare Program," *Journal of Political Economy*, 2021. forthcoming.

Chetty, Raj, Michael Stepner, Sarah Abraham, Shelby Lin, Benjamin Scuderi, Nicholas Turner, Augustin Bergeron, and David Cutler, "The association between income and life expectancy in the United States, 2001-2014," *Jama*, 2016, *315* (16), 1750–1766.

Currie, Janet, "Healthy, Wealthy, and Wise: Socioeconomic Status, Poor Health in Childhood, and Human Capital Development," *Journal of Economic Literature*, 2009, *47* (1), 87–122.

Cutler, David M, "Equality, efficiency, and market fundamentals: the dynamics of international medical-care reform," *Journal of economic literature*, 2002, *40* (3), 881–906.

Cutler, David M., Adriana Lleras-Muney, and Tom Vogl, "Socioeconomic Status and Health: Dimensions and Mechanisms," 2011.

_ **and Jonathan Gruber**, "Does Public Insurance Crowd Out Private Insurance?," *The Quarterly Journal of Economics*, 1996, *111* (2), 391–430.

Danesh, Kaveh, Jonathan T. Kolstad, Johannes Spinnewijn, and William D. Parker, "The Chronic Disease Index: Analyzing Health Inequalities Over the Lifecycle," NBER Working Paper 32577, National Bureau of Economic Research 2024.

Department of Health and Social Care, "National Health Service Guidance on Patient Choice and Private Care," Technical Report, UK Department of Health, London 2017.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux, "Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach," *Econometrica*, 1996, *64* (5), 1001–1044.

Einav, Liran, Amy Finkelstein, and Mark R. Cullen, "Estimating Welfare in Insurance Markets Using Variation in Prices," *Quarterly Journal of Economics*, 2010, *125* (3), 877–921.

_ **and** _ , *We've Got You Covered: Rebooting American Health Care*, New York, NY: Portfolio / Penguin, 2023.

Fadlon, Itzik and Torben Heien Nielsen, "Family Labor Supply Responses to Severe Health Shocks: Evidence from Danish Administrative Records," *American Economic Journal: Applied Economics*, July 2021, *13* (3), 1–30.

Fang, Hanming, Michael Keane, and Dan Silverman, "Disentangling Moral Hazard and Adverse Selection from Dynamic Insurance Data," *American Economic Review*, 2008, *98* (1), 147–185.

Ferey, Antoine, Ben Lockwood, and Dmitry Taubinsky, "Sufficient statistics for nonlinear tax systems with general across-income heterogeneity," *The American economic review*, 2024, *114*, 3206–3249.

Finkelstein, Amy, "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare," *Quarterly Journal of Economics*, 2007, *122* (1), 1–37.

_ and Robin McKnight, "What Did Medicare Do (and Was It Worth It)?," *Journal of Health Economics*, 2008, *27* (6), 1644–1668.

_ , Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, and Katherine Baicker, "The Oregon Health Insurance Experiment: Evidence from the First Year," *The Quarterly Journal of Economics*, 2012, *127* (3), 1057–1106.

Fleitas, Sebastián, Caitlyn Fleming, Gautam Gowrisankaran, and Anthony T. Lo Sasso, "Group health insurance versus ACA marketplaces: Selection, subsidies, and welfare," NBER Working Paper 33938, National Bureau of Economic Research 2025.

Flood, Colleen M. and Bryan Thomas, "Blurring of the Public/Private Divide: The Canadian Chapter," *Canadian Medical Association Journal*, 2001, *164* (4), 541–544.

Geruso, Michael and Timothy J. Layton, "Selection in Health Insurance Markets and Its Policy Remedies," *Journal of Economic Perspectives*, 2017, *31* (4), 23–50.

_ , Timothy Layton, and Adam Leive, "The Incidence of Adverse Selection: Theory and Evidence from Health Insurance Choices," 2023. NBER Working Paper No. 31435.

Glenngård, A., "Sweden: International Health Care System Profile," `https://www.commonwealthfund.org/international-health-policy-center/countries/sweden` 2020. The Commonwealth Fund, International Health Policy Profiles.

Grant Thornton, "Dubblering av svenskar som betalar för att slippa vårdköerna," `https://www.grantthornton.se/insikt/rapport/dubblering-av-svenskar-som-betalar-for-att-slippa-vardkoerna/` December 2024. Grant Thornton Insight. Reports that over 780,000 individuals in Sweden held private health insurance in 2023, with approximately 61% of contracts employer-sponsored.

Hackmann, Martin, Jonathan Kolstad, and Amanda Kowalski, "Adverse Selection in Health Insurance: Evidence from an Employer-Provided Market," *American Economic Review*, 2015, *105* (9), 3049–3082.

Hagen, Johannes, Lisa Laun, Charlotte Lucke, and Mårten Palme, "The rising income gradient in life expectancy in Sweden over six decades," *Proceedings of the National Academy of Sciences*, 2025, *122* (14), e2418145122.

Handel, Benjamin, "Adverse Selection and Inertia in Health Insurance Markets: When Nudging Hurts," *American Economic Review*, 2013, *103* (7), 2643–2682.

_ , **Jonathan Kolstad, Thomas Minten, and Johannes Spinnewijn**, "The Socioeconomic Distribution of Choice Quality: Evidence from Health Insurance in the Netherlands," *American Economic Review: Insights*, 2024, *6* (3), 395–412.

Hermo, Santiago, Miika Päällysaho, David Seim, and Jesse M Shapiro, "Labor market returns and the evolution of cognitive skills: Theory and evidence," *The Quarterly Journal of Economics*, 2022, *137* (4), 2309–2361.

Kiil, Astrid and Jacob N. Arendt, "The Effect of Complementary Private Health Insurance on the Use of Health Care Services," *International Journal of Health Economics and Management*, 2017, *17* (1), 1–23.

Kullberg, L., P. Blomqvist, and U. Winblad, "Health insurance for the healthy? Voluntary health insurance in Sweden," *Health Policy*, 2019, *123* (8), 737–746.

Lavaste, Konsta, "Private health insurance in the universal public healthcare system: The role of healthcare provision in Finland," *Health Policy*, 2023, *132*, 104820.

Layton, Timothy J., Nicole Maestas, Daniel Prinz, and Boris Vabson, "Health care rationing in public insurance programs: Evidence from Medicaid," *American Economic Journal: Economic Policy*, 2022, *14* (4), 397–431.

Lindh, M., J. Sundström, J. Kaarme, and J. Yao, "The healthcare system in Sweden," *Journal of Comparative Effectiveness Research*, 2025.

Lindqvist, Erik and Roine Vestman, "The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment," *American Economic Journal: Applied Economics*, 2011, *3* (1), 101–128.

Manning, Willard G, Joseph P Newhouse, Naihua Duan, Emmett B Keeler, and Arleen Leibowitz, "Health insurance and the demand for medical care: evidence from a randomized experiment," *The American economic review*, 1987, pp. 251–277.

Miller, Sarah, Norman Johnson, and Laura R. Wherry, "Medicaid and mortality: New evidence from linked survey and administrative data," *The Quarterly Journal of Economics*, 2021, *136* (3), 1783–1829.

Nekoei, Arash and David Seim, "How Do Inheritances Shape Wealth Inequality? Theory and Evidence From Sweden," *The Review of Economic Studies*, 2023, *90* (1), 463–498.

OECD, *Private Health Insurance in OECD Countries*, Paris: OECD Publishing, 2004.

_ , *OECD Reviews of Health Systems: Sweden 2021*, Paris: OECD Publishing, 2021.

_ , *Sweden: Country Health Profile 2021 - State of Health in the EU*, Paris: OECD Publishing, 2021.

_ , "Private Health Insurance Spending," Report, Organisation for Economic Co-operation and Development (OECD) March 2022. Accessed: 2025-09-17.

_ , *Health at a Glance 2023: OECD Indicators*, Paris: OECD Publishing, 2023. See chapters on population coverage and voluntary private health insurance.

Pauly, Mark V., "Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection," *Quarterly Journal of Economics*, 1974, *88* (1), 44–62.

Petretto, Alessandro, "Optimal social health insurance with supplementary private insurance," *Journal of Health Economics*, 1999, *18* (6), 727–745.

Russo, Anna, "Waiting or Paying for Healthcare: Evidence from the Veterans Health Administration," Technical Report, Working Paper 2023.

Selden, Thomas M., "Should the government provide catastrophic insurance?," *Journal of Public Economics*, 1993, *51* (2), 241–247.

_ , "More on the economic efficiency of mixed public/private insurance," *Journal of Public Economics*, 1997, *66* (3), 517–523.

Shepard, Mark, Katherine Baicker, and Jonathan Skinner, "Uniform Health Insurance Benefits and the Demand for Supplemental Coverage," *Journal of Political Economy*, 2019, *127* (1), 245–300.

Socialdepartementet, "Reglering av privata sjukvårdsförsäkringar inom den offentligt finansierade hälso- och sjukvården," Departementsserien Ds 2022:15, Regeringskansliet, Stockholm 2022.

Socialstyrelsen, "Privat och offentligt finansierad hälso- och sjukvård," Technical Report, Swedish National Board of Health and Welfare, Stockholm 2020.

_ , "Det statistiska registrets framställning och kvalitet: Patientregistret," Technical Report 2022-2-7767, Socialstyrelsen, Stockholm 2022. Version 1.1, publicerad 9 december 2022, reviderad 20 januari 2023.

Spinnewijn, Johannes, "Heterogeneity, Demand for Insurance, and Adverse Selection," *American Economic Journal: Economic Policy*, 2017, *9* (1), 186–220.

Sveriges Kommuner och Regioner (SKR), "Väntetider i vården," `https://extra.skr.se/vantetiderivarden.46246.html` 2026. Accessed January 28, 2026.

Sveriges läkarförbund, "Yttrande över promemorian Ds 2022:15," Technical Report, Swedish Medical Association, Stockholm 2022.

Swedish Ministry of Health and Social Affairs, "Health and Medical Services Act (HSL)," 2017. SFS 2017:30, principle of need and solidarity in healthcare.

Wagstaff, Adam and Eddy van Doorslaer, "Equity in Health Care Finance and Delivery," 2000.

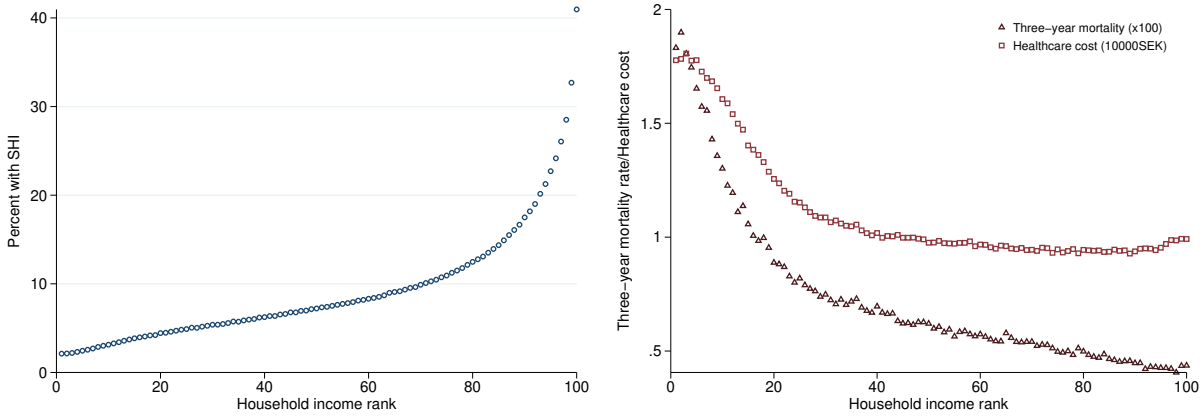
Yang, Ou, Jongsay Yong, and Yuting Zhang, "Effects of Private Health Insurance on Waiting Time in Public Hospitals," *Health Economics*, 2024, *33* (6), 1192–1210.

Figures

Figure 1: **Supplementary insurance and health across income**

(a) Supplementary health insurance

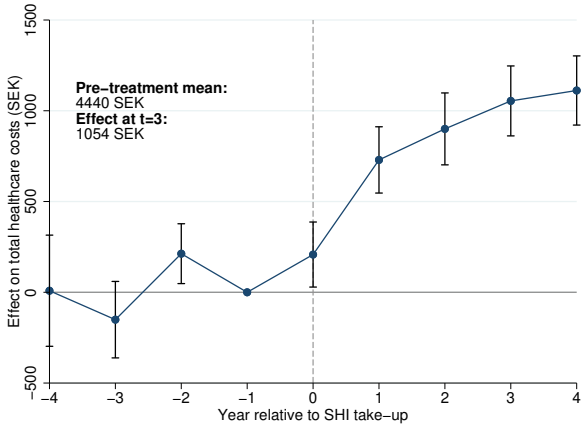
(b) Mortality and health care costs



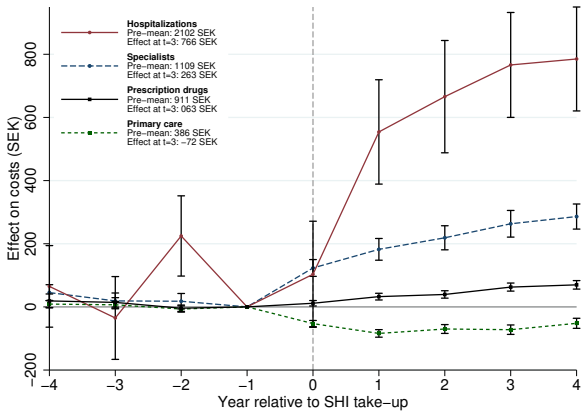
Note: This figure plots SHI coverage in **Panel (a)** and three-year mortality (scaled by 100) as well as mean annual healthcare expenditures (in 10,000 SEK, 10 SEK $\approx$ 1 USD) in **Panel (b)**, each against household disposable income rank for the working-age population (ages 25-65), pooling the years 2008-2015. Healthcare expenditures include all inpatient, outpatient, and prescription drug spending, excluding primary care costs, in a given calendar year. In healthcare data from Stockholm, we observe the average system cost of each procedure at the level of ICD chapter $\times$ first procedure code $\times$ year. We apply that cost to all specialist and hospital visits in the National Patient Register to obtain cost measures for all visits. Prescription drugs are valued as the shelf price at the time of dispensing. All costs include out-of-pocket costs. Household income rank is based on the sum of disposable household income over the last three years, adjusted for household composition. We rank all individuals' income in ages 25-65 within gender and age (one-year intervals). We exclude individuals in the bottom decile to avoid atypical income reporting (e.g., periods abroad or tax-exempt income) along the lines of Hagen et al. (2025).

Figure 2: **Dynamic effects of SHI on healthcare costs**

(a) Total costs



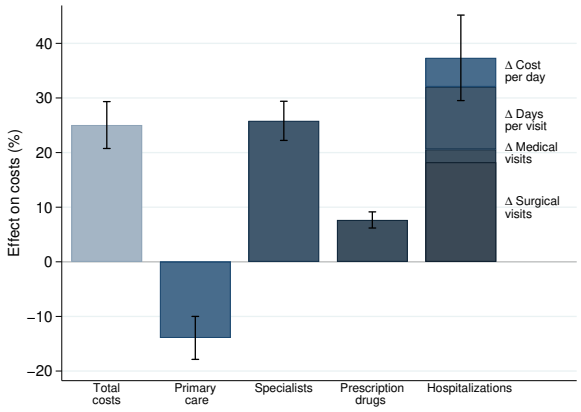
(b) By components



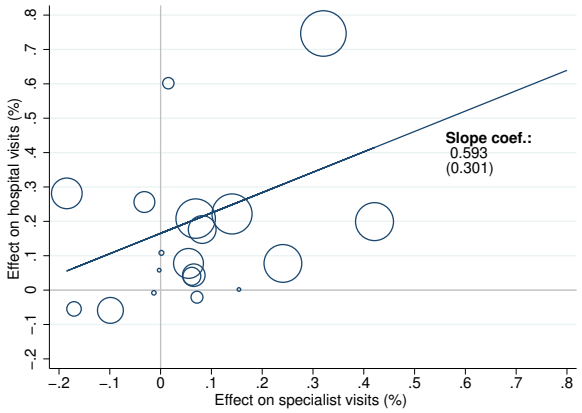
Note: This figure plots the dynamic effects of SHI on healthcare costs. We plot the estimated coefficients from the event-study specification in Equation (1), exploiting variation in the timing of employer-provided SHI. Treated cohorts enroll in SHI during 2007-2010, and control cohorts enroll during 2012-2015. **Panel (a)** reports estimated changes in annual healthcare costs, measured in SEK (9 SEK $\approx$ 1 USD), relative to the year prior to SHI enrollment (t = -1). **Panel (b)** decomposes effects on total costs into its components: hospitalizations, specialist visits, prescription drugs, and primary care. Primary care costs are estimated based on the Stockholm sample. When estimating the effects of SHI on total healthcare costs in Panel (a), we first regress the sum of costs for specialist visits, hospitalizations, and prescription drugs using the full sample, and then add the estimated coefficients for primary care costs. In healthcare data from Stockholm, we observe the average system cost of each procedure at the level of the ICD chapter-first procedure code-year. We apply that cost to all specialist and hospital visits in the National Patient Register to obtain cost measures for all visits. Prescription drugs are valued as the shelf price at the time of dispensing. Primary care costs are observed directly for Stockholm. Standard errors for total costs are approximated using the delta method. We estimate effects on prescription drugs including enrollment-cohort fixed effects to account for an unbalanced panel (as these data are observed only in 2006-2015). The 95% confidence intervals are based on standard errors clustered at the individual level.

Figure 3: **Understanding the effect of SHI on costs**

(a) By components



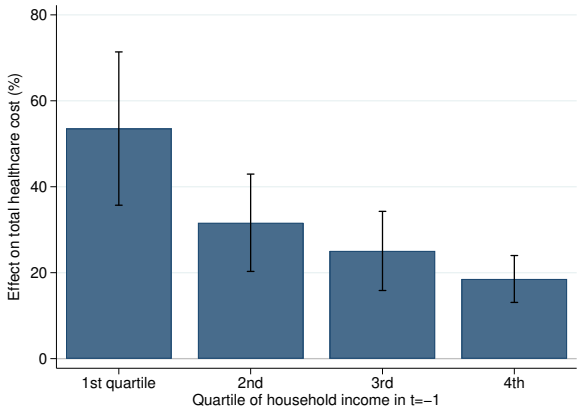
(b) Effect-correlations across ICD-chapters



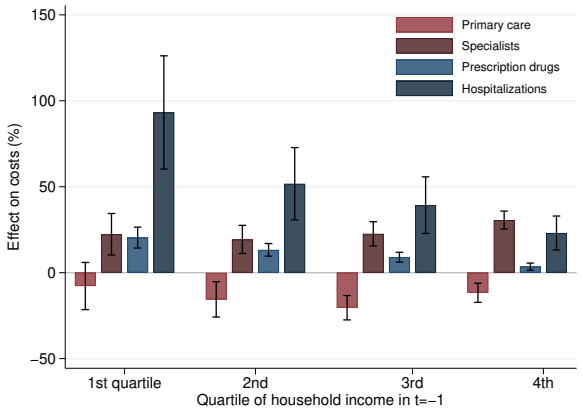
Note: **Panel (a)** reports the estimated event-time-3 coefficients from Equation (1), scaled by the pre-treatment mean ($t = -1$), for all cost measures. We decompose the cost coefficient for hospitalizations into i. the number of visits (which in turn is split into surgical procedures, defined by the Swedish Surgical Procedure (KVÅ) codes that start with three letters, and medical ones, defined by the residual), ii. the length of the visit (in days), and iii. the cost per day. The 95% confidence intervals are based on standard errors clustered at the individual level. In **Panel (b)**, we first regress the number of hospital visits / specialist visits per year within each ICD-chapter on a post SHI dummy-variable (capturing the average effect of SHI in event-years $1-4$) and scale the coefficient by the pre-treatment mean. We plot the estimated treatment effect for hospital visits against that for specialist visits and let the size of the circle be proportional to the lowest absolute value of the t-statistic within the ICD-10 chapter, where the t-statistic is based on standard errors clustered at the individual level. The fitted line, the reported coefficient and standard error represent a regression of hospital visit effects on specialist visit effects among these 19 dots, weighting each observation with the associated t-statistic, applying robust standard errors. Appendix figure D.2 provide the individual estimates by ICD-10 chapter and care modality.

Figure 4: **Heterogeneous effects on costs by income**

(a) Total costs

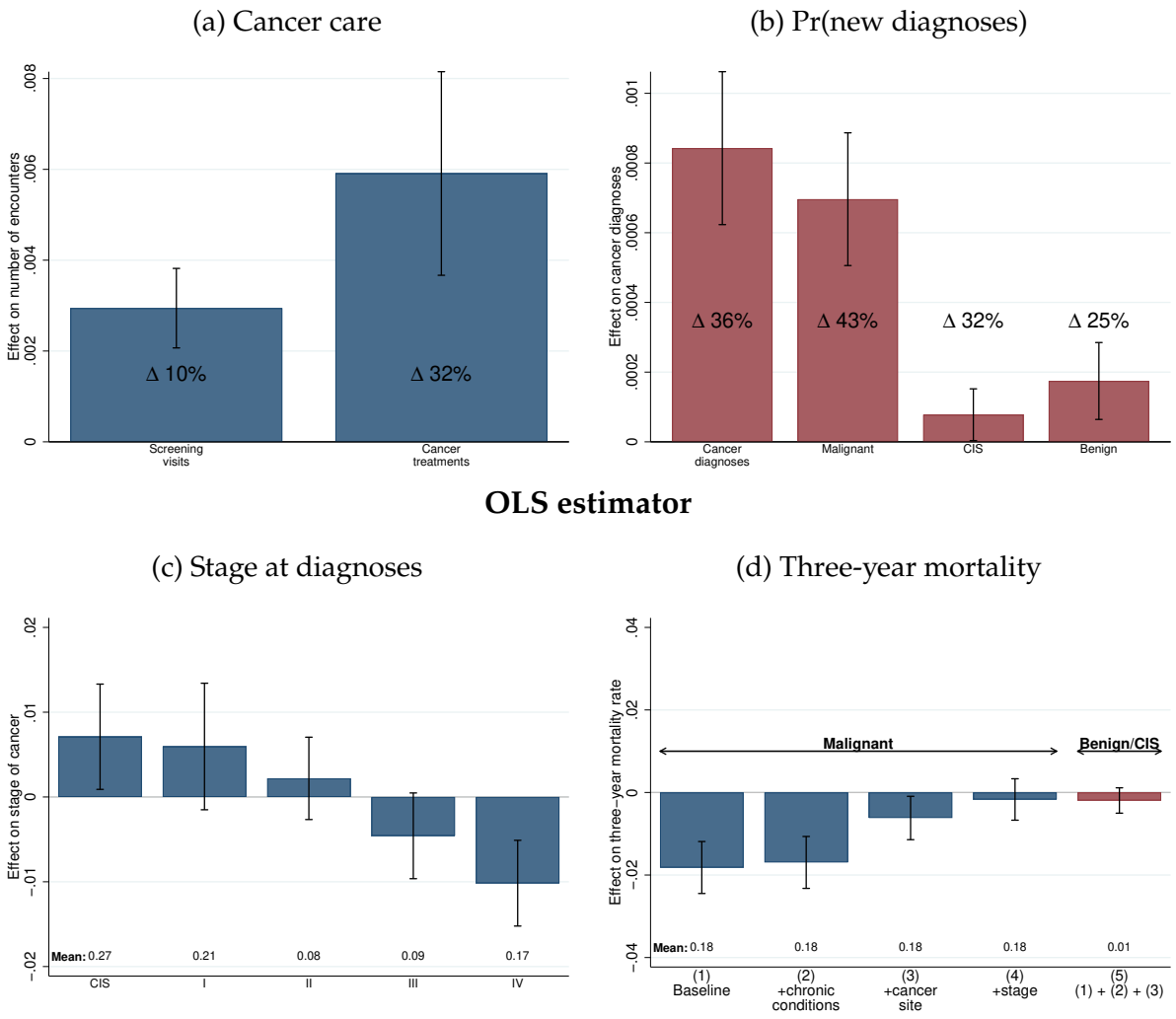


(b) By components



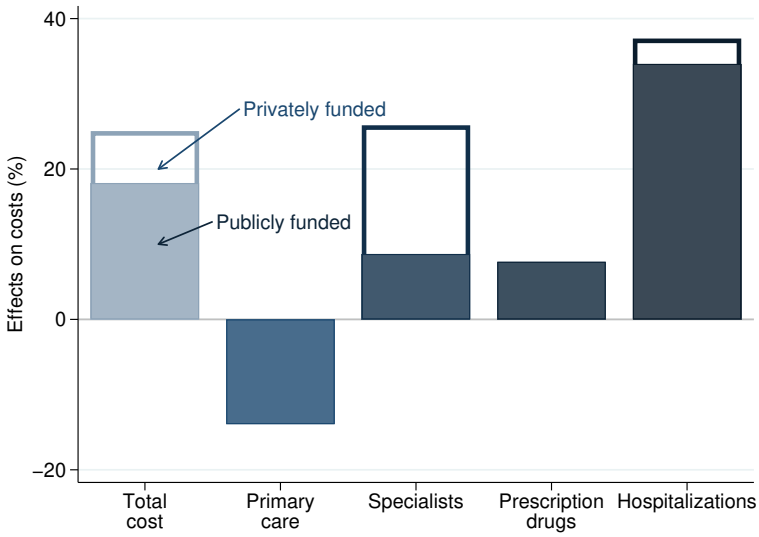
Note: This figure reports the effects of SHI on healthcare costs by quartile of disposable household income measured in the year prior to treatment. **Panel (a)** shows the percentage change in total annual healthcare costs for each income quartile as the event-time-$t = 3$ coefficients scaled by the quartile-specific pre-treatment mean ($t = -1$), analogously to the left-most bar in Figure 3a. The income ranks are constructed in the same way as in Figure 1. **Panel (b)** decomposes these effects into primary care, specialist visits, prescription drugs, and hospitalizations. Estimates are, again, event-time-3 coefficients, scaled by the group-specific pre-treatment mean ($t = -1$). The 95% confidence intervals are based on standard errors clustered at the individual level.

Figure 5: **Effect of SHI on cancer diagnoses and cancer care**



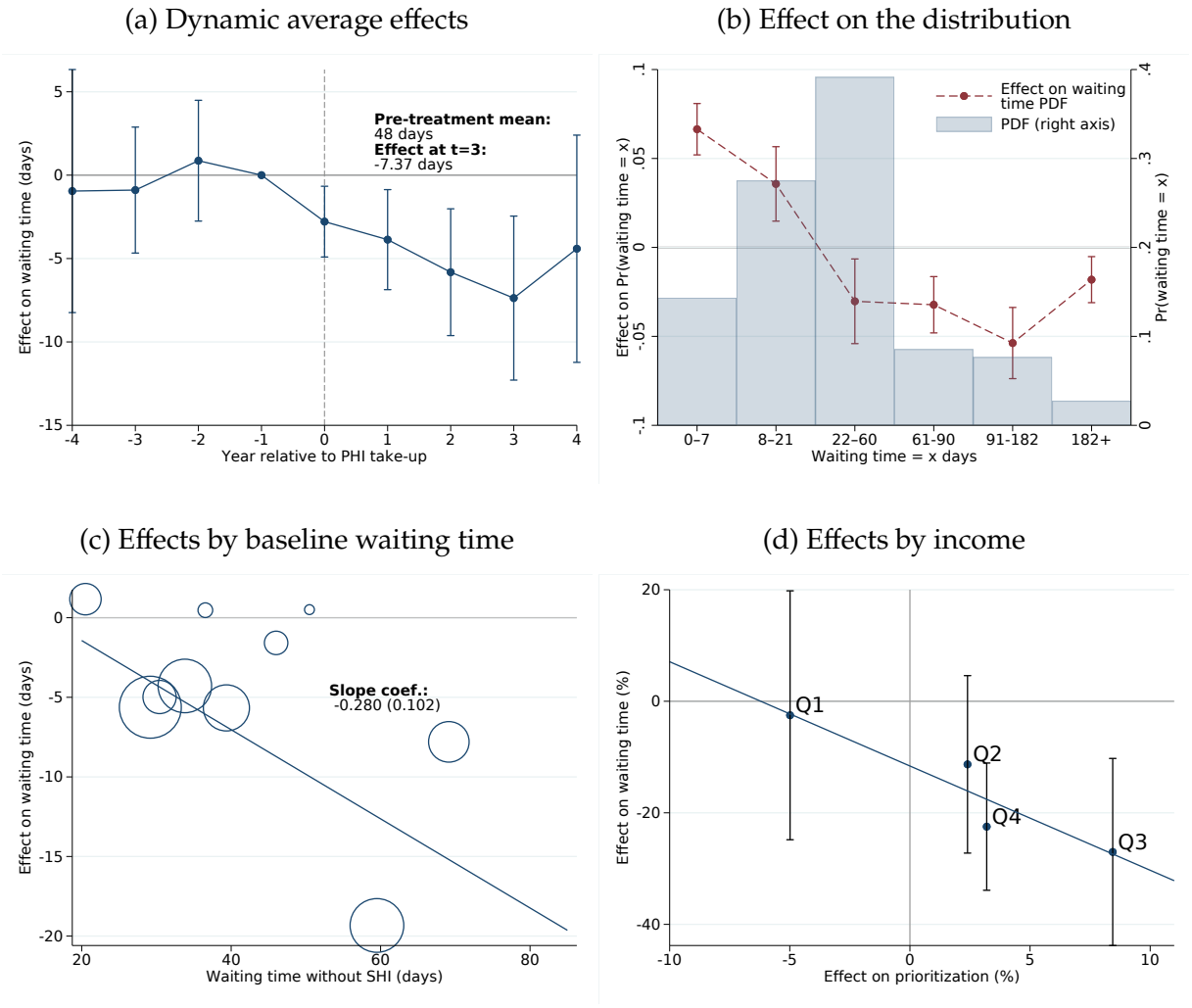
Note: **Panel (a)** reports effects of SHI on cancer care utilization. The outcome in the left bar comprises the number of annual screening visits, defined as a specialist or hospital encounter with an ICD-10 code in Z00–Z04 or Z10–Z13. These codes capture health checks, preventive examinations, and screening activities. The outcome in the right bar is the number of specialist and hospital visits due to cancer care, defined as ICD-10 codes C00–C99, D00–D10, and D37–D48 (malignant cancers, carcinoma in situ, and neoplasms of uncertain or unknown behavior, respectively). **Panel (b)** reports the effect of SHI on the annual probability of being diagnosed with a new cancer diagnoses, i.e. a new entry in the Cancer Register. The outcome in the leftmost bar is a dummy for a new cancer diagnoses. The outcomes in the remaining bars are dummies for a new malignant cancer; carcinoma in situ (CIS) and a benign tumor, respectively. We classify tumor status using the fifth digit of the SNOMED morphology codes (/0 benign, /2 carcinoma in situ (CIS), /3 malignant). Note that an individual can have more than one type of tumor within a year. We estimate the effects in Panels (a) and (b) using Equation (2). The bars correspond to the estimated β, and we also report the coefficient divided by the pre-treatment mean. 95% confidence intervals are based on standard errors clustered at the individual level. Figure E.3 shows the dynamic estimates using Equation (1). **Panel (c)** and **(d)** report OLS-coefficients of SHI and cancer stage at diagnosis (panel c) as well as three-year all-cause mortality (panel d). We report β-estimates from: $y_i = \alpha + \beta 1(SHI_i) + X_i\gamma + \varepsilon_i$, where $1(SHI)$ is an indicator for having any SHI (to increase statistical power we include both employer and group/individual) in the year prior to diagnosis. Cancer stages for solid tumors are defined according to Amin et al., eds (2017). Hematologic cancers, central nervous system tumors and unstageable solid tumors account for 18% of malignant cancers. Panel (d) splits the analysis of SHI and mortality into malign (blue) and benign (maroon) bars. We include baseline controls: year, age, gender, region of residence (21 regions), household disposable income rank (100 percentiles), and education (four levels). In the second bar, we add 22 chronic condition dummy variables as controls. These measure chronic conditions as filling prescriptions for in $t = -1$ and $t = -2$ as in Danesh et al. (2024). Cancer sites are measured using ICD-O-3 codes. Panels (c) and (d) are based on the first tumor of individuals aged 25-63 who are diagnosed between 2007 and 2015 that are employed at a firm with 5 or more employees in the year before diagnosis. 95% CIs are based on robust standard errors.

Figure 6: **Cost externalities of SHI**



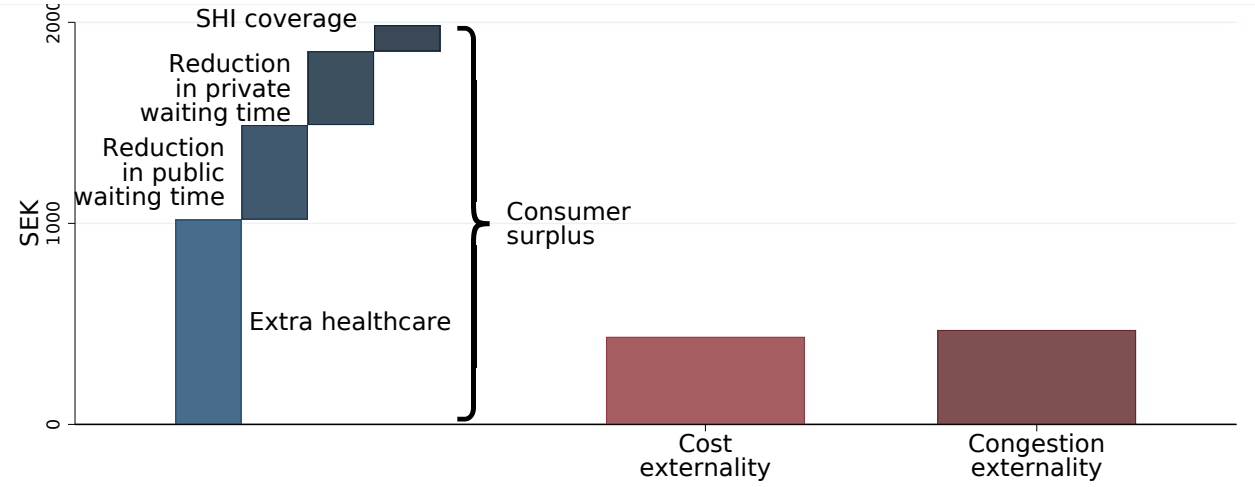
Note: This figure decomposes the estimated effect of SHI on annual healthcare expenditures in Figure 3a by funding source. The height of each bar is split into a shaded region – publicly funded spending – and a hollow region – privately funded spending. We create these as follows. First, we estimate Equation (1) in the Stockholm data component-by-component and splitting by whether the funding is private or public. We then compute the effect share that is private, separately across event time. We retrieve the event-time-3 shares and scale the national estimates with that share. Appendix Figure 34 shows that baseline estimates of the overall effect of SHI on healthcare costs in the national sample are quantitatively similar to those in the Stockholm sample. Figure D.7a reports the dynamic effects on privately- and publicly funded care using Equation (1), and Figure D.7b shows the funding decomposition, both using the Stockholm sample.

Figure 7: **Effect of SHI on waiting times in the public system**



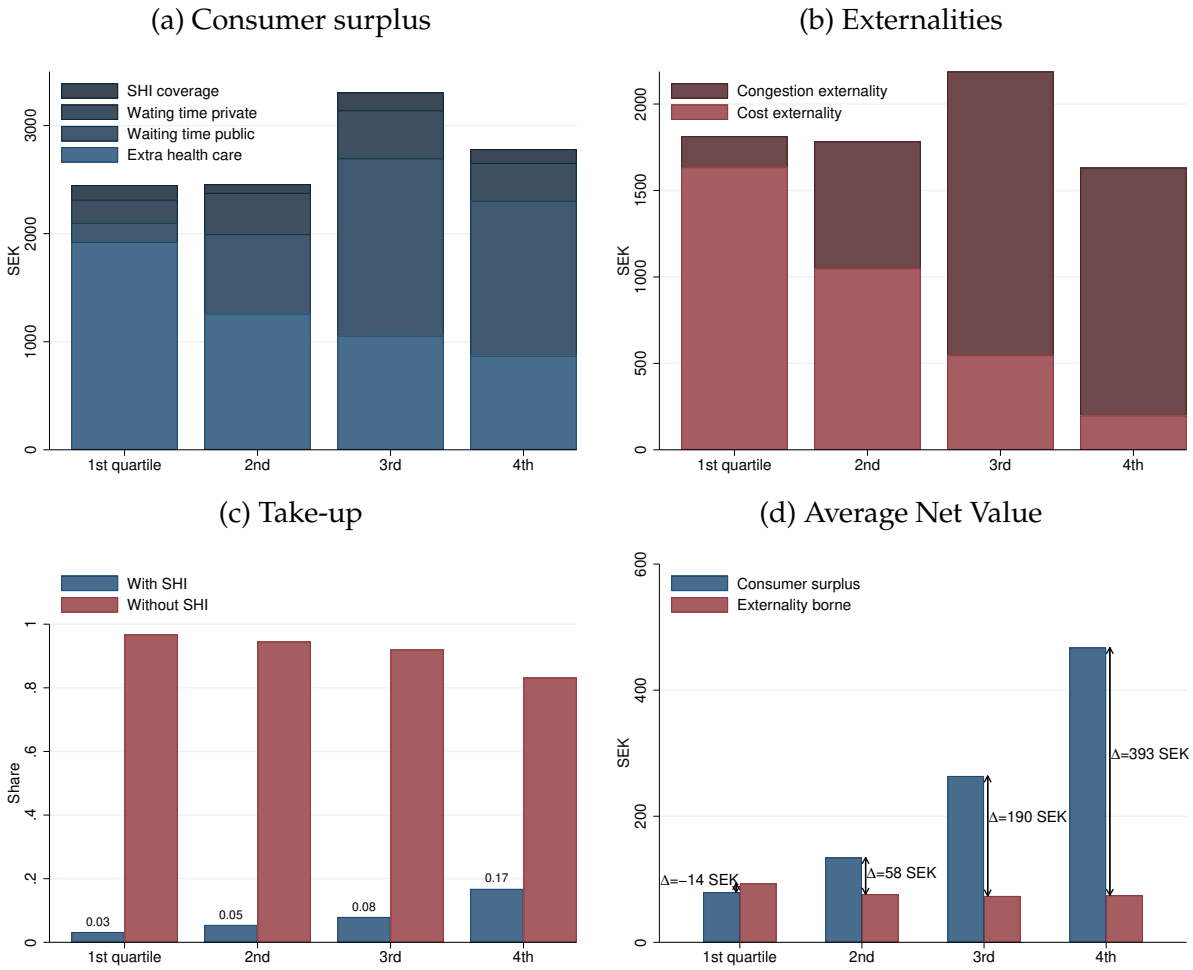
Note: This figure shows the effect of SHI on waiting times for publicly funded care using referral data from Stockholm. **Panel (a)** plots the dynamic average treatment effects of SHI on waiting times per referral in the years surrounding SHI take-up. **Panel (b)** reports the $t = 3$-estimates on the probability of experiencing different waiting-time durations in publicly funded care. The maroon dots represent the estimated coefficients, and the shaded bars display the empirical distribution of waiting times, measured for individuals without SHI between the years 2008 and 2015. **Panel (c)** plots the $t = 3$-coefficients against the average waiting time among the non-SHI population between 2008 and 2015. We start by grouping the data on waiting times from the referral data into forty groups by medical specialty (such as oncology, gynecology, and orthopedics). We then divide those further into ten groups by the average waiting time. We finally estimate the effect of SHI on waiting times within these ten groups. The size of each circle is proportional to the magnitude of the t-statistic of each estimate. The fitted line represents a regression of effect sizes on average waiting times, weighted by the t-statistic. An increase in the waiting time by one day is associated with a decrease in the effect of 0.28 days. **Panel (d)** plots estimates of the event-time-3 effect of SHI on (i) waiting times per referral and (ii) the probability of having a prioritized referral, separately by quartile of disposable income, scaled by the pre-treatment mean ($t = -1$) in each quartile. Income quartiles are measures in the same year as the referral and are based on disposable household income, just as in Figure 1. For each quartile, we then plot the estimates against each other together with 95% confidence intervals retrieved from the waiting time effect. The p-values for the Q1–Q4 prioritization estimates are 0.334, 0.606, 0.009, and 0.120, respectively. All panels are estimated by pooling never-treated and later-treated units along Callaway and Sant'Anna (2021). This allows us to include more treatment years (2009-2014) and expand the control group, thereby increasing statistical power. The unit of observation is a referral. An individual may contribute multiple referrals per year. All specifications include controls for age, gender, household disposable-income percentile (1–100), education (four categories), referral type (treatment/diagnostic/consultation), and medical specialty (e.g. oncology or orthopedics). 95% confidence intervals based on robust standard errors.

Figure 8: **Consumer surplus and externalities of SHI**



Note: This figure shows the average private consumer surplus, $E[CS]$, and the per-insured externalities of SHI per year (not including premiums). The first bar measures the total consumer surplus as the sum of three components: (i) the additional healthcare due to SHI (the sum of the $t = 3$ estimates for specialist costs and hospitalization costs in Figure 2b); (ii) the monetized value of waiting time reductions; and (iii) the $t = -1$ private care that becomes covered by SHI. We monetize the value of waiting times as follows: (a) Figure 7c reports a change in waiting times in publicly funded care of $\Delta w_{\text{public}} = -7.4$ days. For privately funded care, we set $\Delta w_{\text{private}} = 7 - (43 + 3) = -39$ days, where 43 days is the average waiting time to specialists and hospitals in the public system and 3 days is statutory waiting time to a GP. 7 days is the advertised waiting time within SHI. (b) We use the willingness-to-pay estimate from Russo (2023), where patients are on average willing to pay \$2.5 for one day shorter waiting time. We translate this into a WTP per healthcare cost of $\gamma^w = 2.5/186 \approx 0.014$, where \$186 is the mean total cost for a GP visit in the US (Agency for Healthcare Research and Quality , AHRQ). We use this parameter to convert waiting time reductions into value terms as $value^w_{\text{public}} = \gamma^w \cdot \Delta w_{\text{public}}$ and $value^w_{\text{private}} = \gamma^w \cdot \Delta w_{\text{private}}$. (iii) Finally, we scale the monetized value of waiting time by the $t = 3$ cost of publicly funded specialist and hospitalization care (4,743 SEK) and privately funded specialist and hospitalization care (699 SEK), respectively. The two maroon bars to the right report the externalities imposed by SHI coverage on the public system. The cost externality corresponds to the $t = 3$ effect on publicly funded specialist and hospital care, while the congestion externality reflects the $t = 3$ monetized value of the change in waiting time for publicly funded care.

Figure 9: **Consumer surplus, externalities, and net values by income**



Note: **Panel (a)** reports the average consumer surplus by quartile of disposable income, $E[CS_g]$, calculated in the same way as in Figure 8 but with income group specific components. Disposable income is measured as in Figure 4 at event time $t = -1$, We allow the following components to vary by disposable income quartile: (i) the additional healthcare consumed with SHI (Figure 4); (ii) the change in waiting times for publicly funded care (Figure 7d); (iii) the value of public and private specialist and hospital care; and (iv) the amount of pre-SHI privately funded care that becomes covered by SHI. We hold the value of waiting time, γ^w, fixed at the level used in Figure 8. **Panel (b)** reports the average cost- and congestion externalities imposed by each SHI holder, separately by income quartile. **Panel (c)** shows the share of individuals with and without SHI by income quartile. **Panel (d)** reports the aggregate consumer surplus, the externalities borne, and the resulting net value of the SHI market (abstracting from premiums paid), separately by income. Aggregate consumer surplus (navy-colored bars) is $CS_g = S_g \times E[CS_g]$, where S_g is reported in Panel (c) and $E[CS_g]$ in Panel (a). We compute aggregate externalities (maroon bars) by assuming that the cost externalities are shared equally across the population: $B^q = B^q_g = S \cdot E[CS^{q,public}]$. We assume that the congestion externalities are borne by the uninsured, where the per uninsured externality, given by $E^w = \frac{S}{1-S} E[CS^{w,public}]$, is proportional to care use among the uninsured - individuals are more affected by congestion if they use more care. Let $c_{g,\text{noS}}$ denote total care use for non-SHI individuals in group g. The burden is $B^w_g = E^w \cdot \frac{(1-S_g)\, c_{g,\text{noS}}}{\sum_{g=1}^{4} (1-S_g)\, c_{h,\text{noS}}}$. $E[CS^{q,public}]$ and $E[CS^{w,public}]$ corresponds to the maroon bars in Figure 8. The annotations report the net value for each income group: $\Delta_g = CS_g - (B^q_g + B^w_g)$. Table 2 provide robustness and counterfactual analysis.

Tables

Table 1: Drivers of the income gradient in SHI take-up

	Outcome: Supplementary health insurance		
Panel (a): Full sample			
	(1)	(2)	(3)
Quintile 2	0.021 (0.0002)	0.018 (0.0002)	0.006 (0.0001)
Quintile 3	0.040 (0.0002)	0.035 (0.0002)	0.015 (0.0001)
Quintile 4	0.069 (0.0002)	0.063 (0.0002)	0.029 (0.0002)
Quintile 5	0.168 (0.0004)	0.162 (0.0004)	0.084 (0.0003)
Chronic FEs	No	Yes	Yes
Firm FEs	No	No	Yes
SES FEs	No	No	No
Skills FEs	No	No	No
R-Squared	0.041	0.044	0.456
Observations	34,908,110	34,908,110	34,756,455
Panel (b): Males with IQ scores			
	(1)	(2)	(3)
Quintile 2	0.01 (0.0004)	0.01 (0.0004)	0.01 (0.0004)
Quintile 3	0.03 (0.0004)	0.02 (0.0005)	0.02 (0.0005)
Quintile 4	0.05 (0.0005)	0.04 (0.0006)	0.03 (0.0006)
Quintile 5	0.12 (0.0007)	0.08 (0.0008)	0.07 (0.0008)
Chronic FEs	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes
SES FEs	No	Yes	Yes
Skills FEs	No	No	Yes
R-Squared	0.515	0.699	0.700
Observations	7,652,020	7,646,829	7,646,829

Note: This table reports the association between enrollment in SHI (employer provided, group or individual) in year t and household income rank (in quintiles) in the same year. Household income quintiles are based on the average equivalised disposable household income over the three years preceding year t. To get equivalised disposable household income, we follow Statistics Sweden and divide total disposable household income (the sum of all taxable and non-taxable income minus taxes and other negative transfers) by the household's consumption weight to adjust for household size and composition, using a modified version of the OECD equivalence scale (weights: 1.00 for single adults; 1.51 for cohabiting couples; $+0.60$ for each additional adult; $+0.52$ for the first child aged 0–19; and $+0.42$ for subsequent children aged 0–19). The omitted reference income level is quintile 1. Across columns, we sequentially add covariates. Chronic conditions are 22 indicators for having filled a certain prescription in $t = -1$ and $t = -2$ (See Appendix table F.1 for details). Firm fixed effects denote dummies for the primary employer in year t. We include a dummy for unemployment. Skill measures include cognitive and non-cognitive ability scores obtained at military enlistment at age 18. Cognitive ability is measured as the within-cohort rank of the sum of test scores along four subtests: synonyms, inductions, metal folding, and technical comprehension. Non-cognitive ability is measured as a score ranging 1-5 on four traits: social maturity, intensity, psychological energy, and emotional stability. We use these raw non-cognitive scores in the analysis. Lindqvist and Vestman (2011) and Hermo et al. (2022) provide detailed information about these cognitive and non-cognitive ability scores. Socioeconomic status (SES FE) includes measures of cohort-specific wealth quintiles, based on the three-year average of individual wealth between 2004-2006, and highest completed level of education at time t (less than high school, high school, post-secondary vocational, or university education). The sample covers 2008–2015. Panel (a) includes the full population of working-age individuals with complete covariate information. Panel (b) restricts the sample to males with available cognitive-ability scores from enlistment, i.e. birth cohorts 1951–1975, for whom military service was mandatory. Differences in sample size across specifications arise because observations in cells with no within-cell variation in treatment, or that become perfectly collinear after absorbing high-dimensional fixed effects, do not contribute to identification and are therefore dropped. Standard errors are clustered at the individual level.

Table 2: Net values of SHI: robustness and counterfactuals

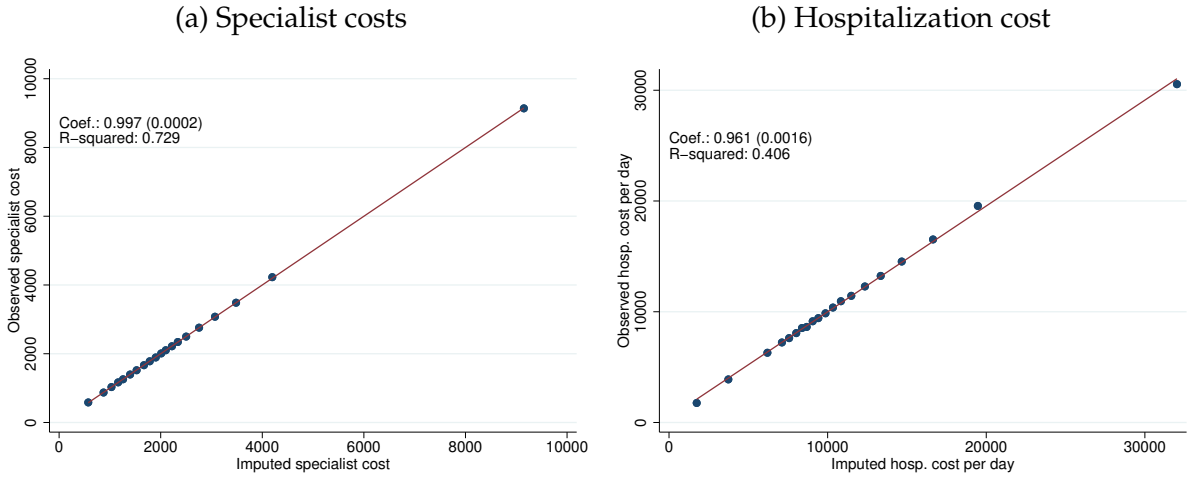
	Income Q1			Income Q4		
Scenario	Value	Externality	Net value	Value	Externality	Net value
(1) Baseline	79	93	-14	468	75	393
(2) Heterogeneous γ_g^w	71	45	27	604	206	399
(3) Statutory γ_{SHI}^w	120	276	-156	1433	197	1236
(4) Uniform enrollment	205	93	112	233	75	159
(5) Expanded SHI	159	198	-39	935	157	778

Note: This table reports robustness checks and counterfactual exercises for the distributional analysis, focusing on the bottom and top income quartiles. **Row (1)** presents the baseline results corresponding to Figure 9d. Aggregate consumer surplus for group g is defined as $CS_g = S_g \times E[CS_g]$. Aggregate cost externalities are computed under the assumption that these externalities are shared equally across the population:$B^q = B_g^q = S \cdot E[CS^{q,\text{public}}]$. Congestion externalities are assumed to be borne by the uninsured. The per-uninsured congestion externality is given by $E^w = \frac{S}{1-S} E[CS^{w,\text{public}}]$, and is proportional to care use among the uninsured, reflecting that individuals who use more care are more affected by congestion. Let $c_{g,\text{noS}}$ denote total care use among non-SHI individuals in group g. The resulting congestion burden for group g is $B_g^w = E^w \cdot \frac{(1-S_g)\, c_{g,\text{noS}}}{\sum_{h=1}^{4}(1-S_h)\, c_{h,\text{noS}}}$. The quantities $E[CS^{q,\text{public}}]$ and $E[CS^{w,\text{public}}]$. Net value is calculated as: $\Delta_g = CS_g - (B_g^q + B_g^w)$. We assess robustness to the choice of γ^w, the value of a one-day reduction in waiting time for care. In **Row (2)**, γ^w is allowed to vary by income group, using group-specific values corresponding to the bottom and top income willingness-to-pay for a one-day shorter wait reported in Russo (2023). In **Row (3)**, we instead use a value of γ based on the daily compensation paid by insurance companies when statutory waiting-time guarantees are not met (SEK 300 per day), scaled by the average cost per specialist and hospital visit observed in our data (SEK $5,287$). We then conduct counterfactual analyses that alter the distribution of SHI coverage across the income distribution using the baseline scenario. In **Row (4)**, we impose a uniform enrollment rate equal to the average SHI enrollment between 2008 and 2015 (approximately 8.1%). **Row (5)** reports the counterfactual resulting from a proportional doubling of the SHI market, yielding average coverage rates comparable to those observed in Finland (see Table F.7).

Appendix - Figures

A Data

Figure A.1: **Imputed prices**

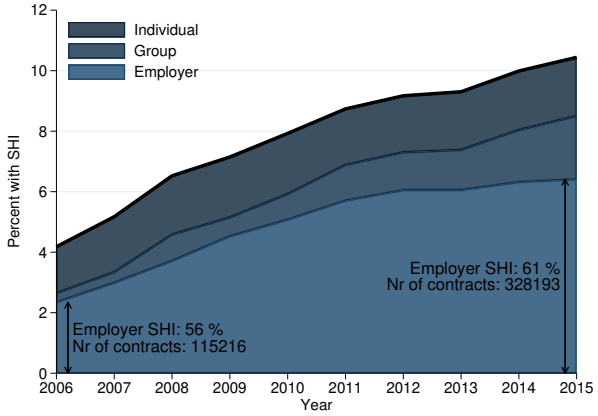


Note: This figure compares imputed costs to observed costs for specialist visits (Panel a) and hospitalizations (Panel b). The sample consists of individuals observed in the Stockholm billing data between 2003 and 2018. Average prices are calculated using an 80 percent sample, defined at the level of three-digit ICD diagnosis codes, procedure codes (KVÅ), and calendar year. These averages are then applied to a 20 percent holdout sample to generate imputed prices, which are plotted against observed prices in the figure. Each point represents the mean observed and imputed price using 20 equal sized bins. The solid line depicts the fitted linear relationship between imputed and observed prices; reported coefficients and R-squared values are from regressions of observed prices on imputed prices in the holdout sample.

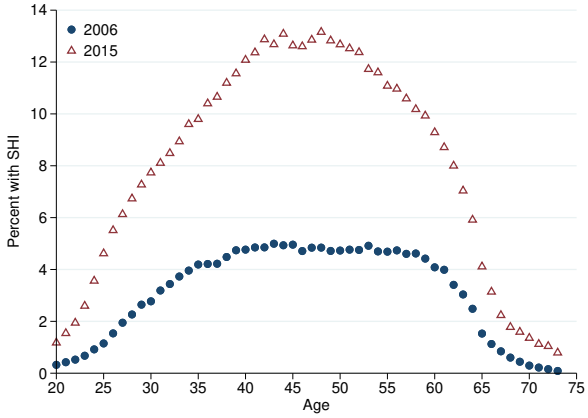
B Enrollment in SHI

Figure B.1: **SHI coverage over time and age**

(a) Take-up over time

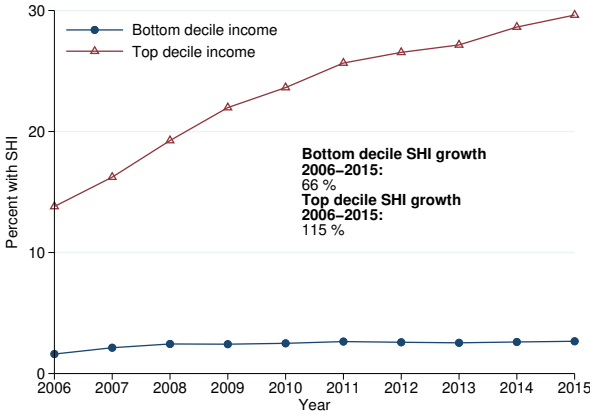


(b) Take-up and age



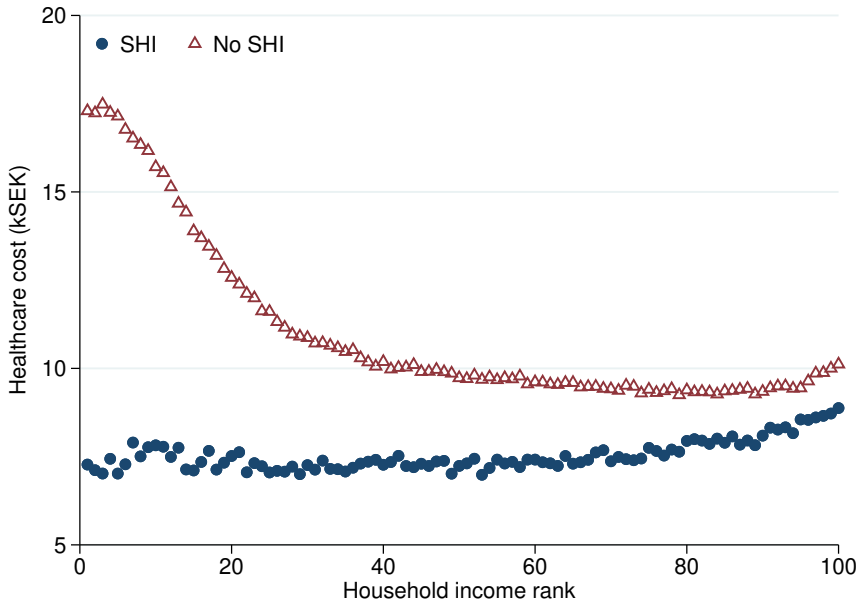
Note: **Panel (a)** reports the share of the working-age population (ages 26-65) enrolled in SHI between 2006 and 2015, decomposed into individual, group, and employer-provided contracts. The solid black line represents total SHI coverage. The figure presents the share and number of employer-provided SHI contracts in 2006 and 2015. **Panel (b)** reports SHI coverage by age, pooling the three insurance types together, for individuals aged 20-74 in 2006 and 2015.

Figure B.2: **SHI over time by household disp. income**



Note: This figure reports the share of the working-age population (ages 26-65) enrolled in SHI between 2006 and 2015, separately for households in the bottom and top disposable income deciles, pooling the three insurance types together. Household income rank is based on the sum of disposable household income over the last three years, adjusted for household composition. We rank all individuals' income in ages 25-65 within gender and age (one-year intervals). We exclude individuals in the bottom decile to avoid atypical income reporting (e.g., periods abroad or tax-exempt income) along the lines of Hagen et al. (2025).

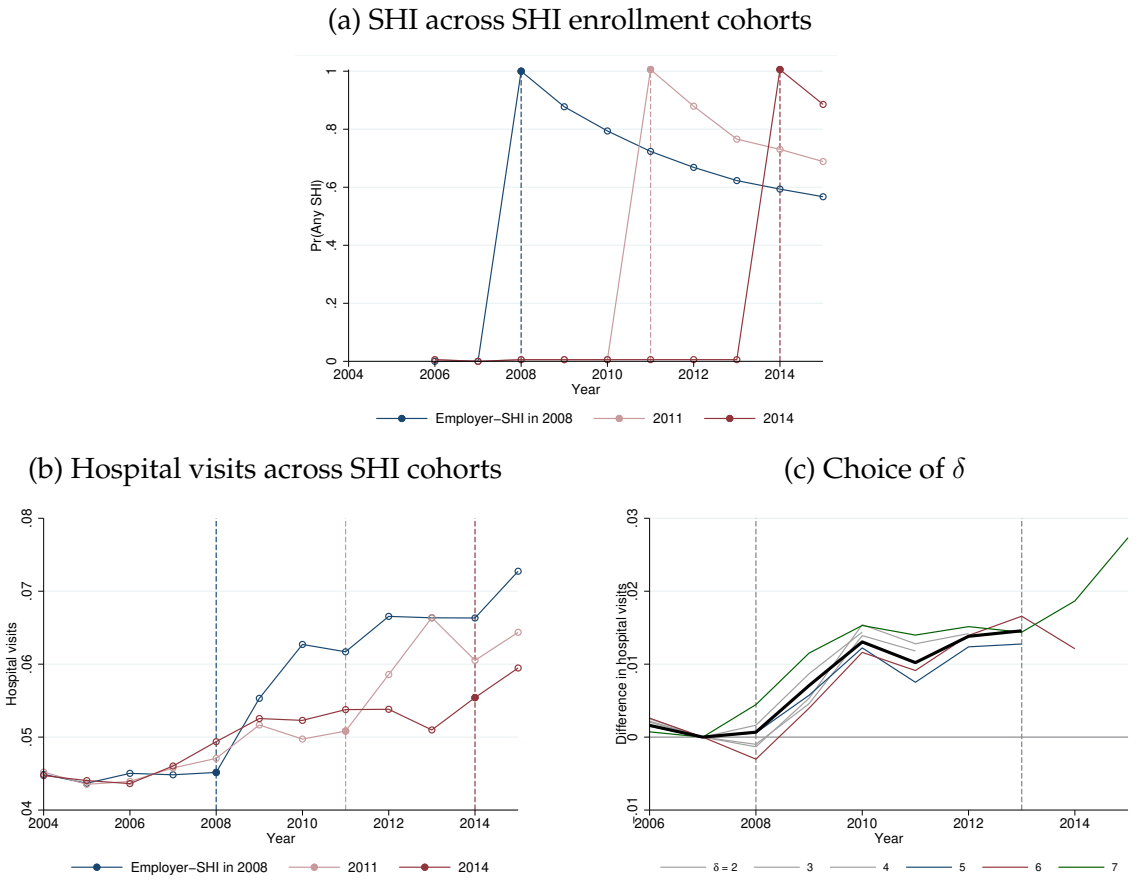
Figure B.3: **Healthcare costs and supplemental health insurance**



Note: This figure plots average total healthcare expenditures by household income rank for individuals with and without SHI. Healthcare costs include all inpatient, outpatient, and prescription drug costs. Healthcare costs and income rankes are generated as described in Figure 1.

C Design

Figure C.1: **Empirical design and choice of δ**

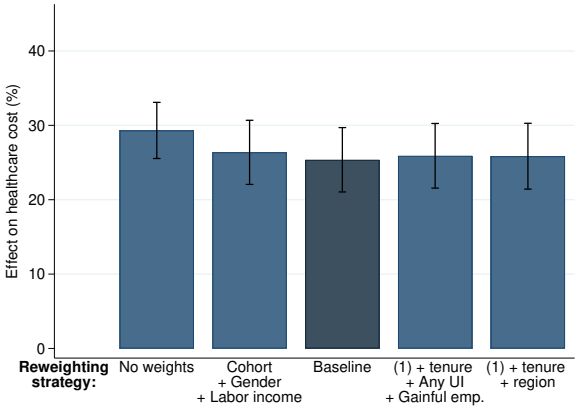


Note: This figure illustrates our empirical design. **Panel (a)** plots the share of individuals covered by any SHI by calendar year, separately for cohorts who receive employer-provided SHI for the first time in 2008, 2011, and 2014. We restrict attention to those who work at the firm that provides SHI in the enrollment year, are in ages 25-63 at the time of enrollment, and do not have any SHI prior to receiving employer-provided SHI. **Panel (b)** reports the corresponding mean number of hospital visits for each cohort over time. **Panel (c)** displays the mean difference in hospital visits who receive employer-provided SHI in 2008 (treatment group) and various control groups, normalized in 2007. The lines are shown for different δ until the potential control group receives employer-provided SHI (and are treated). The thick black line represents the difference using $\delta \geq 5$ years, which is used in the baseline analysis.

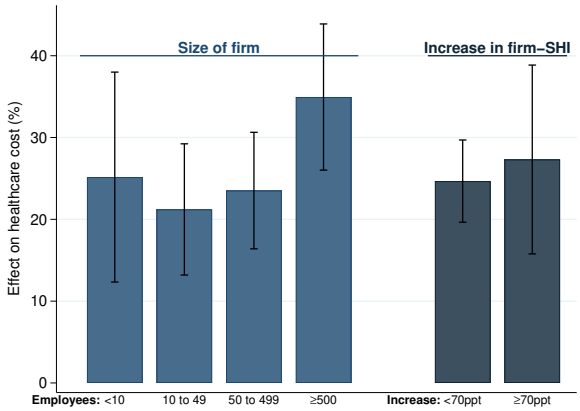
D Effects of SHI

Figure D.1: **Robustness**

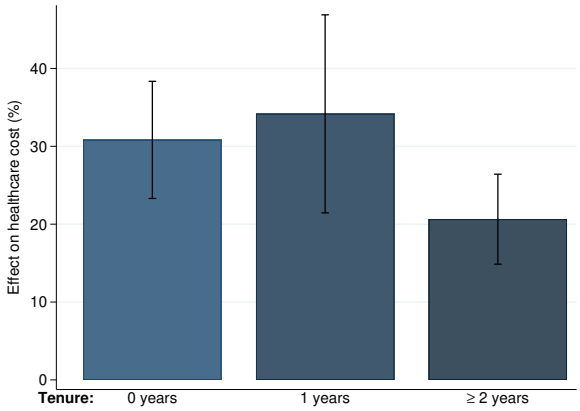
(a) Varying the re-weighting strategy



(b) Share getting SHI within firm and firm size



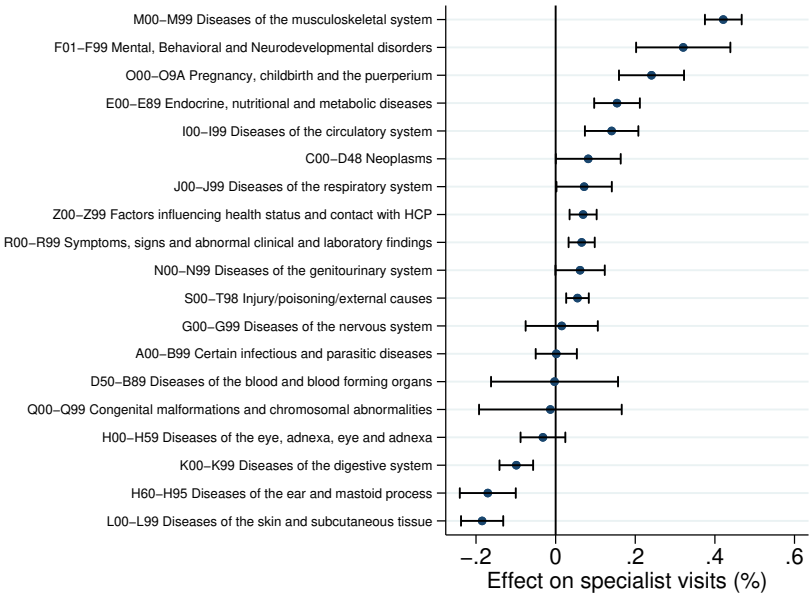
(c) Tenure



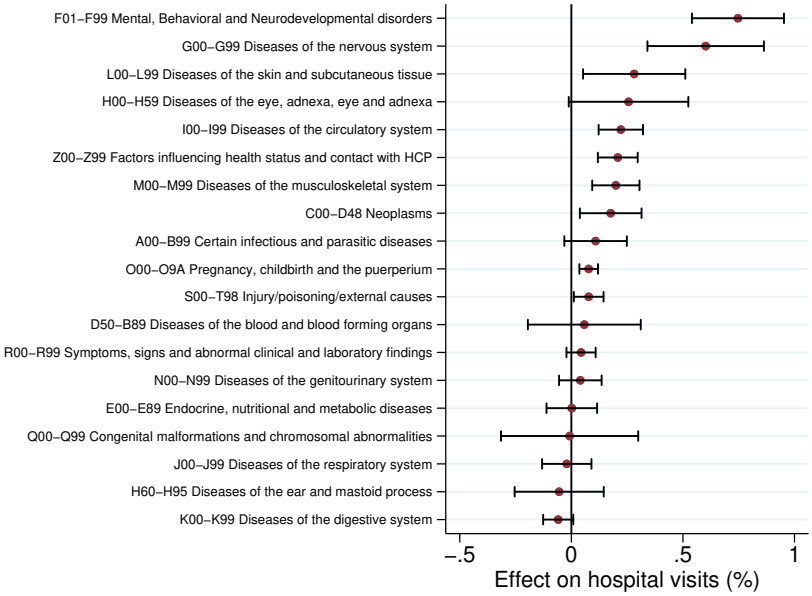
Note: This figure presents robustness checks for the estimated effect of employer-provided SHI on healthcare costs (excluding primary care costs). The bars consequently show the event-time 3 estimates scaled by the pre-treatment mean ($t = -1$). **Panel (a)** shows how the estimated effect on healthcare costs varies under different re-weighting strategies, ranging from no weights to rich matching schemes based on demographic characteristics and labor-market histories. The third bar shows our baseline weighting strategy. We reweigh the control cohorts of each treatment group separately. E.g. enrollment cohorts 2012-2015 are reweighted to match characteristics of the 2007 cohort. The share of treated units with empty cells vary from 0.1% to 6% across the four different strategies. The composition of the control group changes between each weighting strategy due many cell without treated. **Panel (b)** reports estimates by firm size (measured in event year $t = -1$) and by the share of employees within the firm who receive SHI in year $t = 0$ (conditional on having more than 10 employees in event-time $t = -1$). We compute the change in share of workers who are covered in year $t = 0$ and $t = -1$ and divide the sample into those cases where that change is larger or equal to 70 percentage points. **Panel (c)** shows heterogeneity by worker tenure at the time of SHI take-up. 95% confidence intervals are based on standard errors clustered at the individual level.

Figure D.2: **Effects by type of care and ICD chapter**

(a) Specialist visits

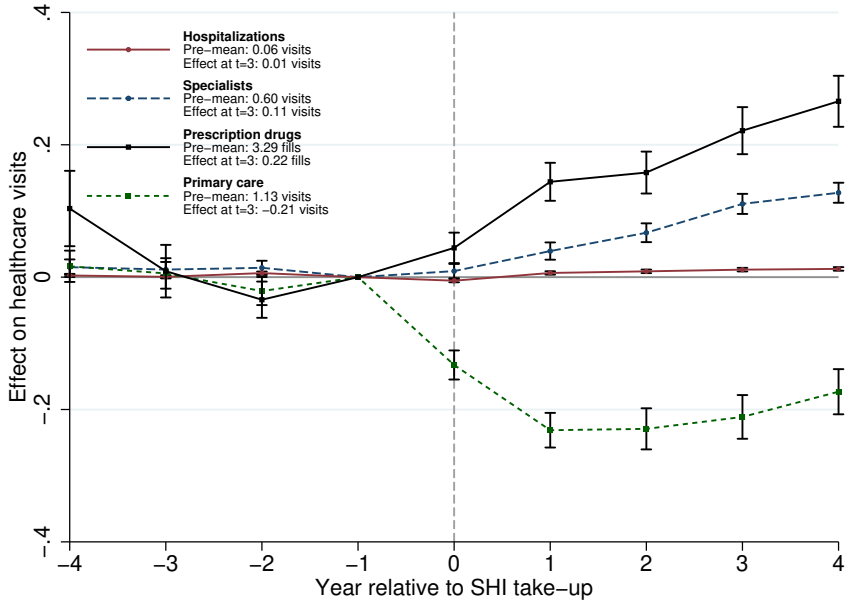


(b) Hospital visits



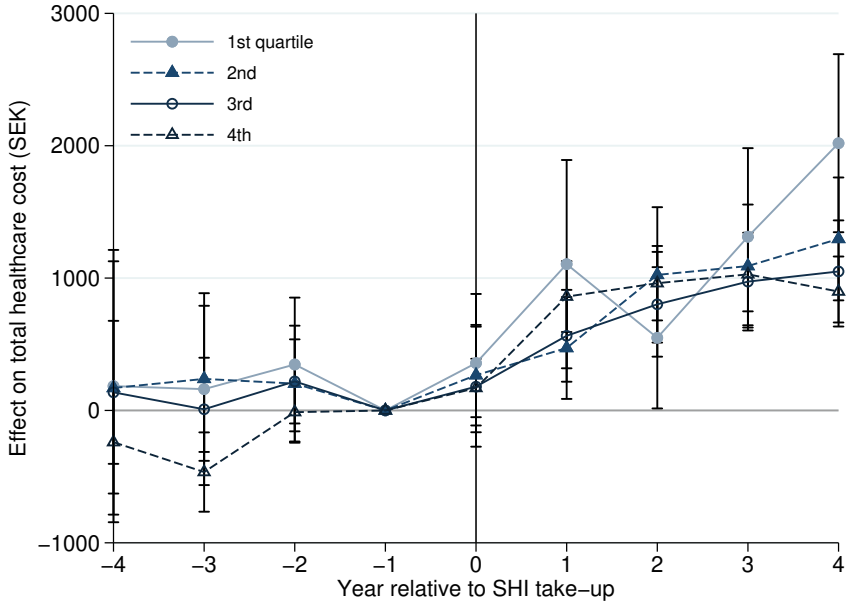
Note: This figure reports the point estimates used to construct Figure 3b. **Panel (a)** shows specialist visits and **Panel (b)** hospital visits, both expressed relative to the pre–SHI take-up mean. Estimates are obtained from a pre–post specification of equation (1): $\hat{y}_{it} = \alpha + \beta\, 1\{t - T_i > 0\} + \mu + \varepsilon_{it}$, where $\hat{y}_{it}$ denotes the outcome for individual i in year t after subtracting the mean of the comparison group in year t. T_i is the year of SHI take-up, and μ denotes SHI-cohort fixed effects. The coefficient β captures the average post–SHI effect. The 95% confidence intervals are based on standard errors clustered at the individual level.

Figure D.3: **Dynamic effects: utilization**



Note: This figure reports dynamic effect of SHI on the number of healthcare visits (hospitalizations, specialists and primary care) and on prescription drug use, measured as the total number of dispensed prescription fills. Primary care visits are estimated only for Stockholm. Effects are estimated using Equation (1). 95% confidence intervals are constructed using standard errors clustered at the individual level.

Figure D.4: **Dynamic effects by income**

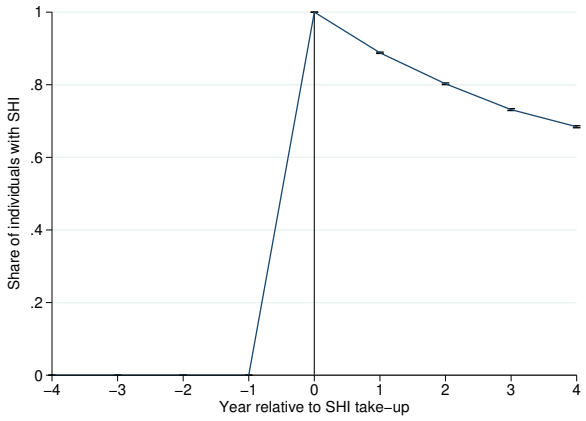


Note: This figure reports dynamic effect of SHI on total healthcare cost by quartile of disposable household income. Effects are estimated using equation (1). The income ranks are constructed in the same way as in Figure 1 and fixed at $t = -1$. 95% confidence intervals are constructed using standard errors clustered at the individual level.

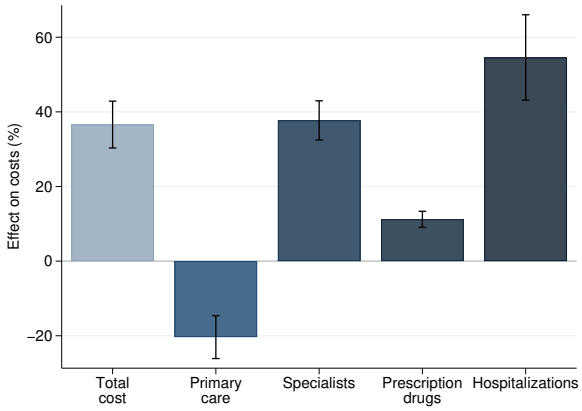
Figure D.5: **Scaling by SHI take-up**

Full sample

(a) First stage

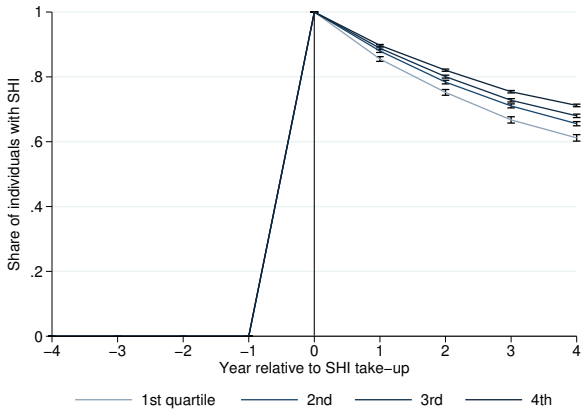


(b) Effect scaled by SHI take-up

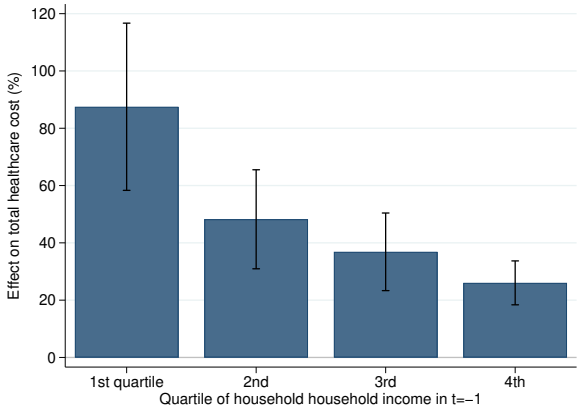


By income

(c) First stage



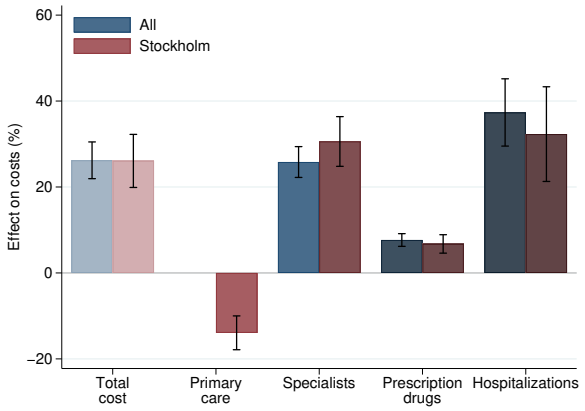
(d) Effect scaled by SHI take-up



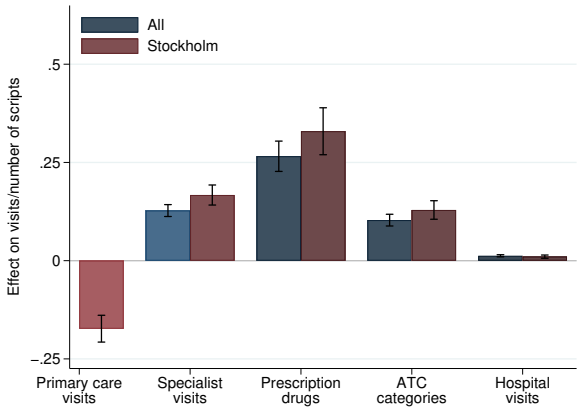
Note: This figure reports the evolution of SHI enrollment following employer SHI take-up and presents the $t = 3$ cost estimates scaled by the pre-mean ($t = -1$) from Figures 3a and 4a, scaled by the corresponding SHI enrollment rates at $t = 3$. **Panel (a)** shows the dynamic effect of first employer SHI take-up on subsequent SHI coverage (employer provided and other). **Panel (b)** reports the effect of SHI enrollment on healthcare costs, scaled by SHI take-up rates in $t = 3$. **Panel (c)** splits the dynamic SHI coverage by income quartiles. **Panel (d)** reports the effect of SHI enrollment on total healthcare costs, scaled by income–group-specific SHI take-up rates. 95% confidence intervals in Panel (b) and (d) are approximated using the delta method.

Figure D.6: **Effects of SHI: Full sample versus Stockholm**

(a) Effect on costs



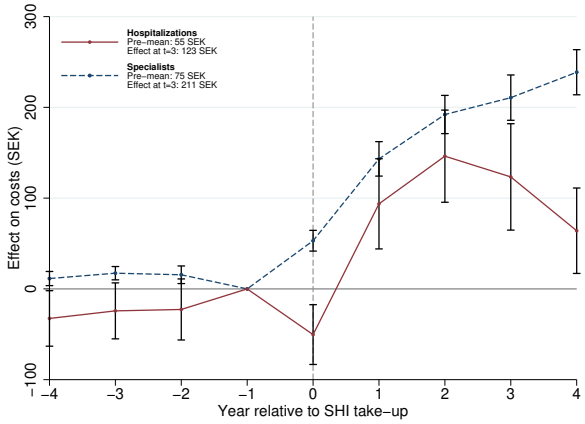
(b) Effect on visits and prescription drugs



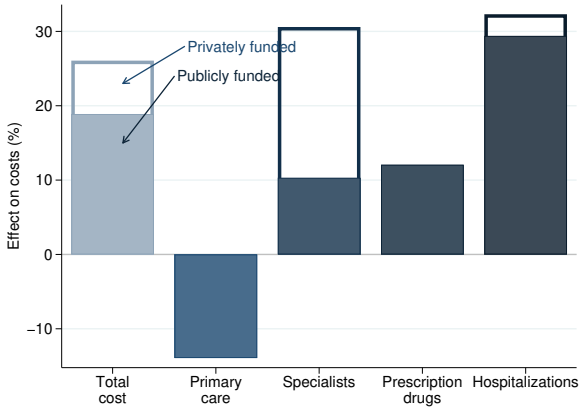
Note: This figure reports estimated effects of SHI on healthcare utilization and costs, comparing national estimates to estimates obtained using the Stockholm sample. Panel (a) shows impacts on total healthcare costs and cost components, analogously to Figure 3a. Panel (b) reports impacts on the number of healthcare visits and on prescription drug use. Prescription drug use is measured as the total number of dispensed prescription fills. ATC categories measure the breadth of drug use and are defined as the number of unique medications dispensed to an individual, identified by distinct five-character ATC codes. This level of aggregation corresponds to the chemical substance level and captures changes in the range of pharmacologically distinct treatments received, rather than variation in dosage or refill frequency. 95% confidence intervals are constructed using standard errors clustered at the individual level.

Figure D.7: **Publicly and privately funded care in Stockholm**

(a) Dynamic effects: privately funded care



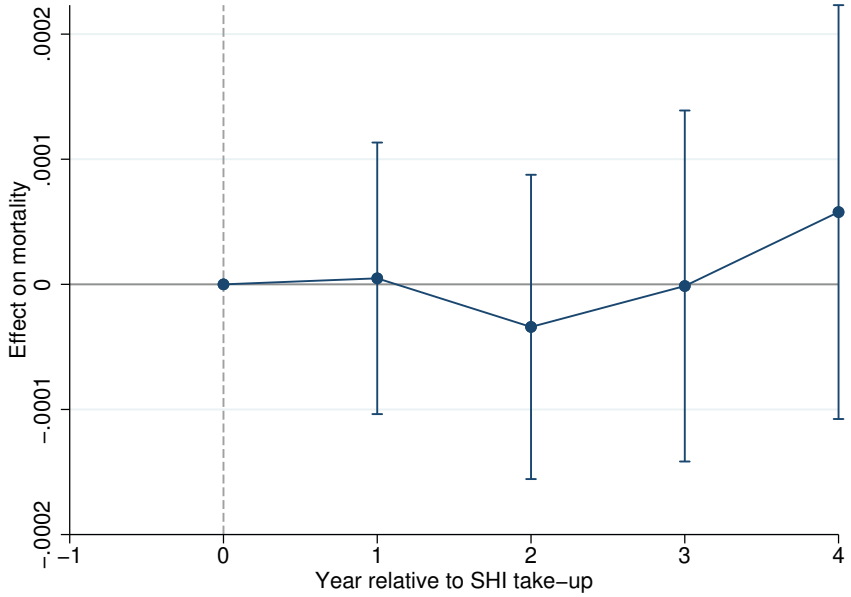
(b) Cost decomposition



Note: **Panel (a)** reports the dynamic effects of SHI on privately funded specialist and hospital costs using the Stockholm sample. **Panel (b)** shows the decomposition of publicly and privately funded care using the Stockholm sample. We take the event-time $t = 3$ estimate and divide by the pre-treatment ($t = -1$) mean. The shares of publicly and privately funded care are used to generate Figure 6 for the national decomposition. We estimate the effects using Equation (1) and 95% confidence intervals are constructed using standard errors clustered at the individual level.

E Effects of SHI on cancer and cancer survival

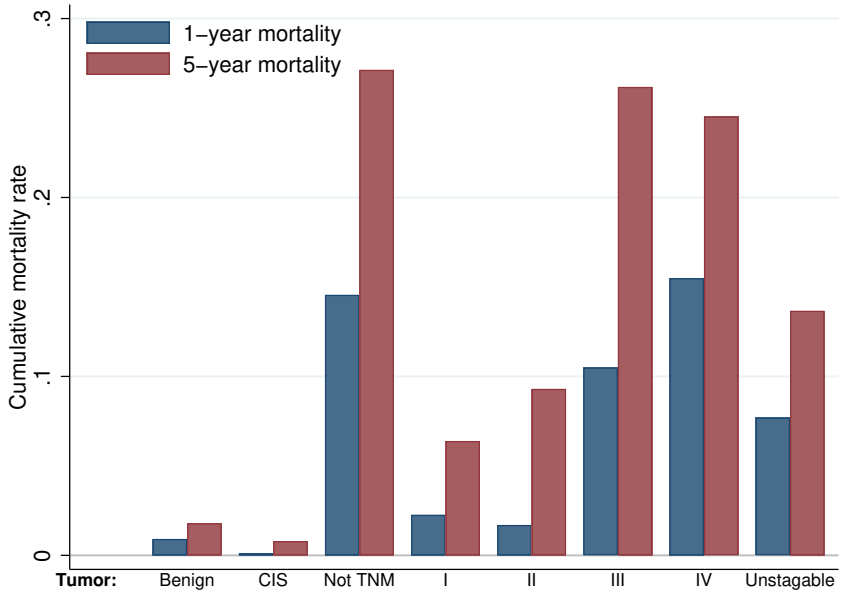
Figure E.1: **Mortality hazard rate**



Note: This figure reports the estimated effect of SHI on one-year mortality (hazard rate) using the estimator of Callaway and Sant'Anna (2021). Relative to the baseline design, we do not condition treatment on survival through event time $t + 5$ and include all treatment cohorts from 2007 to 2014. The final treatment cohort (2014) contributes only to the first post-treatment period. The control group consists of individuals treated at a later date (up to the year prior to treatment) as well as never-treated individuals. Inclusion in the analysis sample requires that individuals are observed in all years between $t = 0$ and $t = x$, where x denotes the year in which we estimate the probability of being recorded as dead in the subsequent year. All specifications control for gender, age, disposable household income percentile, tenure, employment status, and four education categories. 95% confidence intervals are constructed using standard errors clustered at the individual level.

Figure E.2: **Mortality by stage of cancer and SHI status**

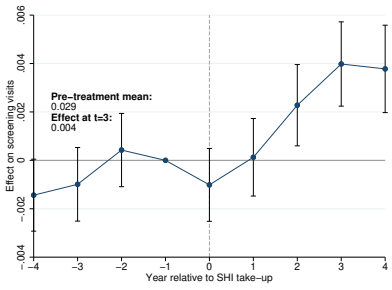
(a) Mortality by stage of cancer



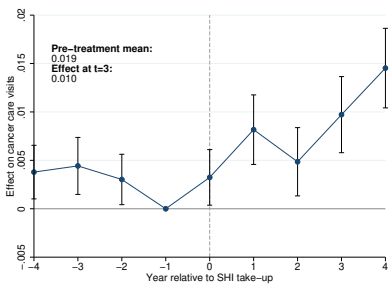
Note: Panel (a) reports the cumulative one- and five-year cancer mortality rates following cancer diagnosis. The sample comprises individuals aged 25–63 who were employed at a firm in the year prior to their cancer diagnosis and were diagnosed with cancer between 2007 and 2015.

Figure E.3: **SHI and cancer**

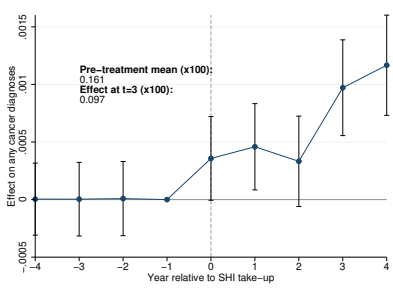
(a) Any screening



(b) Any cancer care

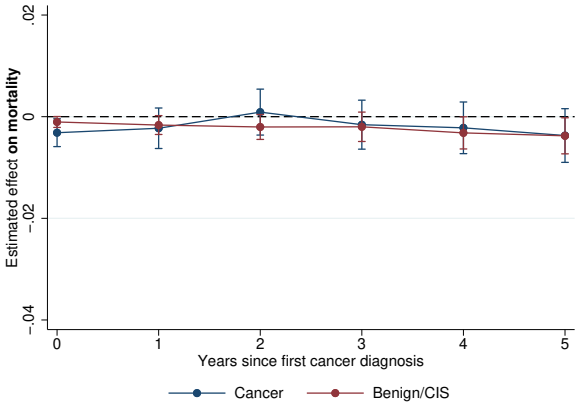


(c) Pr(cancer diagnoses)



Note: **Panel (a)** reports the effects of SHI on the number of annual screening visits, defined as a specialist or hospital encounter with an ICD-10 code in Z00–Z04 or Z10–Z13. These codes capture health checks, preventive examinations, and screening activities. **Panel (b)** shows the number of specialist and hospital visits due to cancer care, defined as ICD-10 codes C00–C99, D00–D10, and D37–D48 (malignant cancers, carcinoma in situ, and neoplasms of uncertain or unknown behavior, respectively). **Panel (c)** reports the effect of SHI on the annual probability of being diagnosed with a new cancer diagnosis, i.e. a new entry in the Cancer Register for a new malignant cancer, carcinoma in situ (CIS), or a benign tumor. We estimate the effects using Equation (1) and 95% confidence intervals are constructed using standard errors clustered at the individual level.

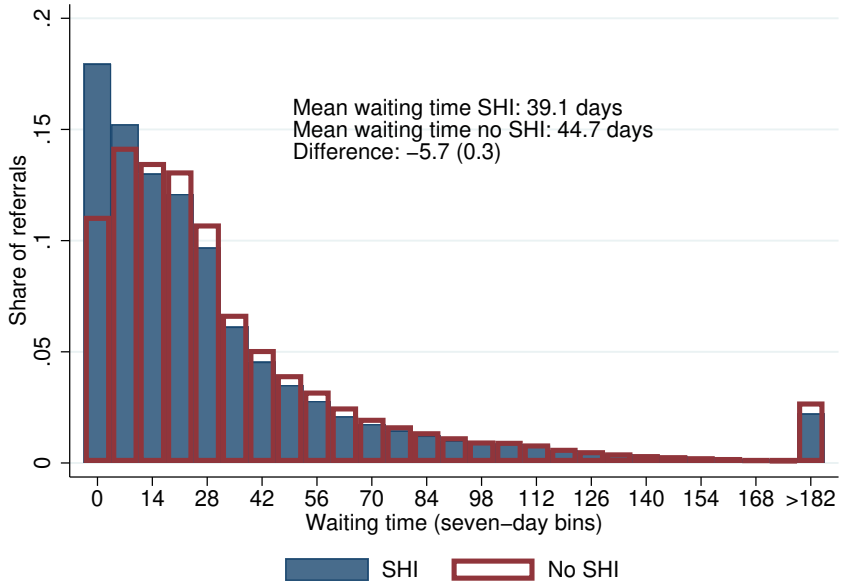
Figure E.4: **Effect of PHI on mortality following cancer**



Note: This figure shows estimated cumulative differences in mortality rates by years since the first cancer diagnosis between individuals with PHI and those without PHI. Estimates are reported separately for malignant cancers and for benign tumors or carcinoma in situ (CIS). The estimates use the same specification as bars 4 and 5 in Figure 5d, with 95% confidence intervals constructed using standard errors clustered at the individual level.

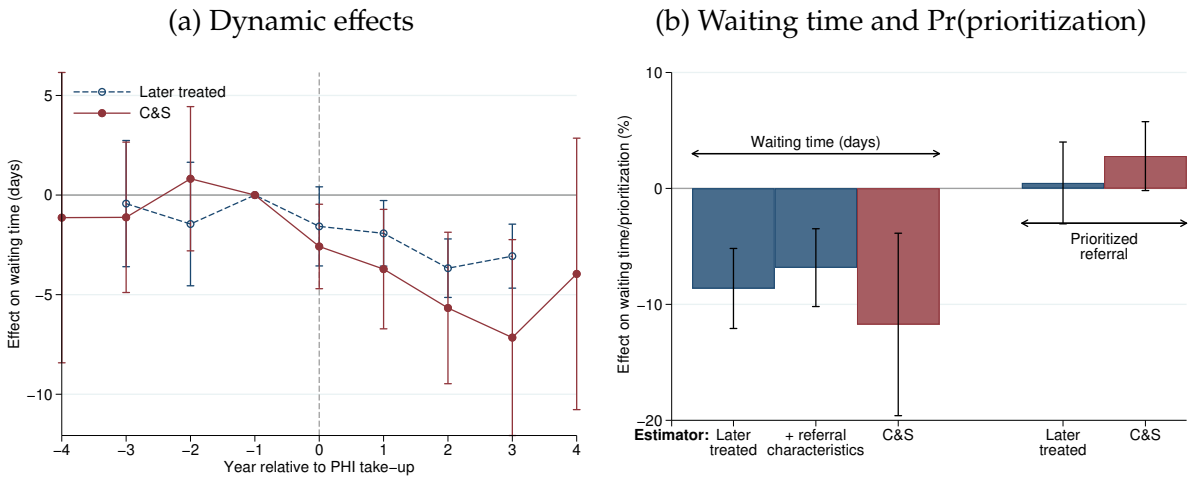
F Effect of SHI on waiting times

Figure F.1: **Waiting time distribution**



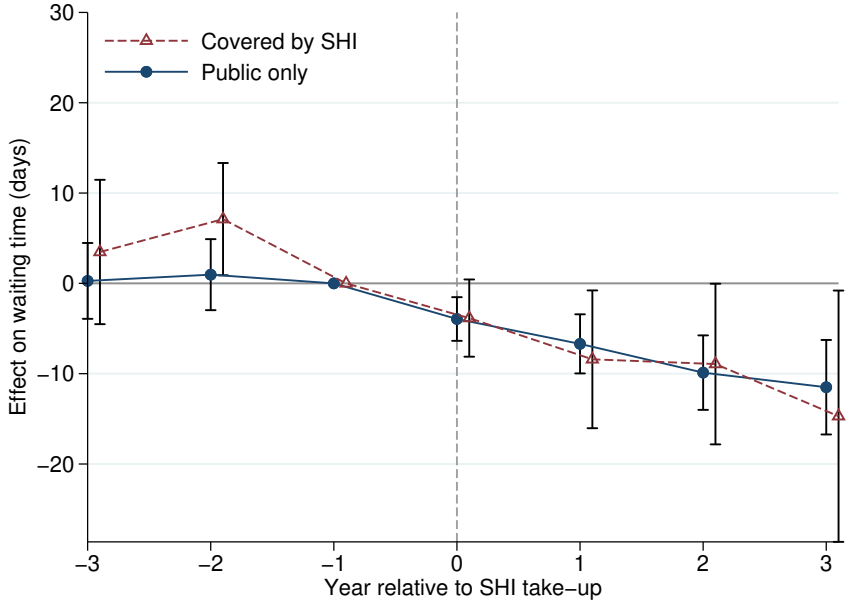
Note: This figure plots the distribution of observed waiting times by SHI status using the CVR-data. The sample includes 2,268,429 individual referrals attached to those in ages 25-65, issued between 2008 and 2015 for publicly funded care in region Stockholm. Referrals are grouped into seven-day waiting-time intervals, with the first bin covering 0 to 6 days (0.7% of referrals have zero days waiting time). The height of each bar shows the share of referrals that falls within each bin, computed separately for those with SHI and those without. We top-code waiting times above 182 days in the last bar (2.6% of all referrals). Filled bars correspond to individuals with SHI and outlined bars to individuals without SHI. Reported means are the average waiting time for each group, and the difference is the β-coefficient (s.e.) from running: $y_{i,r} = \alpha + \beta SHI_i + e_{i,r}$, where SHI=1 if the individual have SHI in the year the referral is issued.

Figure F.2: **Later treated versus Callaway & Sant'Anna**



Note: **Panel (a)** compares the dynamic effects obtained from the two designs used to estimate the effect of SHI on waiting times for public care. The hollow navy series correspond to the effects displayed in Figure 7. The maroon series reports dynamic effects estimated using all not-yet-treated units, following Callaway and Sant'Anna (2021). **Panel (b)** compares the $t = 2$ estimates, scaled by the pre-treatment mean. The first bar corresponds to the baseline effect. The second bar shows that including referral characteristics—aggregate CVR codes for type of specialist and type of visit (consultation, diagnostics, or treatment)—does not significantly affect the estimates. The third bar reports the $t = 2$ estimate obtained using the estimator of Callaway and Sant'Anna (2021), including referral characteristics. Bars four and five report the estimated effects on an indicator for having a prioritized referral, respectively for the two methods. 95% confidence intervals are constructed using robust standard errors.

Figure F.3: **Public only versus SHI covered care**



Notes: The figure reports the dynamic effect of SHI on waiting times, separately for referrals associated with conditions that are generally excluded from SHI coverage under the applicable terms and conditions (public-only care) and for referrals associated with conditions covered by SHI. Excluded categories are defined using ICD-10 diagnosis codes recorded as either the primary or secondary diagnosis. Conditions classified as excluded include: mental disorders and dementia (F00–F09); mental and behavioural disorders due to psychoactive substance use (F10–F19); schizophrenia, schizotypal, and delusional disorders (F20–F29); eating disorders (F50); and other mental and behavioural disorders, including mood, anxiety, personality, and developmental disorders (F51–F99); obstetrics and maternity (O00–O99); congenital and chromosomal conditions (Q00–Q99); dental conditions (K00–K14); preventive care and routine screening (Z00–Z13); fertility, assisted reproduction, and family planning (Z30–Z39, N46, N97); cosmetic and reconstructive-related encounters (Z41–Z42); donor or recipient administration and transplant status (Z49, Z52, Z94); communicable disease exposure or status and selected common acute infections (Z20–Z29, J00–J06, H10, H66); diabetes (E10–E14); malnutrition, overweight, and obesity (E40–E46, E65–E68); chronic renal failure and dialysis-related conditions (N18–N19); sleep disorders and snoring-related conditions (G47, R06); chronic cardiac conditions (I20–I25, I50); chronic lower respiratory conditions (J40–J47); cancer and neoplasms (C00–D48); and social or behavioral factors influencing health (Z55–Z65). An observation is classified as excluded if any diagnosis code falls within these ranges. We construct the list of excluded conditions by downloading the current general terms and conditions from insurers' webpages and mapping the listed exclusions to ICD-10 codes using a large language model. This procedure is likely to understate the set of excluded (public-only) care, as some exclusions—such as injuries related to sporting activities—are not fully captured. We match individual referrals to the Stockholm billing records using date information to obtain the ICD-10 code of each referral. When multiple visits are matched to the same referral, we give priority to visits closest in time to the referral date. Effects are estimated following Callaway and Sant'Anna (2021), allowing never treated be included in the control group to increase statistical power. 95% confidence intervals are base on robust standard errors.

Appendix - Tables

Table F.1: Chronic conditions

Chronic Disease	**ATC Code(s)**
Acid related disorders	A02
Bone diseases (osteoporosis)	M05
Cancer	L01
Cardiovascular diseases (inc. hypertension)	B01A, C01, C04A, C02, C07, C08, C09
Dementia	N06D
Diabetes (mellitus)	A10A, A10B, A10X
Epilepsy	N03
Glaucoma	S01E
Gout (Hyperuricemia)	M04
HIV	J05A
Hyperlipidemia	C10
Intestinal (inflammatory) diseases	A07E
(Iron deficiency) anemia	B03A
Migraines	N02C
Pain	N02A, N02B
Parkinson's disease	N04, N05B, N05C
Psychological disorders	N06A
Psychoses	N05A
Respiratory illnesses	R03
Rheumatological conditions	L04A
Thyroid disorders	H03
Tuberculosis	J04A

Note: This table presents our categorization of chronic conditions based on ATC codes from the Swedish Prescribed Drug Register following Danesh et al. (2024). We define an individual as having a chronic condition if at least one drug within the relevant ATC category has been dispensed in two consecutive years prior to the index year. ATC codes follow the WHO Anatomical Therapeutic Chemical Classification System.

Table F.2: Summary Statistics: SHI vs No SHI

	2007-2010		2011-2015	
	SHI	No SHI	SHI	No SHI
		Demographic		
Age	45.08	45.36	45.23	45.12
Female	0.34	0.51	0.35	0.51
Immigrant	0.11	0.16	0.12	0.17
Spouse	0.69	0.59	0.68	0.57
Nr. children	0.84	0.65	0.83	0.65
Less than high school	0.10	0.20	0.08	0.18
High school	0.41	0.43	0.39	0.43
Vocational educ.	0.17	0.15	0.17	0.15
University educ.	0.32	0.23	0.35	0.25
Disp. income rank	71.63	54.24	71.67	54.15
Wealth rank 2006	62.16	50.35	57.79	47.05
		Labor market		
Labor income	446.90	249.18	487.00	278.06
Tenure (0-5 years)	3.27	3.29	3.36	3.32
Any unemployment	0.02	0.07	0.01	0.06
Sick-leave days	5.43	11.02	6.83	13.37
		Geographic		
Stockholm	0.30	0.22	0.30	0.22
Gothenburg	0.21	0.17	0.20	0.17
Malmo	0.10	0.13	0.10	0.13
		Health		
Specialist visits	0.75	1.03	0.99	1.20
Hospitalizations	0.08	0.12	0.07	0.12
Specialist cost	3.71	6.04	3.75	5.76
Hospital cost	1.60	1.97	2.37	2.72
Prescription drug cost	1.74	2.82	1.85	2.88
Observations	1,000,358	12,112,181	2,246,600	19,548,971

Note: This table reports mean characteristics for individuals with and without SHI. The sample includes working age (25-65 years old) individuals. Sick-leave includes spells longer than 14 days provided by the public sick-leave insurance. Wealth and household disposable income percentile ranks are within birth cohort and year in the Swedish population. All monetary values are measured in kSEK.

Table F.3: Advantageous selection

Panel (a): Full sample	Outcome: Healthcare cost		
	(1)	(2)	(3)
SHI	-2,918	-1,959	-1,281
	(34)	(34)	(41)
Constant	11,106	11,016	10,936
	(16)	(15)	(12)
Gender FE	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Income	No	Yes	Yes
SES FE	No	No	Yes
R-Squared	0.004	0.006	0.114
Observations	34,908,110	34,908,110	34,844,586

Panel (b): Males with IQ scores	(1)	(2)	(3)
	All	Low IQ	High IQ
SHI	-992	-1,128	-656
	(70)	(123)	(86)
Constant	9,431	10,701	8,081
	(20)	(28)	(26)
Gender FE	No	No	No
Age FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Income	Yes	Yes	Yes
SES FE	Yes	Yes	Yes
R-Squared	0.154	0.161	0.175
Observations	8,384,624	4,234,739	4,149,045

Note: This table reports the association between annual healthcare expenditures in year t and an indicator for having SHI in the same year (individual-, group-, or employer-provided). Healthcare expenditures include inpatient care, specialist outpatient care, and prescription drugs, but exclude primary care. For healthcare visits, we observe average system costs in the Stockholm area at the level of ICD chapter x first procedure code x year, which are applied to all specialist and hospital visits in the National Patient Register to construct national cost measures. Prescription drugs are valued at the shelf price at the time of dispensing. All costs include out-of-pocket payments. Across columns, we sequentially expand the set of covariates. Income is measured as the household disposable income rank over the previous three years. Socioeconomic status (SES FE) includes measures of cohort-specific wealth quintiles, based on the three-year average of individual wealth between 2004–2006, and highest completed level of education at time t (less than high school, high school, post-secondary vocational education, or university education). The sample covers 2008–2015. Panel (a) uses the full population of working-age individuals (ages 25–65) for whom all covariates are observed. Panel (b) restricts the sample to males with available military enlistment data, limited to birth cohorts 1951–1975, when enlistment was mandatory. Column (1) in Panel (b) replicates Column (3) in Panel (a); Columns (2)–(3) split the sample at the median cognitive-ability score. Cognitive ability scores are obtained at military enlistment at age 18 and are measured as the within-cohort rank of the sum of test scores across four subtests: synonyms, inductions, metal folding, and technical comprehension. Standard errors are clustered at the individual level.

Table F.4: Summary statistics: main analytic sample

SHI cohort:	2007		2008		2009		2010	
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
				Demographic				
Age	38.99	38.47	39.36	38.84	40.07	39.58	39.41	39.02
Female	0.35	0.35	0.34	0.34	0.36	0.36	0.33	0.33
Immigrant	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Spouse	0.57	0.57	0.58	0.57	0.60	0.59	0.58	0.58
Nr. children	0.85	0.88	0.85	0.87	0.87	0.88	0.88	0.88
Less than high school	0.08	0.09	0.10	0.09	0.09	0.09	0.09	0.08
High school	0.39	0.42	0.41	0.43	0.41	0.42	0.39	0.42
Vocational educ.	0.18	0.19	0.18	0.19	0.18	0.19	0.18	0.19
University educ.	0.35	0.30	0.32	0.29	0.32	0.30	0.35	0.30
HH income rank	66.04	65.11	64.43	64.16	65.70	64.96	65.68	65.52
Wealth rank 2006	56.47	55.00	54.49	53.50	54.66	53.11	52.70	51.20
				Labor market				
Labor income	361.02	353.37	364.54	360.64	392.00	386.16	387.23	386.58
Tenure (0-5 years)	2.63	2.62	2.58	2.56	2.66	2.62	2.59	2.59
Any unemployment	0.07	0.07	0.05	0.05	0.03	0.04	0.06	0.07
Sick-leave days	4.98	5.54	4.99	5.27	4.60	4.91	3.55	3.71
				Geographic				
Stocholm	0.33	0.32	0.32	0.31	0.30	0.32	0.32	0.33
Gothenburg	0.17	0.18	0.18	0.19	0.20	0.19	0.19	0.20
Malmo	0.10	0.11	0.11	0.11	0.11	0.11	0.10	0.12
Observations	38,341	194,845	40,544	127,321	29,817	75,674	29,430	22,971

Note: This table reports descriptive statistics for the treatment and control groups in the main estimation sample. All variables are measured at $t = -1$. Monetary variables are expressed in thousands of SEK. Sick leave includes spells exceeding 14 days covered by the public sick-leave insurance system. Household disposable income rank and wealth rank are measured as percentile ranks within birth cohort and calendar year (2006 for wealth) in the Swedish population. The comparison groups are reweighted to match the joint distribution of covariates in the treatment group with respect to gender, age, labor income decile, and job tenure as described in Section . The resulting weights range from 0.03 to 20.11.

Table F.5: Stage of cancer at diagnoses

Panel (a): OLS estimate						
	(1) CIS	(2) Stage I	(3) II	(4) III	(5) IV	(6) Linear
SHI	0.0055	0.0083	0.0010	-0.0011	-0.0076	-0.0465
	(0.0062)	(0.0075)	(0.0048)	(0.0050)	(0.0051)	(0.0226)
R-Squared	0.534	0.175	0.148	0.174	0.562	0.564
Observations	142,468	142,468	142,468	142,468	142,468	116,250
Panel (b): IV estimate using the leave-one-out firm instrument						
	(1) CIS	(2) Stage I	(3) II	(4) III	(5) IV	(6) Linear
SHI	0.0055	0.0083	0.0010	-0.0011	-0.0076	-0.0465
	(0.0062)	(0.0075)	(0.0048)	(0.0050)	(0.0051)	(0.0226)
First stage	.99	.99	.99	.99	.99	.99
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
FS: F-statistic	24,373	24,373	24,373	24,373	24,373	19,406
Observations	142,468	142,468	142,468	142,468	142,468	116,250

Note: Columns (1) to (5) in **Panel (a)** show our baseline OLS estimates of the association between SHI and cancer stage at diagnoses, the same as shown in Figure 5c. Cancer stages are defined according to the AJCC 8th Edition TNM (Tumor, Node, Metastasis) system for solid tumors (stages I–IV) as in Amin et al., eds (2017). Hematologic and central nervous system tumors that are not staged using TNM, as well as unstageable solid tumors (where T, N, or M are missing or not measured), account for 18% of malignant tumors in our sample. Column (6) replaces the categorical indicators for cancer stage with a linearized measure of stage severity, ranging from 1 (CIS) to 5 (Stage IV). **Panel (b)** reestimates the effect of SHI on cancer stage at diagnosis using a leave-one-out measure of co-worker employer SHI coverage as an instrument for individual SHI status. For each individual i employed at firm f, the instrument is defined as $Z_i = \frac{1}{N_f - 1} \sum_{j \in f,\, j \neq i} SHI_j$, which captures firm-level variation in SHI coverage. Firm attachment for individual i and co-workers' employer-provided SHI coverage are both measured in the year prior to cancer diagnosis. Identification relies on two assumptions standard in this setting. First, the *exclusion restriction* requires that conditional on controls, co-workers' SHI coverage affects individual i's cancer stage at diagnosis only through its effect on i's own SHI enrollment, and not through other firm-level channels. Second, *monotonicity* requires that higher co-worker SHI coverage weakly increases the probability that individual i is covered by SHI. The first stage relates individual SHI coverage (firm-based, individual, or other group SHI) to this instrument, $SHI_i = \pi_0 + \pi_1 Z_i + X_i\delta + \varepsilon_i$ and structural parameters are recovered via two-stage least squares (2SLS). The parameter of interest, β_1, captures the local average treatment effect of SHI on stage at diagnosis for compliers. Both OLS and IV specifications include baseline controls for calendar year, age, gender, region of residence (21 regions), industry (20 categories), household disposable income rank (100 percentiles), and education (four levels). Column (2) additionally controls for 22 chronic condition indicators, defined as having filled prescriptions in $t = -1$ and $t = -2$, following Danesh et al. (2024). The sample in columns (1) to (4) include individuals aged 25-63 who are diagnosed with their first malignant tumor between 2007 and 2015 that are employed at a firm with 5 or more employees in the year before diagnosis. Robust standard errors are reported in parentheses.

Table F.6: Three-year mortality

Outcome: Three-year mortality					
Panel (a): OLS estimate					
	Malignant cancers				Benign/CIS
	(1)	(2)	(3)	(4)	(5)
SHI	-0.0201	-0.0187	-0.0057	-0.0016	-0.0021
	(0.0031)	(0.0031)	(0.0026)	(0.0025)	(0.0015)
R-Squared	0.043	0.046	0.347	0.430	0.015
Observations	142,468	142,468	142,468	142,468	45,241
Controls:					
Chronic conditions	No	Yes	Yes	Yes	Yes
Cancer site	No	No	Yes	Yes	No
Stage at diagnosis	No	No	No	Yes	No
Panel (b): IV estimate using the leave-one-out firm instrument					
	(1)	(2)	(3)	(4)	(5)
SHI	-0.0209	-0.0195	-0.0153	-0.0121	0.0010
	(0.0058)	(0.0058)	(0.0048)	(0.0047)	(0.0029)
First stage	1	.99	.99	.99	.98
	(.01)	(.01)	(.01)	(.01)	(.01)
FS: F-statistic	24,413	24,387	24,373	24,366	7,486
Observations	142,468	142,468	142,468	142,468	45,241
Controls:					
Chronic conditions	No	Yes	Yes	Yes	Yes
Cancer site	No	No	Yes	Yes	No
Stage at diagnosis	No	No	No	Yes	No

Note: **Panel (a)** reports our baseline OLS estimates of the association between SHI and three-year all-cause mortality, corresponding to the results shown in Figure 5d. Figure E.4 presents analogous estimates using the specifications in columns (4) and (5), but varying the mortality horizon from one to five years. In **Panel (b)** we reestimate the effect of supplementary health insurance on three-year mortality using the leave-one-out share of co-worker employer SHI coverage in $t = -1$ as an instrument. See Appendix table F.5 for details. Both the OLS and IV include baseline controls: year, age, gender, region of residence (21 regions), household disposable income rank (100 percentiles), and education (four levels). In column (2), we add 22 chronic condition dummy variables to capture underlying health status that may affect mortality. These measure chronic conditions as filling prescriptions for in $t = -1$ and $t = -2$ as in Danesh et al. (2024). In column (3) we add indicators for cancer sites measured using ICD-O-3 codes, and in column (4) we add controls for stage of cancer at diagnosis. The sample in columns (1) to (4) include individuals aged 25-63 who are diagnosed with their first malignant tumor between 2007 and 2015 that are employed at a firm with 5 or more employees in the year before diagnosis. Column (5) use the same inclusion restrictions but for individuals diagnosed with a CIS or begin tumors. Robust standard errors are reported in parentheses.

Table F.7: Private health insurance coverage and public system type

Country	Type of private health insurance	Type of public health system	Average PHI coverage
Finland	Supplementary (additional PHI alongside public and occupational care)	National Health Service with occupational tier (tax-financed)	∼20%
Denmark	Complementary and supplementary	National Health Service (tax-financed)	∼40–42%
Norway	Supplementary (mainly employer-paid)	National Health Service (tax-financed)	∼9–10%
Sweden	Supplementary (limited fast-access cover)	National Health Service (tax-financed)	∼10%
United Kingdom	Supplementary (private medical insurance)	National Health Service (tax-financed)	∼11–12%
Ireland	Supplementary (private hospital and specialist access)	Mixed system (tax-financed public + private access)	∼45%
France	Complementary (mutuelles covering co-payments)	Social Health Insurance (contribution-financed)	∼95%
Belgium	Complementary and supplementary	Social Health Insurance (contribution-financed)	∼85%
Netherlands	Complementary (outside mandatory basic package)	Mandatory regulated private insurance (SHI-type)	∼85%
Germany	Duplicate/substitutive (full private for eligible) and supplementary	Social Health Insurance with opt-out for high earners	∼11% (fully private)
Switzerland	Supplementary (on top of mandatory basic insurance)	Mandatory individual insurance (regulated private)	∼70% (supplementary)
Australia	Supplementary and duplicate (private hospital cover)	National Health Service (Medicare, tax-financed)	∼55%
Canada	Supplementary (employment-based for drugs and dental)	National Health Insurance (single payer, tax-financed)	∼65%
New Zealand	Supplementary (private hospital and specialist access)	National Health Service (tax-financed)	∼35%
United States	Primary private insurance (dominant coverage source)	Mixed system (private + Medicare/Medicaid)	∼65%

Notes: Approximate population coverage rates are based on OECD *Health at a Glance*, OECD and European Observatory country health profiles, and Commonwealth Fund international system summaries. *Supplementary* insurance improves access or choice relative to the public system; *complementary* insurance covers statutory co-payments; *duplicate/substitutive* insurance covers services also included in the public benefit package or substitutes for public coverage. Public system types follow standard comparative health system classifications.