How Do Health Insurance Costs Affect Low- and High-Income Workers?*

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Abstract

Given that employer-sponsored health insurance constitutes a significant component of labor costs, we examine the causal effect of insurance premiums on worker outcomes across the income distribution. To address endogeneity concerns, we instrument premiums using idiosyncratic variation in insurers' recent losses, which is plausibly exogenous to worker outcomes. Analyzing US administrative data, we demonstrate that firms reduce employment following premium increases. Importantly, higher premiums adversely affect lower-income workers but not high-income workers. Following instrumented premium increases, low-income workers face higher risks of job separation, unemployment, large earnings losses, transitions to staffing arrangements, and reduced wage growth even when retained. In contrast, high-income workers experience minimal or opposite effects.

JEL Codes: G22, G31, G28, G18, J01, J08, J32, J22, J23

Keywords: Health insurance, insurer losses, low-income workers, worker skills, firm employment, labor composition, inequality

*We thank seminar participants at New York University, the University of Georgia, Labor and Finance Group meeting, NBER Summer Institute, AFA, Texas Finance Festival, FSU Truist Conference, Conference on Finance, Labor, and Inequality, the Virtual Corporate Finance Seminar, Early Career Women's Conference in Finance, Texas Finance Festival, MIT Sloan Finance Juniors Conference, and FSU RMI Research Symposium. We are grateful for the comments by Tania Babina, Amy Finkelstein, Tim Liu, David Matsa, Holger Mueller, Roberto Pinto, Johannes Stroebel, Martha Stinson, Johnny Tang, Margarita Tsoutsoura, and Selale Tuzel. All remaining errors are our own. The U.S. Census Bureau has not reviewed the paper for accuracy or reliability and does not endorse its contents. Any conclusions expressed herein are those of the authors and do not represent the views of the U.S. Census Bureau. The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data used to produce this product (Data Management System (DMS) number: P-7503840, Disclosure Review Board (DRB) approval numbers: CBDRB-FY22-SEHSD003-019, CBDRB-FY22-SEHSD003-037, CBDRB-FY23-SEHSD003-044, CBDRB-FY24-SEHSD003-043, CBDRB-FY24-SEHSD003-063, and CBDRB-FY25-SEHSD003-023). Shan Ge acknowledges financial support from the Center for Global Economy and Business at NYU.

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1 Introduction

While health insurance mitigates the financial repercussions of health shocks, its costs are large and rapidly rising. In the U.S., employer-sponsored health insurance plays a central role, covering 54% of Americans. In 2023, the average family plan costs $23,968, of which employers contribute $17,393.[1] Unlike wages and payroll taxes, health insurance costs do not scale with worker productivity, making them a larger fraction of the total costs associated with employing low-income workers.

Given institutional and practical constraints that limit the scope for firms to offer different plans to different employees, health insurance closely resembles a significant per-person fixed cost that may depress labor demand, particularly for low-income workers, as hypothesized by Saez and Zucman (2019) and Deaton and Case (2021). Despite the heated ongoing policy debates about employers' role in healthcare provision and its potential labor market distortions, Finkelstein et al. (2023) note that how the employer-sponsored health insurance scheme contributes to labor market inequality remains understudied. Our paper helps fill this gap by examining how plausibly exogenous variation in firms' health insurance costs affects employment across the income distribution.

Health insurance premiums are typically shared between firms and workers. When premiums increase (assuming insurance enrollment remains constant), the cost increase must be absorbed through some combination of higher total labor costs for firms (earnings plus firm contributions) and reduced take-home pay for workers (earnings minus worker contributions). This should reduce employment through two channels: firms face incentives to lay off workers due to higher costs, while workers may choose to leave due to lower net compensation.

Importantly, rising health insurance costs can affect high- and low-income workers very differently, since they constitute a considerably larger share of total labor costs for lower-paid workers within the firm. In our data, the average premium per participant makes up around 30% of the wages of workers in the lowest earnings tercile and 6%

[1] See, https://www.census.gov/library/publications/2022/demo/p60-278.html and KFF Employer Health Benefits Survey, 2023 https://www.kff.org/report-section/ehbs-2023-summary-of-findings/.

of those in the highest earnings tercile. Given that spousal and family plans involve multiple participants, these percentages are even higher on a per-worker basis. Plan participation is heavily subsidized by the firm—the share of premiums contributed by employers is high (around 80%) and relatively homogeneous across the income spectrum.[2] To the extent that firms adjust employment in response to rising insurance premiums, low-income workers are therefore likely to be disproportionately impacted. This occurs because a given dollar increase in premiums represents a larger proportional increase in both the firm's total compensation costs and the worker's net-of-insurance pay for lower-paid employees.

To test these hypotheses, we construct a unique employer-employee matched dataset spanning 2012–2019 that contains around 23,000 firms. Our data combine Census administrative microdata on US firms and their workers with information on firms' health insurance costs from Form 5500, a mandatory filing for firms with benefit plans covering more than 100 participants. Crucially, our data allow us to study heterogeneity across workers within each firm and to understand subsequent labor market outcomes for impacted workers regardless of whether they stay with a given employer. We supplement these administrative data with insurers' financial data from their Affordable Care Act (ACA) filings.

We find that firms reduce employment following a plausibly exogenous increase in health insurance premiums. The impact is highly uneven across the income distribution. Low-income workers face more adverse consequences when health insurance premiums increase: higher rates of job separation, increased unemployment, steeper wage declines upon job separation, and slower wage growth even when retained. In contrast, high-income workers experience minimal effects or even opposite patterns.

To identify the causal effects of health insurance premiums on employment outcomes, one must address endogeneity concerns. For example, firms seeking to attract and retain workers may choose more expensive and generous health insurance plans, creating a correlation between premiums and unobserved labor demand. We overcome this challenge

[2]See, https://www.bls.gov/news.release/ebs2.t03.htm and Ouimet and Tate (2022).

through a novel identification strategy that uses idiosyncratic variation in insurers' recent losses as an instrumental variable for the premiums faced by their client firms. This approach isolates premium changes that are plausibly exogenous to firms' or workers' conditions.

Insurer losses can influence premium pricing through several channels. First, when faced with negative financial shocks, insurers may have strong incentives to prioritize short-term cash flows. In our setting, where existing customers' demand is inelastic in the short run, insurers can generate more immediate cash by increasing markups, even though this strategy may sacrifice long-term profitability.[3] Second, ACA guidelines specifically cap insurers' profits over three-year periods and therefore link allowable premium increases to recent losses. As a result, higher recent losses create regulatory room for insurers to raise premiums. Third, insurers can raise expectations about future claims following larger losses and thus raise prices. We discuss these mechanisms further in Section 2. Regardless of the mechanism, we argue that an insurer's decision to raise premiums after losses reflects its own financial objectives and regulatory constraints, rather than the conditions of its client firms or their workers.

We employ a two-stage least squares (2SLS) design to examine how idiosyncratic shocks to health insurance costs affect firm and worker outcomes. Our instrumental variable shows strong relevance. Supporting the exclusion restriction, we find that past insurer losses predict higher markups (measured as the premiums-to-claims ratio), but are not associated with larger future claims. These patterns are consistent with premium changes stemming from insurers' objectives rather than omitted employer or worker characteristics. In robustness tests, we also use insurers' losses incurred in states outside of the focal firm's state to further rule out endogeneity.

We find that an increase in the instrumented insurance premiums leads to a significant decline in firms' overall employment. Our estimates suggest that a 10% increase in premiums leads to a 2–3% decline in firm-level employment. While these estimates likely

[3]See, e.g., Chevalier (1995), Chevalier and Scharfstein (1996), Gilchrist et al. (2017), Khanna and Tice (2005), and Campello (2003). For insurance markets, see, e.g., Froot and O'Connell (1999), Oh et al. (2022), Koijen and Yogo (2022), and Ge (2022).

reflect responses of both labor demand and labor supply, they suggest that firms are quite responsive to idiosyncratic shocks to health insurance costs.

Next, we turn to our main analysis, which investigates how health insurance premium increases differentially affect workers across the income distribution. We partition workers into terciles based on their past earnings and examine the effect of health insurance premiums on worker outcomes for each income tercile. Our 2SLS estimation employs individual-level data and imposes granular fixed effects, including firm and state-by-industry-by-year fixed effects. They control for time-invariant factors and local industry dynamics. In alternative specifications, we include firm-by-year fixed effects to eliminate concerns related to time-varying employer conditions.

We find stark disparities in how premium increases affect job separation probabilities across income groups. A 10% increase in health insurance premiums is associated with a 3-percentage-point increase in separation probability for workers in the lowest income tercile. This effect diminishes to 1-2 percentage points for middle-income workers. Interestingly, the effect is reversed for high-income workers: their separation probability decreases by around 1.5 percentage points following the premium increase. This pattern suggests that firms may respond to higher insurance costs by substituting low-income, low-skill workers with their high-income, high-skill counterparts.

We next examine two additional worker-level outcomes: the probability that a worker becomes unemployed and the probability that a worker's earnings experience a severe drop upon job separation. For low-income workers, following a 10% exogenous increase in premiums, their unemployment probability increases by 1–2 percentage points. Their probability of experiencing a severe earnings loss (defined as an earnings change in the bottom 20th percentile) also increases by 2 percentage points. In contrast, high-income workers see their unemployment probability decrease by nearly 0.7 percentage points, and their probability of a severe earnings loss declines by 0.3 percentage points following the same premium increase.

These findings yield two implications. First, our separation results among low-income workers are unlikely to be driven by voluntary moves to better opportunities. Moreover,

increases in health insurance premiums have divergent effects: while low-income workers face adverse employment outcomes, high-income workers may actually modestly benefit due to incentives for impacted firms to substitute towards them.

Additional analysis provides indirect evidence consistent with firms responding to health insurance premium shocks by converting low-income employees to contractor arrangements through staffing firms. Since staffing firms primarily employ low-income workers, they can offer less generous health insurance plans without concerns about benefit equity with high-income workers. Indeed, we find that staffing firms have lower health insurance premiums per person. Following an exogenous increase in premiums, low-income workers are more likely to transition to staffing firms, with smaller effects for medium-income workers and no effect for high-income workers.

A natural question is whether firms pass higher insurance costs on to workers, either via reduced earnings (before workers' health insurance contributions) or higher employee insurance contributions. Unfortunately, we only observe net earnings after pre-tax deductions for health insurance and retirement contributions. With these data limitations in mind, we find two relevant patterns. First, premium increases negatively affect low-income workers' earnings growth rates, even among those retaining their jobs. Second, higher premiums reduce plan participation rates (measured as the ratio of participants to total employees). This decline in participation could reflect higher employee contributions and/or other steps taken by firms to reduce plan generosity.[4]

Taking stock, our findings are consistent with two complementary mechanisms. First, higher premiums increase employer contributions, creating incentives for firms to reduce their workforce. Second, firms may pass part or all of the increased premiums to workers through higher employee contributions, effectively lowering take-home pay and leading workers to seek outside options. Under either mechanism, low-income workers are most

[4]Note that we cannot observe insurance take-up at the individual level, so we cannot test the heterogeneity across workers. Other reasons can explain the declining participation rates. First, firms can make some workers ineligible by converting them to part-time workers. This channel is unlikely to drive our findings as we find that the part-time worker ratio at the firm-year level does not change with health insurance premiums. Second, firms can stop offering health insurance to spouses. Third, firms can stop offering health insurance to some workers. While plausible, this channel is unlikely to explain the magnitude of our findings as ACA mandates that firms with at least 50 full-time employees offer health insurance plans to at least 95% of those workers.

adversely impacted: they face higher unemployment risk, experience larger earnings losses upon job separation, and see slower wage growth even when retaining their jobs.

Related literature: Our study contributes to the growing literature on the effect of health insurance costs on employment outcomes, most of which exploit market-level, aggregate shocks. Prior and concurrent studies exploit different sources of variation in health insurance costs using a variety of datasets and arrive at mixed conclusions.[5] Closely related to us, Brot-Goldberg et al. (2024) use county-level hospital mergers as shocks to healthcare costs to study various county-level outcomes. Consistent with our paper, they also find a negative effect on employment, especially for low- and mid-income worker groups. Contemporaneous work by Ouimet and Tate (2022) uses variation in health insurance costs due to the competitive pressure from other employers in the same Metropolitan Statistical Areas (MSA) and industry to provide high-quality plans. They find that health insurance costs are negatively associated with entry relative to the exit rate for low-income workers.

Our study differs from the other papers in important ways. First, we document heterogeneous impacts of workers across the income distribution, which is overlooked in other papers except for concurrent papers by Ouimet and Tate (2022) and Brot-Goldberg et al. (2024). Second, prior papers in this literature use aggregate shocks that often can be confounded by other macro or regional shocks, as well as affect many employers' and employees' outside options for obtaining health insurance. For example, the ACA affects a large number of employers, as well as individuals' ability to obtain health insurance independent of employers. Our paper takes advantage of idiosyncratic and exogenous shocks that generate idiosyncratic variation *within markets*. This strategy allows us to

[5] Gruber (1994) finds that when states stipulated that childbirth be covered comprehensively in health insurance plans, female workers' wages declined without an effect on employment. Cutler and Madrian (1998) find that rising health insurance costs are associated with increasing work hours. Using similar data over a different sample period, Baicker and Chandra (2006) document that higher insurance premiums reduce the probability that a worker is employed full-time and the hours worked. Buchmueller et al. (2011) find that employer health insurance mandate in Hawaii had no effect on workers' employment probabilities. Several other papers study the effect of the ACA, which mandated many employers to offer health insurance plans to workers, and found mixed results. Almeida et al. (2021) find that public firms do not change employment, but cut the number of covered workers. Mulligan (2020) argues that firms cut jobs to stay under 50 employees to avoid triggering the employer mandate. Dillender et al. (2022) find that part-time employment increases.

better tease out the substitution incentives they create without the influence of other factors (e.g., worker outside options in labor markets and goods prices that increase as a result of market-level shocks). Third, the variation in health insurance costs in the other papers can be correlated with a higher valuation of health insurance by workers either due to better plan quality (e.g., Ouimet and Tate 2022 and Gruber and Krueger 1991) or changing costs of obtaining health insurance outside of one's employer (e.g., Brot-Goldberg et al. 2024). In contrast, we argue that the variation we exploit is uncorrelated with workers' valuation of the insurance, allowing us to isolate the direct effect of higher costs. Moreover, we are able to study the implications for individual workers' subsequent labor market outcomes following the shock, including earnings losses and job switching.

We are also related to Finkelstein et al. (2023), who calibrate a theoretical model about how the employer-sponsored health insurance regime and the rise in health insurance premiums contribute to lower equilibrium wages and employment for low-skill workers. We empirically examine how such premiums affect the employment outcomes of low- vs. high-income workers. This paper is also related to the broader literature on non-wage benefits, including seminal theoretical work by Summers (1989) and recent work by Aizawa et al. (2022), Goldin et al. (2020), Clemens et al. (2018), Liu et al. (2023) and Simintzi et al. (2023).

Third, our novel finding that insurers raise premiums following losses, including losses incurred in other states, contributes to the literature on health insurance pricing, which mostly focuses on consumer behavior and the market structure of the industry (e.g., insurer competition, market segmentation, bargaining between insurers, employer, and healthcare providers, as well as search frictions).[6] Our instrument, particularly the one using insurer losses from other states, also highlights the role of insurers in transmitting shocks across geographical regions and firms. We thus complement existing work showing how insurers propagate shocks in the economy.[7]

[6]See, e.g., Town and Liu (2003), Frank and Lamiraud (2009), Dafny (2010), Dafny et al. (2012), Avraham et al. (2012), Starc (2014), Ericson and Starc (2015), Dafny et al. (2015), Trish and Herring (2015), Ho et al. (2017), Ho and Lee (2017), Dafny (2019), Dickstein et al. (2024), Tebaldi (2024), and Lin and Zhou (2024).

[7]For example, Ellul et al. (2011), Koijen and Yogo (2015), Ge (2022), Oh et al. (2022), and Bhardwaj et al. (2022).

Fourth, our paper contributes to the literature examining how labor costs affect employment outcomes. While existing research primarily focuses on market-level shocks, our paper analyzes a unique idiosyncratic shock to labor costs to better isolate substitution incentives. Importantly, idiosyncratic and market-level shocks such as minimum wage changes can have fundamentally different effects.[8] We are also related to papers using other aggregate shocks to labor costs such as payroll tax (Kramarz and Philippon 2001 and Saez et al. 2019) and employment subsidies (Katz 1996).

Finally, we add to the literature on the persistent decline in labor share as well as the demand for low- and middle-skill workers (Autor and Dorn 2013). Prior literature focuses on the impact of import competition (Autor et al. 2013, Lu and Ng 2013, Pierce and Schott 2016), technological advancement (Doms et al. 1997, Acemoglu and Restrepo 2019, Acemoglu and Restrepo 2020), and tax policies (Tuzel and Zhang 2021 and Smith et al. 2022). We add to this line of research by focusing on a less explored yet important part of labor input costs, namely health insurance premiums, as another source of deteriorating labor demand for low-income workers. Relatedly, we also contribute to the literature trying to explain the widening wage gap between high- and low-skill workers, which has focused on technological development, institutional changes (e.g. labor unions and minimum wages), globalization, and worker-firm sorting.[9] Our results imply that rising health insurance costs could be another force driving rising wage inequality.

[8]For instance, when minimum wages increase, they affect all workers' outside options simultaneously, and firms can pass costs to consumers since their competitors face similar cost pressures (Harasztosi and Lindner, 2019). Indeed, many papers find that the effect of minimum wages on employment is small, including seminal papers by Katz and Krueger (1992), Card and Krueger (1994), landmark meta-analyses by Card and Krueger (1995), as well as recent papers such as Cengiz et al. (2019) and Engbom and Moser (2022). The literature estimates a wide range of effects of minimum wages on employment, from negative to positive, see survey by Flinn (2011), as well as recent work by Harasztosi and Lindner (2019), Karabarbounis et al. (2022), Dustmann et al. (2022), and Azar et al. (2024) and so on.

[9]See, for example, Katz and Murphy (1992), Goldin and Katz (2009), Acemoglu and Autor (2011), and Autor et al. (2020), Card et al. (2004), Farber et al. (2021), and Lee (1999), Feenstra and Hanson (2003), Goldschmidt and Schmieder (2017), Abowd et al. (1999), Mueller et al. (2017), and Song et al. (2019).

2 Identification Strategy: Instrument for Premiums

2.1 Instrumenting Premiums with Insurer Losses

To estimate the causal effects of health insurance premiums on employer and employee outcomes, we instrument premiums with insurers' losses (approximately claims scaled by premiums) while controlling for various fixed effects such as firm and state-by-industry-by-year fixed effects. We describe how we construct the instrument in detail in Section 3.2.

Several mechanisms link insurer losses to premium increases.[10] First, losses create pressure to increase short-term profits, even at the expense of long-term profits. When insurers face financial constraints due to losses, immediate cash becomes more valuable. If demand is inelastic in the short term, insurers can increase cash in the short term by raising premiums, despite the risk of eroding their customer base over time. This mechanism aligns with evidence that financially constrained firms raise prices, both broadly (Chevalier 1995, Chevalier and Scharfstein 1996, and Gilchrist et al. 2017) and specifically in insurance markets (Froot and O'Connell 1999, Koijen and Yogo 2022, Ge 2022, and Oh et al. 2022). Additionally, insurers may increase premiums following losses due to managerial incentives to manage short-run earnings (Stein 1989 and Edmans et al. 2017).

Second, insurers may revise their pricing models after experiencing losses, anticipating higher future costs. Importantly, our instrument reflects insurers' losses across many customers in many different locations and industries. Therefore, it is unlikely that a specific employer's claims or healthcare/business environment drives our instrument.

Third, ACA regulations can cause insurers to raise premiums following losses. In the large group market (which serves employers with at least 51 or 101 employees—depending on the state), insurers must spend at least 85% of premiums on claims over any three-year period or provide rebates. This effectively caps premiums relative to recent losses. When insurers have low prior claims, this restriction may prevent optimal pricing. Higher recent

[10] Note that health insurers do not face regulatory restrictions in their pricing in the large group market, in which our sample firms fall.

losses can relax this constraint, allowing insurers to raise premiums closer to optimal levels while maintaining ACA compliance.

The exclusion restriction requires that insurer losses affect firm and worker employment outcomes only through premium changes. Most of the insurers in our sample are large national firms serving numerous employers across multiple locations. Their losses reflect the aggregate gap between premiums and claims across their entire portfolio, making it unlikely that any single employer's conditions significantly influence these outcomes.

By including state-by-industry-by-time fixed effects, we effectively isolate idiosyncratic variation in losses, addressing concerns about macroeconomic or regional healthcare cost trends. We provide additional evidence supporting the exclusion restriction in Section 7. For instance, we show that insurer losses predict higher future markups but not higher future claims, consistent with the losses reflecting insurers' pricing decisions rather than underlying healthcare cost changes.

Moreover, we also report results from alternative specifications which instrument premiums using insurers' losses from states outside firms' locations. This instrument is even less likely to correlate with local employment outcomes through non-premium channels. The results remain similar using this alternative instrument.

2.2 Insurers' Pricing Power

Insurers' ability to raise prices following losses depends on their market power, which can stem from substantial market frictions. Both employers and workers face significant costs when switching insurance providers. Employers face high search costs because the health insurance plans are complex, the market has severe search frictions, and is intermediated by brokers. For employees, changing insurers can disrupt established relationships with healthcare providers due to changing coverage networks. It also requires learning new plan rules and procedures.

Our data confirm limited switching: only 9.8% of firms switch insurers annually. Additionally, while employers face higher premiums when their insurers suffer larger losses, they do not increase the probability of switching insurers (Section 7). Therefore, we

argue that employers are likely to have relatively inelastic demand towards their current insurers, enabling insurers to exert pricing power. This is consistent with findings in Dafny (2010), Dafny et al. (2012), and Lin and Zhou (2024).

Moreover, the primary impact of switching is likely to potentially weaken the first stage of our 2SLS procedure. We instrument for premiums using recent losses incurred by a firm's previous insurer rather than its current one. If firms could readily switch insurers to avoid premium increases, this would weaken our first stage. However, we find a strong first stage, indicating that firms cannot fully avoid premium increases by switching insurers.

3 Data

3.1 Employers' Health Insurance Data

We obtain information on employer-sponsored health insurance plans from the Annual Reports of Employee Benefit Plan required by the Department of Labor. The data come from the "Insurance Information" section of Schedule A of Form 5500. All employer-sponsored plans with more than 100 participants need to file Form 5500. Schedule A reports the premiums and number of participants associated with various types of contracts. We classify the following types as health plans: health (other than dental or vision), health maintenance organization (HMO) contracts, and preferred provider organization (PPO) contracts. Form 5500 provides rich information regarding the employer, including its employer identification number (EIN), name, location, phone number, and industry. More importantly, the data include the total premium paid, the number of participants, and the insurer for each plan-year observation. Most plans start in January. We exclude firms that are self-insured (identified following Panis and Brien 2020) or have a unionized workforce (i.e., firms that report any collective-bargaining welfare plans in Form 5500).

We also include employers found in the Schedule D Part 2 filings and matched via Schedule D main filings to a health insurance filing in Schedule A. These employers do

not file their own 5500 Schedule A health insurance data, and are part of insurance programs joined by other firms in a Group Insurance Arrangement. For these firms, we use the premiums, number of participants, and insurers reported by the Group Insurance Arrangement. However, we exclude them in analyses using the number of participants, as such firms do not report their individual firm-level number of participants.

Our main explanatory variable is the natural log of the premium per participant at each firm, calculated as total premiums divided by total participants for each employer-year observation. For employers with multiple insurance contracts, we aggregate premiums and participants across all insurers. Both measures include the covered family members of employees.

An important feature of Form 5500 data is that reported premiums combine employer and employee contributions. Employer contributions typically comprise about 73% of premiums for family plans.[11] While firms' contributions represent a direct labor cost to the firm, employee contributions can also influence their employment outcomes. When insurers charge higher premiums, if workers need to contribute more to health insurance plans, they receive lower net compensation after deducting such contributions from their pay. Given our state-by-industry-by-year fixed effects, the shocks we exploit are idiosyncratic and should not affect workers' outside options. Thus, we expect premium shocks to affect firm employment by decreasing employees' take-home pay or increasing employers' labor costs.

3.2 Construction of Instrumental Variable

We instrument log premiums per participant with insurer losses, using insurers' financial data from the Centers for Medicare & Medicaid Services (CMS). Due to CMS data availability beginning in 2011, our analysis of outcome variables starts in 2012. Under the ACA, health insurers must report their underwriting performance to CMS by state and market segment. The large group market segment serves plans with at least 51 employees in most states (101 in some).[12] This aligns with our sample from Form

[11] See, https://www.kff.org/report-section/ehbs-2023-summary-of-findings/.
[12] The other market segments are "individual" and "small group".

5500 filings, which are required for plans with more than 100 participants. In our final sample matched with the administrative earnings data, 92% of firms have more than 51 employees, and 85% have more than 101. In computing the instrument, we use large group market data because insurers typically manage this segment separately, making its losses particularly relevant for pricing decisions affecting large employer clients.

The ACA requires insurers to maintain a minimum three-year medical loss ratio of 0.85 in the large group market or provide customer rebates. This ratio's numerator comprises of claims plus allowable expenses and adjustments, while the denominator includes premiums plus adjustments. We compute loss ratios at the insurance conglomerate level using insurers' National Association of Insurance Commissioners (NAIC) group codes. Specifically, we aggregate both the numerator and denominator across all subsidiaries within each conglomerate. We aggregate at the conglomerate level for two reasons. First, with active internal capital markets within insurer groups (Niehaus 2018, Ge 2022, and Oh et al. 2022), losses from other divisions could spillover and influence the financial constraints of the focal division. Second, one division may expect higher future claims if recent losses are high in other divisions. We impose a floor value of 0.85 on conglomerate-level loss ratios motivated by the ACA 0.85 rule.[13] For employers with multiple insurers in year $t-1$, we calculate a premium-weighted average of insurers' loss ratios using the premium shares of each insurer in $t-1$ as weights.

Formally, we instrument firm i's log premium per person in year t with insurer losses defined as:

$$Insurer\ Loss_{i,t-3\ to\ t-1} = \sum_{j \in 1}^{N_i} w_{i,j,t-1} max\{Loss\ Ratio_{j,t-3,t-1}, 0.85\} \tag{1}$$

where $Loss\ Ratio_{j,t-3,t-1}$ represents insurer j's large group market loss ratio aggregated across all divisions over the past three years. Due to data limitations in the early sample period, we use only 2011 data for $t = 2012$, and 2011–2012 data for $t = 2013$. N_i denotes

[13]This procedure does not strictly follow ACA regulation, which requires that individual insurers' medical loss ratio at the state level to be at least 0.85 in the large group market. However, this should work against us from finding a strong first-stage result.

the total number of insurers serving firm i in $t-1$, and $w_{i,j,t-1}$ represents the share of employer i's premiums paid to insurer j in year $t-1$. More than 90% of firm-year observations have only one insurer.

3.3 Worker Data from IRS and U.S. Census

We obtain micro-level employer-employee matched data from the SOI Individual Tax Returns (W-2) data provided by the Internal Revenue Service (IRS) and housed by the US Census Bureau. This database, which is available from 2005 onwards, provides information on job affiliations (identified by EIN) and annual wage income for all US taxpayers. We exclude workers who are younger than 18 or older than 70. The analysis period spans 2012–2019 (for the outcome variables), where the start year is determined by CMS data availability, though some worker characteristics are computed using additional information from Form W-2 in earlier years. We construct two primary samples: a firm-year panel and an individual-year panel.

We use the firm-year panel to study the effect of health insurance premiums on firms' total employment. The key outcome variable is *Log(Employees)*, the natural log of the total number of workers employed by a firm in a year. When calculating annual firm employment, we exclude workers earning less than the federal minimum wage at 20 hours per week for 52 weeks since these workers may have been separated mid-year.[14] To ensure health insurance represents a meaningful portion of labor costs, we exclude firms where the number of plan participants (including family members) is less than 50% of total employees.

We match employers across W2 and Form 5500 data using EIN. Given that firms may have multiple EINs, this mapping can be imperfect, creating a source of potential attenuation. For example, a parent company can shift the reporting of workers and/or health insurance plan participants across EINs over time. To partially address such linkage issues, we implement two safeguards. First, we exclude EINs where year-on-year growth rates in total workers and plan participants differ by more than 30 percentage

[14]This approach has two caveats: it may exclude part-time workers, and it may include separated workers who earned above the threshold before departure.

points. Second, we conduct robustness tests, where we aggregate employment, premiums, and the instrument across all EINs within each parent company. Our matching algorithm, which uses EINs, phone numbers, and fuzzy name and address matching, allows us to match EINs to the Census firm identifier for the parent company using the Longitudinal Business Database (LBD).

The individual-year panel tracks the effect of health insurance premiums on worker outcomes. We focus on the differential impact across income levels. In our main analyses, for individual outcomes in years t and $t+1$, we sort workers into terciles based on their average earnings from $t-5$ to $t-1$, excluding the years when they do not have earnings.

We define five individual-level outcome variables of interest. (1) $1(Separated)_t$ is an indicator that equals one if a worker's earnings from their $t-1$ employer fall below minimum wage at 20 hours per week for 52 weeks in year t. (2) $1(Unemployed)_t$ is an indicator that equals one if a worker's earning falls below the minimum wage threshold and does not file 1099 forms (typically used for contractors and ad hoc service workers). (3) $1(Separated\ \&\ WageDrop)_t$ equals one if a worker leaves their $t-1$ employer and if their earnings relative to the prior five-year average is in the bottom quintile of year t. (4) $1(at\ Staffing\ Firm)_t$ is an indicator for employment at a staffing firm (NAICS code 5613, following De Leon et al. 2024) in year t. (5) $Wage\ Growth_t$ measures the log difference between a worker's wages in year t and her prior five-year average (excluding zeros). We examine the outcomes in years t and $t+1$. This allows us to account for slow-moving responses of worker career transitions and observe attenuation of the effect over time.

3.4 Summary Statistics

Table I presents the summary statistics for our key variables of interest, including insurance premiums, as well as firm and worker outcomes. In the firm-year sample, the average insurer loss ratio is 0.89, with the standard deviation being 0.02. On average, firms in our sample employ 270 workers. Health insurance premiums are on average \$6,763 per individual participant. In the individual-level panel, workers' average probability of

being separated from their previous-year employer is 11%. The average probability of being unemployed is 2%.

TABLE I ABOUT HERE

4 Empirical Specification

To analyze how health insurance costs affect firm and worker outcomes, we employ a 2SLS framework using the instrumental variable described in Sections 2 and 3.2. We begin with firm-level analysis by estimating the following equations:

$$Premium_{f,t} = \beta \times Insurer\ Loss_{f,t-3\ to\ t-1} + \alpha_f + \tau_t + \epsilon_{f,t} \tag{2}$$

$$Y_{f,t} = \gamma \times \widehat{Premium}_{f,t} + \lambda_f + \kappa_t + \nu_{f,t}, \tag{3}$$

where $Premium_{f,t}$ represents the log of premium per participant for firm f in year t, typically determined before year t begins. $Insurer\ Loss_{f,t-3\ to\ t-1}$ is the medical loss ratio of the firm's $t-1$ insurer over the previous three years, as defined in Section 3.2. Our primary firm-level outcome $Y_{f,t}$ is the log of employee counts. We include firm and year fixed effects, and progressively enhance our controls by replacing year fixed effects with industry-by-year, state-by-year, and industry-by-state-by-year fixed effects, where the industry is defined by two-digit NAICS codes. Standard errors are corrected by clustering at the firm level.

Our worker-level analysis examines how insurance costs differentially affect high- and low-income workers. We hypothesize that premium increases more adversely affect low-income workers' employment outcomes, relative to their higher-income counterparts. To

test this hypothesis, we estimate the 2SLS framework below:

$$Premium_{f,t} \times Tercile^{j}_{i,t} = \sum_{k=1}^{3}(\beta^{j,k} Insurer\ Loss_{f,t-3\ to\ t-1} \times Tercile^{k}_{i,t} + \delta^{j,k} Tercile^{k}_{i,t}) + \alpha^{j}_{f} + \zeta^{j}_{i} + \tau^{j}_{s,m,t} + \epsilon^{j}_{i,f,t} \tag{4}$$

$$Y_{i,f,t} = \sum_{j=1}^{3}(\gamma^{j} \widehat{Premium_{f,t} \times Tercile^{j}_{i,t}} + \delta^{j} Tercile^{j}_{i,t}) + \lambda_{f} + \eta_{i} + \kappa_{s,m,t} + \nu_{i,f,t}, \tag{5}$$

where i, f, t, s, and m denote individual, firm, year, state, and industry respectively. The indicator variables, $Tercile^{k}_{i,t}$ and $Tercile^{j}_{i,t}$ $(k, j = 1, 2, 3)$, equal one if worker i's past five-year average earnings fall into the corresponding tercile in year t. Equation 4 comprises three separate first-stage regressions. The second-stage outcome, $Y_{i,f,t}$, represents individual employment outcomes as defined in Section 3.3, including separation and unemployment. We weigh observations with the inverse of the number of employees at each firm to reduce the influence of large firms. The equations are estimated simultaneously.

Our baseline specification includes individual, firm, and state-by-industry-by-year interactive fixed effects to account for time-invariant individual and firm characteristics, as well as state-by-industry trends. The individual fixed effects also address worker-firm sorting concerns. For example, low-income workers with higher job turnover rates may be systematically matched with firms experiencing premium-increasing shocks. The coefficients of interest, γ_j $(j = 1, 2, 3)$, measure the effect of health insurance premiums on the employment outcomes of workers whose income falls in the j^{th} tercile. We correct standard errors for clustering at the firm level.

In addition, we directly compare the effects on low-income and high-income workers within the same firm and year via a within-firm-year analysis. We do so by replacing the state-by-industry-by-year fixed effects with firm-by-year fixed effects, which remove potential confounding employer-year-level factors. We omit the interaction terms for the highest income tercile indicator in both stages. Thus, the coefficients on the premium

interactions with the lowest and middle terciles capture the differential effects relative to the highest tercile.

5 Insurance Premiums and Firm-Level Employment

In this section, we examine the effect of health insurance premiums on firm-level employment using the 2SLS approach following Equations 2 and 3. Panel A of Table II presents the first-stage results. The dependent variable is the natural logarithm of premium per plan participant ($Log(Premium\ per\ Person)_t$). The independent variable is insurers' loss ratio ($Insurer\ Loss_{t-3\ to\ t-1}$). In column (1), we control for firm and year fixed effects. We then replace the year fixed effects with state-by-year fixed effects in column (2), industry-by-year fixed effects in column (3), and state-by-industry-by-year fixed effects in column (4). These fixed effect structures remove confounding effects arising from state- and industry-level dynamics and isolate the idiosyncratic variation in insurer losses relative to firms in the same state and/or industry. Across these specifications, coefficients on $Insurer\ Loss_{i,t-3\ to\ t-1}$ are positive and statistically significant. The estimates suggest a stable magnitude: a one-standard-deviation increase in insurer losses (0.022) is associated with around a 2% increase in premium per person.

Table II About Here

Panel B presents the second-stage results. Columns (1) through (4) correspond to the first stage in Panel A. The dependent variable is the log number of employees in a firm ($Log(Employees)_t$). The coefficients on the instrumented premiums are negative, suggesting that higher premiums lead to a decline in employee counts. The estimates suggest that a 10% increase in premium per person leads to a 1.6–3.0% reduction in employees. While one might be tempted to map these estimates into a labor demand elasticity, such an interpretation is challenging given that these estimates are likely to reflect shifts in both labor supply and labor demand. We discuss this issue and the magnitude of the overall employment estimate further in Section 9.

In columns (5) and (6), we examine whether the decline in employment is driven by a

reduction in the number of retained workers or newly hired ones. The results suggest that higher premiums significantly reduce the number of retained workers, with a magnitude similar to the overall employment decline. While premium increases also negatively affect new hiring, this effect is not statistically significant.

Table IA.1 presents robustness results where we repeat our 2SLS analysis by aggregating firm employment and premiums at the parent firm level. Results remain similar. Table IA.2, Panel A presents the OLS relationship between firm employment and health insurance premiums. The estimated coefficients on premiums are also negative, but smaller in absolute magnitude than the 2SLS estimates. This can be explained by the endogeneity bias in the OLS regression. For example, when firms want to retain/attract more workers, they offer more generous health insurance plans that are more costly.

6 Insurance Premiums and Worker-Level Outcomes

Having established that higher health insurance costs reduce firm-level employment, we now examine how premiums differentially affect workers across income levels, analyzing a number of worker-level outcomes. Before turning to results, we first discuss the economic rationale for heterogeneous effects.

Crucially, a number of institutional constraints imply that firms are likely to offer similar health benefits to all employees, regardless of pay levels. First, there are regulatory restrictions that limit a firm's ability to make smaller health plan contributions to workers with lower productivity. The employer mandate in the ACA requires large employers (with 50 or more full-time employees) to offer health coverage to at least 95% of their full-time employees and their dependents. In addition, ACA's affordability mandate requires that workers' contributions need to be less than a certain percentage of their household income. The percentage varies over time and has been between 9% and 10%. Second, as is discussed further in Ouimet and Tate (2022) and Finkelstein et al. (2023), equity concerns and the Health Insurance Portability and Accountability Act (HIPAA) nondiscrimination regulations prevent employers from charging different premiums within

a firm. Finally, having a uniform set of health insurance options reduces administrative complexity and helps employers to have large diversified risk pools, potentially yielding better pricing. Consistent with these motives, Ouimet and Tate (2022) find small within-firm variation in firms' health benefit costs.

In light of this institutional context, employer-sponsored health insurance premiums resemble a fixed, "head tax" on individual workers (Finkelstein et al., 2023). For a highly compensated worker, premiums comprise a fairly modest share of her overall compensation. By contrast, it can make up a very sizable fraction of total compensation for her lower-income, benefits-eligible coworker. As a result, a fixed increase in total premiums leads to a much larger increase in total compensation for the latter worker relative to the former. Accordingly, one would anticipate that rising premiums raise the cost of employing lower-income, benefits-eligible workers relative to their higher-income coworkers. This change in relative costs, in turn, creates incentives for firms to substitute away from lower-income employees.

If firms pass premium increases to workers by raising required contributions, the impact on take-home pay relative to outside options is more severe for low-income workers, potentially inducing a larger change in the labor supply of low-income workers. We discuss labor supply and demand forces further in Section 9, after presenting evidence on different worker outcomes here. We test these predictions following the design of worker-level analysis outlined in Section 4.

6.1 Job Separation

We first examine workers' probability of separating from their previous employer. Using the individual-year panel discussed in Section 3.3, we estimate Equations 4 and 5. We focus on the interaction between insurance premiums and worker income terciles (based on workers' $t-5$ to $t-1$ average earnings). We hypothesize that low-income workers are more likely to be separated from firms for reasons discussed above: the larger impact of premium increases on their employment costs and the larger effect of higher contributions on their take-home pay.

Table III reports the second-stage results, where the dependent variable *1(Separated)* indicates worker separation from their $t-1$ employer. We examine the effects of premiums on worker separation probability in year t (columns 1 and 2), immediately following the premium change at the beginning of year t (usually determined at the end of year $t-1$) and in year $t+1$ (columns 3 and 4).

TABLE III ABOUT HERE

Columns (1) and (3) include firm, individual, and state-by-industry-by-year fixed effects. The results suggest stark differences across income groups. The coefficients on *Log(Premium per Person)*×*Low Income* are positive and statistically significant, while those on *Log(Premium per Person)*×*High Income* are negative and statistically significant in column (3). The magnitudes suggest that a 10% premium increase raises low-income workers' separation probability by 2.6 percentage points, while reducing high-income workers' separation probability by 0.6–1.4 percentage points. Medium-income workers experience a moderate increase in separation risk. These effects are economically significant relative to the baseline annual separation probability of 11%.

Columns (2) and (4) include individual and firm-by-year fixed effects while omitting interaction terms with the *High Income* indicator. Thus, the coefficients on *Log(Premium per Person)*×*Low Income* indicate the differential effects of premiums on low-income relative to high-income workers. The positive, significant coefficients on *Log(Premium per Person)*×*Low Income* confirm that low-income workers face significantly higher separation risk than high-income workers following premium increases. The magnitudes of the coefficients are similar to the difference between the coefficients of *Log(Premium per Person)*×*Low Income* and *Log(Premium per Person)*×*High Income* without firm-by-year fixed effects.

Table IA.3 uses an alternative 2SLS regression. We interact the instrument and the endogenous premiums with a continuous measure of workers' past five-year average wages, which is in the form of a natural log and standardized to have a mean of zero and a standard deviation of one. The results suggest a similar pattern as those above:

workers with lower earnings experience an increase in separation, while workers whose earnings are at least 0.8 (=0.10/0.13) standard deviation higher than the average worker experience a decrease in the probability of separation.

Table IA.2, Panel B reports the OLS estimation results of Equation 5. The coefficients on *Log(Premium per Person)*×*Low Income* remain positive but are smaller in magnitude compared to the 2SLS estimates. Again, this attenuation likely reflects endogeneity bias in the OLS specification. Specifically, firms may simultaneously choose more generous (and costly) health insurance plans when they aim to attract or retain workers, a force that pushes in the opposite direction and biases the estimates towards zero.

The instrumental variable results show that health insurance premiums increase the separation probability of low-income workers but not for high-income workers. The fixed-cost nature of health insurance premiums creates a relatively larger burden on low-income workers, leading to higher separation rates when premiums increase. The reduced separation rate for high-income workers likely reflects firms' ability to substitute low-income workers with high-income workers.

One natural question is whether such results are driven by low-income workers quickly landing other, potentially more desirable jobs, which will offset any negative effect of increased health insurance costs on these workers. To further shed light on this question, we look into other worker career outcomes, such as unemployment and large wage drops.

6.2 Unemployment

In this section, we examine the differential effects of premiums on the probability of unemployment across the worker income distribution. We estimate the specifications in Table III, replacing the dependent variable with *1(Unemployed)*, which equals one if the worker earns less than the federal minimum wage at 20 hours a week and does not receive a Form 1099.

Table IV About Here

Table IV presents the second stage of the instrumental variable estimation. Again,

we find that health insurance premiums have adverse effects on low-income workers but opposite effects on their high-income peers. Based on column (1), following a 10% premium increase, the probability of unemployment increases by 1.1 percentage points for low-income workers and reduces by 0.7 percentage points for high-income workers. These effects are large relative to the baseline one-year unemployment probability of 1.8%. The within-firm-year analysis in column (2) confirms that the difference is statistically significant. Moreover, columns (3) and (4) demonstrate that these divergent unemployment patterns persist into the following year.

Comparing Tables III and IV, the effect on unemployment is smaller than on separation for low-income workers. This suggests that some separated workers successfully find alternative employment. This pattern of labor reallocation echoes that induced by minimum wage increases (Dustmann et al. 2022; Engbom and Moser 2022). However, the fact that unemployment effects remain significant indicates that these transitions are not frictionless, with some workers experiencing extended unemployment.

6.3 Separation with Large Wage Declines

We continue to explore the adverse consequences of health premium shocks on worker employment outcomes across the income distribution. In this section, we repeat the individual analyses above, using the probability that workers both experience job separation and a large wage decline as the outcome variable, a proxy for involuntary unemployment used by Meeuwis et al. (2024). Specifically, we define an indicator variable *1(Separated & Wage Drop)* that turns to one if a worker is separated from their previous employer and also experiences a wage growth in the bottom quintile across all worker observations. We measure wage growth as the difference between the log wage in year t (or $t+1$) and log of the previous five-year average. In the bottom quintile, the median wage growth is -0.34 (or -29%) in year t and -0.60 (or -45%) in $t+1$. Such large earnings losses typically signal adverse employment transitions, whether through unemployment or moving to lower-paying positions.

Table V presents the second-stage results. The interaction terms between premiums

and the *Low Income* indicator have positive and statistically significant coefficients. This suggests that premium increases raise low-income workers' probability of experiencing separation and large wage drops. A 10% premium increase raises their probability of separation with a severe wage drop by 1.5 percentage points, 21% of the baseline probability of 7%. This effect persists into the following year. In contrast, high-income workers experience a 0.3 percentage point reduction in their probability of adverse transitions. This suggests they may benefit from these labor market adjustments because of their substitutability with low-income workers.

TABLE V ABOUT HERE

The consistent pattern across both unemployment (Table IV) and wage decline outcomes (Table V) provides evidence that premium increases generate adverse labor market consequences for low-income workers while benefiting high-income workers. These findings also suggest that low-income workers' larger separation response described earlier is unlikely to be explained by their voluntary departure, as voluntary moves would be unlikely to result in unemployment or substantial wage declines.

6.4 Transition to Staffing Firms

Firms can mitigate health insurance premium shocks by converting low-skill employees to contractors through staffing firms. Since staffing firms primarily employ low-income workers, they can offer less generous health insurance plans without concerns about maintaining benefit equity with high-income workers (Ouimet and Tate, 2022), who are more likely to desire higher-quality insurance. The resulting cost savings on insurance premiums can then be passed on to the original employer.

In Table IA.4, we investigate whether staffing firms have lower health insurance premiums by regressing log premiums per person on a staffing firm indicator (identified using NAICS code 5613 for Employment Services, following De Leon et al. 2024). We present three specifications: with year fixed effects in column (1), year and state fixed effects in (2), and state-by-year fixed effects in (3). Across all specifications, the staffing firm

indicator coefficients are negative and statistically significant. Column (3) indicates that health insurance premiums at staffing firms are 5.5% lower than at other firms.

To investigate whether firms respond to premium increases by moving workers to staffing arrangements, we track employee transitions to staffing firms following exogenous premium increases at their original employers. Table VI presents second-stage results using our individual-level regression framework. The dependent variable is an indicator for employment at a staffing firm (NAICS code 5613) in year t (columns 1-2) or $t+1$ (columns 3-4). The results reveal that low-income workers are significantly more likely to transition to staffing firms following premium increases. A 10% premium increase raises this probability by 0.5 percentage points. Medium-income workers show a smaller but significant effect, while high-income workers show no statistically significant response. Column (2) confirms that these effects for low- and medium-income workers significantly differ from those for high-income workers. The effects for low- and median-income workers become weaker by period $t+1$ (column 3), possibly due to workers leaving staffing positions.

While indirect, our evidence suggests that firms respond to premium shocks by transferring workers—particularly those with lower incomes—to staffing arrangements that can reduce health insurance costs. However, we cannot observe other similar arrangements, such as transitions to independent contractor status through small business formation (e.g., as franchisees of janitorial service companies).[15] In these cases, workers typically lose access to employer-sponsored health insurance entirely.

6.5 Worker-Level Wage Growth for All and Retained Workers

A natural question is how health insurance premiums affect workers' compensation. Answering this question presents several challenges. First, we cannot observe total compensation, which would include both wages (before health insurance deduction) plus employer health insurance contributions. Our wage data only reflect earnings after workers' health insurance deductions. Second, premium increases likely shift both labor supply

[15]For anecdotal evidence, see https://www.marketplace.org/shows/the-uncertain-hour/congratulations-youre-an-entrepreneur-now/.

and demand curves, making theoretical wage predictions ambiguous (discussed further in Section 9). Third, firms may respond by converting full-time workers to part-time status differentially across wage levels, further complicating the interpretation of wage effects.

Despite these challenges, we examine how premium increases affect wage growth, measured as the difference between a worker's log wages in year t and the log of her average wages from $t-5$ to $t-1$. We repeat the specifications as in the previous worker-level regressions using the 2SLS approach. Table VII reports second-stage results, examining both the full sample of workers (columns 1-2) and those retained by their $t-1$ employers (columns 3-4).

The results reveal that low-income workers experience significant relative wage declines following premium increases in both samples. When premiums increase by 10%, their earnings in t relative to the past average decrease by 2.6% in the full sample and by 1.8% in the retained sample. Effects on medium and high-income workers are not statistically significant.

The negative wage effects among retained low-income workers suggest two potential mechanisms. First, employers may pass premium increases to low-income workers through higher workers' contribution or reduced wages (recall that we observe post-deduction earnings). Second, firms may convert low-income workers to part-time status, making them ineligible for health insurance while reducing their total earnings. The effect on low-income workers' wage growth is more negative using all workers compared to the retained sample. This is consistent with our earlier findings that low-income workers also experience a larger increase in separation, unemployment, and separation with a large wage drop.

TABLE VII ABOUT HERE

7 Addressing Concerns Related to the Instrument

In this section, we address various concerns related to our instrumental variable approach. First, we construct an alternative instrument based solely on insurers' premiums

and claims from outside the focal employer's state. This measure, *Insurer Other States Loss*, captures premium adjustment incentives driven by losses unrelated to local firm conditions. This alternative instrument addresses several concerns regarding the exclusion restriction of our main instrument. For example, if low-income workers in certain locations have deteriorating health, it can cause both adverse labor market outcomes and higher insurer losses (if insurers are heavily exposed to these locations).

Panel A of Table VIII presents firm-level results using this alternative instrument. The first-stage estimates in column (1) demonstrate that out-of-state losses significantly predict higher firm-level premiums. Column (2) presents the second-stage result with firms' log of employee counts as the outcome variable. The coefficient on the instrumented premium is negative and statistically significantly different from zero, suggesting that premium increases lead to significant employment declines, consistent with our main findings.

Panel B repeats our worker-level analyses from Tables III and IV using this alternative instrument. The results closely mirror our baseline findings: low-income workers experience significant increases in both separation and unemployment probabilities following premium increases, while high-income workers benefit.

Table VIII About Here

Second, we investigate whether declining worker health could drive results using our main instrument. Deteriorating worker health could simultaneously affect employment outcomes and lead insurers to raise premiums based on anticipated future claims. We test this mechanism by examining the relationship between insurer losses and future claims per person at the employer-year level. Column (1) of Table IA.5 shows no positive correlation between losses and future claims; if anything, we find a weak negative relationship. Column (2) reveals that insurer losses positively predict future premium-to-claims ratios, suggesting that premium increases reflect pricing decisions rather than underlying health costs.[16]

[16]One caveat is that only plans where insurers provide rebates based on plans' actual claims need to report claims. Thus, the sample is small and the interpretation may not generalize to the full sample.

Third, we examine whether firms respond to insurer losses by switching insurers. Despite the market frictions discussed in Section 2.2, we directly test this possibility by constructing an indicator *1(Switch Insurer)*$_{t-1\ to\ t+1}$ for employer insurer changes between years $t-1$ and $t+1$.[17] Column (3) of Table IA.5 presents the second stage of the firm-level analysis, with this indicator as the outcome variable. The result suggests no significant relationship between insurer losses and switching probability, further supporting our argument that insurers maintain substantial pricing power.

Finally, in Table IA.6, we examine the robustness of our findings using two alternative samples. The first sample consists of firms that maintained the same insurer between years $t-1$ and t. These firms likely experience stronger effects from premium shocks since they do not switch to a potentially cheaper insurer. The second sample includes only firm-year observations where a firm's premiums comprise less than 1% of their insurer's total premium revenue in that year—around 90% of the full sample. This restriction helps address potential reverse causality concerns, as these firms are unlikely to meaningfully influence their insurers' performance. The second-stage instrumental variable estimates for both firm-level employment and individual-level separation probability remain consistent with our main findings across both alternative samples.

8 Effects of Insurance Premiums on Plan Take-up

In response to premium increases, firms can choose whether or not to pass on any or all of such increases to workers in the form of higher employee contributions. Since employee take-up is voluntary, one would expect that such a policy would discourage plan participation. Similarly, firms can also convert full-time workers to part-time, making them ineligible for health plans.[18]

TABLE IX ABOUT HERE

[17] For employers with multiple insurers, we consider only the largest insurer by premium volume.

[18] We can observe workers' number of hours worked in the ACS survey. However, each worker is surveyed only once in most instances, limiting our ability to test whether workers are converted from full-time to part-time.

We investigate how worker participation in employer-sponsored health insurance plans changes following shocks to plan premiums. In columns (1) through (3) of Table IX, we examine the effect of health insurance premiums on the number of plan participants in a firm. The analyses again use our instrumental variable approach and include analogous specifications to the firm-level employment specification (Panel B of Table II), except that our outcome variable is the log number of plan participants rather than the number of employees. Across all specifications, we estimate that increases in premiums lead to substantial changes in the number of participants (with elasticities between -0.76 and -0.77), which are 2-3 times that of our baseline employment effects. We next directly check whether insurance premiums affect the fraction of workers who enroll in an employer-sponsored health insurance plan. We do so by computing the ratio of the number of plan participants to total employment, and use this ratio as the dependent variable in the second stage of our 2SLS approach.[19] Columns (4) through (6) report the results. Across all fixed effects specifications, we estimate large declines in the take-up ratio in response to rising health insurance costs.

Overall, our findings suggest that plan participation is substantially more responsive to health insurance costs than employment counts. This means that, following a hike in insurance premiums, the average retained worker is less likely to participate in health insurance plans, likely due to increases in employee contributions. That said, an alternative possibility is that firms decrease in part by reducing plan generosity (e.g., raising deductibles, etc). With a lower take-up rate, workers potentially become less attached to the firm, which can be costly to the firm in the long run. We further elaborate on this in the next section.

9 Discussion of the Firm-Level Magnitude

Our main employment estimates in Section 5 suggest that a 10% increase in premiums results in a 1.6–3% decline of employed workers, implying a large elasticity of employment

[19]The number of participants includes eligible dependents. Thus, we do not strictly measure the "take-up ratio". However, this caveat of our measurement will unlikely change the interpretation of our results.

to total labor costs if taken at face value. However, for the reasons we discuss below, we caution against inferring a labor demand elasticity from our estimate, because premium increases likely cause both labor demand and supply curves to shift.

Nonetheless, we offer a back-of-the-envelope calculation for such a number here. Using estimates from Table 1 in Finkelstein et al. (2023), we assume that 66% of workers obtain health insurance from their employers, and that the average worker earns $70,333. They report that the average premium for employer-provided health insurance was $11,764 in 2019. Thus, assuming positive take-up, a 10% increase in health insurance premiums imposes a similar change in total compensation as a wage increase by 1.1% ($1,176×66%/$70,333).[20] As a result, the coefficients in Table II are analogous to firms reducing employment by 1.5–2.7% in response to 1% wage increase. An important caveat on even this magnitude is that since 1) the largest employment responses are observed for low-income (presumably less productive) workers and 2) firms can switch workers to staffing arrangements, the employment effect likely overstates the actual change in the firm's number of efficiency units of labor.

Setting aside these measurement concerns, interpreting our back-of-the-envelope number as a labor demand elasticity requires two very strong assumptions. First, we need to take a fully static perspective (i.e., ignore frictions related to finding and retaining workers). Second, we assumed that take up is fixed and plan quality remains the same. Under these conditions, an $\$X$ increase in premiums implies that a total compensation level of $\$C + \$X$ delivers the same worker utility (wage + amenity value) as she would have derived from an expenditure of C with the previous premium, which is analogous to a shift in the worker's labor supply curve.[21] These shifts in the supply curve would therefore allow us to recover the slope of the labor demand curve.

However, it is more natural to interpret the premium shocks we consider as a shift

[20]For ease of comparison with the prior literature, we compute the "elasticity" in terms of wage increases rather than total labor costs. Following Finkelstein et al. (2023), we ignore the fact that firms, on average, pay around 75% of the health insurance premium, as the total premiums should be included in the total costs of labor regardless of the actual incidence, which is consistent with the tax literature. We are also ignoring the change in plan take-up in response to the shock. We are also omitting the payroll tax exemption of health insurance premiums.

[21]See, e.g., Sorkin (2018) and Lamadon et al. (2022) for recent papers emphasizing the importance of non-wage amenities for workers' labor supply decisions.

in the cost of providing amenities, as in Hwang et al. (1998), in which case it is not reasonable to treat labor demand as being unaffected. The firm will typically respond to such a shock by reducing the optimal provision of amenities (e.g., by reducing benefit quality or increasing employee contributions), consistent with the evidence we document in Section 8 above. In the presence of search frictions, better amenities generate *dynamic* benefits, increasing the probability of attracting and retaining workers. For example, Morchio and Moser (2024) develop a model in which better amenities allow the firm to save on vacancy posting costs. This result obtains because, when the costs of providing amenities are low, the same expenditure on flow employee compensation (wages + cost of amenities) is associated with a higher match surplus since matches last longer. In equilibrium, an increase in a firm's cost of benefit provision reduces its optimal scale and shrinks its labor demand.

These dynamic forces may be particularly relevant for employer-sponsored health insurance. Table IX shows that take-up rates decline with higher premiums as workers can switch to alternative coverage options, such as spousal plans. Prior research documents that employer-sponsored health insurance creates a "job lock" effect, strengthening workers' ties to their employers.[22] The fact that many employers contribute to workers' health insurance, even prior to ACA's employer and affordability mandate, is consistent with these results and implies that firms value worker take-up.[23] If firms' less generous benefit provision leads to declines in plan participation, those who opt out face lower adjustment costs of leaving their current employers, making them more difficult to retain and generating future costs of replacing them. In other words, lower take-up can be quite costly to the firm in the long run, even if it can generate savings in the short run.

While modeling these dynamic benefits is beyond the scope of this paper, making it more costly for firms to provide insurance benefits hurts the ability of firms to retain

[22]See, Madrian (1994),Garthwaite et al. (2014), Ouimet and Tate (2022), the review in Gruber (2000) and Gruber and Madrian 2002, as well as theoretical arguments in Dey and Flinn (2005).

[23]Note there are no additional tax advantages associated with employers' contributions: both employers' and employees' contributions to health insurance are income- and payroll-tax deductible when employers offer Section 125 plans. Section 125 plans are likely prevalent among the firms in our sample (with more than 100 plan participants), given that 92% of firms with 200 or more employees signed up for such plans as of 2012. See https://www.kff.org/report-section/tax-subsidies-for-private-health-insurance-i-federal-and-state-tax-exclusions-for-esi/.

valuable human capital and reduces expected additional costs of replacing workers in the future, impacting labor demand directly. Therefore, while our results suggest that firm employment is quite responsive to health insurance costs, we cannot directly infer a labor demand elasticity.

Our estimates also differ from many in the existing literature along another important dimension. Unlike previous research focusing on regional or macroeconomic shocks such as minimum wage or payroll tax changes, our paper analyzes an idiosyncratic shock to labor costs. This distinction matters: when shocks are regional, as with minimum wage increases, all workers' outside options change simultaneously, and firms can pass costs to consumers because their competitors face similar cost pressures (Harasztosi and Lindner, 2019). In our case, it is more plausible that outside options remain unchanged, helping us to identify substitution forces more directly.

10 Conclusion

In this paper, we leverage US employer-employee matched data to study the impact of firms' health insurance costs on firm employment and individual-level worker outcomes across the income spectrum. Empirically, we find that following an exogenous increase in premiums, firms reduce employment. Following individual workers over time, we find that declines in employment are concentrated among the lowest-paid workers within the firm. Our evidence suggests that these shocks are costly to these workers: they also experience sizable increases in the probability of having unemployment spells, leaving the firm and having large earnings declines, and transitioning to staffing firms. Low-income workers who stay at the firm experience slower wage growth following instrumented premium increases. By contrast, we find no adverse outcomes for workers in the top income tercile, and in some cases find opposite-signed effects. These results illustrate how rising health insurance costs can potentially depress labor demand, especially for lower-income workers.

Our paper also highlights the complexity of health insurance regulations. Policies like the ACA's Employer and Affordability Mandates aim to ensure low-income workers' ac-

cess to employer-sponsored health insurance. However, our work demonstrates how health insurance costs can create cost pressures that particularly impact low-income workers. This tension between expanding health insurance access and maintaining employment opportunities for low-income workers presents a fundamental challenge for healthcare policy design.

Our paper also speaks to the persistent decline in the labor share and weakening demand for low- and middle-skill workers in the U.S. (e.g., Acemoglu and Autor 2011, Karabarbounis and Neiman 2014, Autor 2014, Autor et al. 2020, Kehrig and Vincent 2021). A growing body of research investigates various determinants of this structural shift, including technological progress, trade exposure, and offshoring pressure—secular trends that have made substitutes for these workers' labor increasingly competitive. In the current US regime in which health insurance access is tied to employers, health insurance costs—which have been rising much faster than inflation and wages—could be an alternative and complementary channel that exacerbates the decline in firms' demand for low-skill labor.

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Figures and Tables

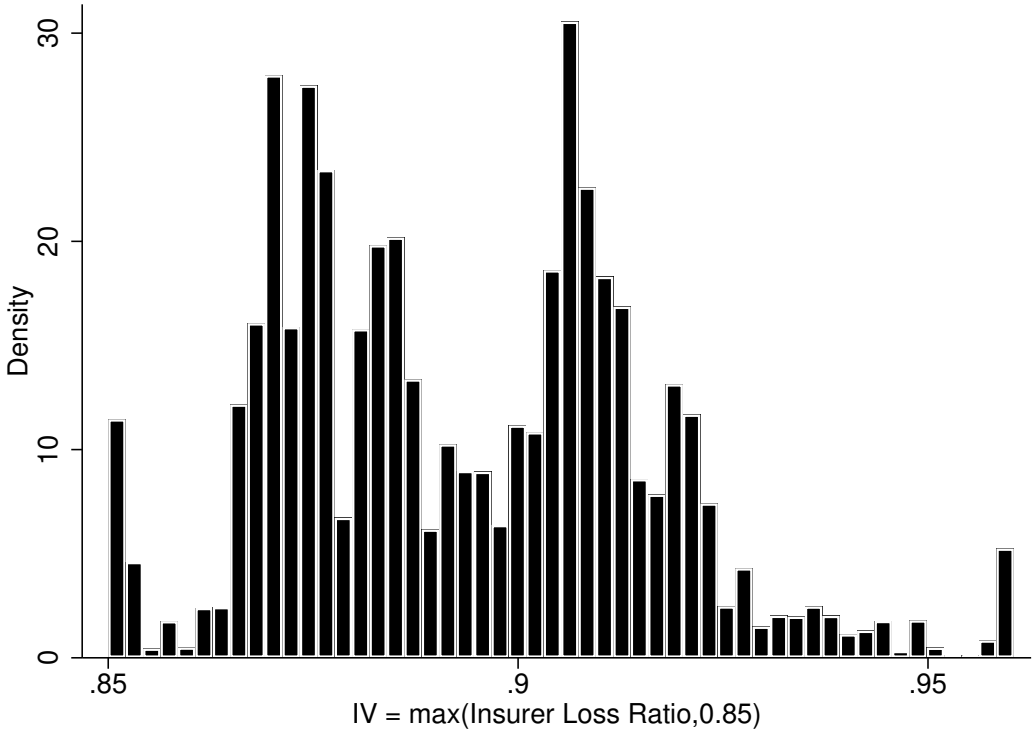
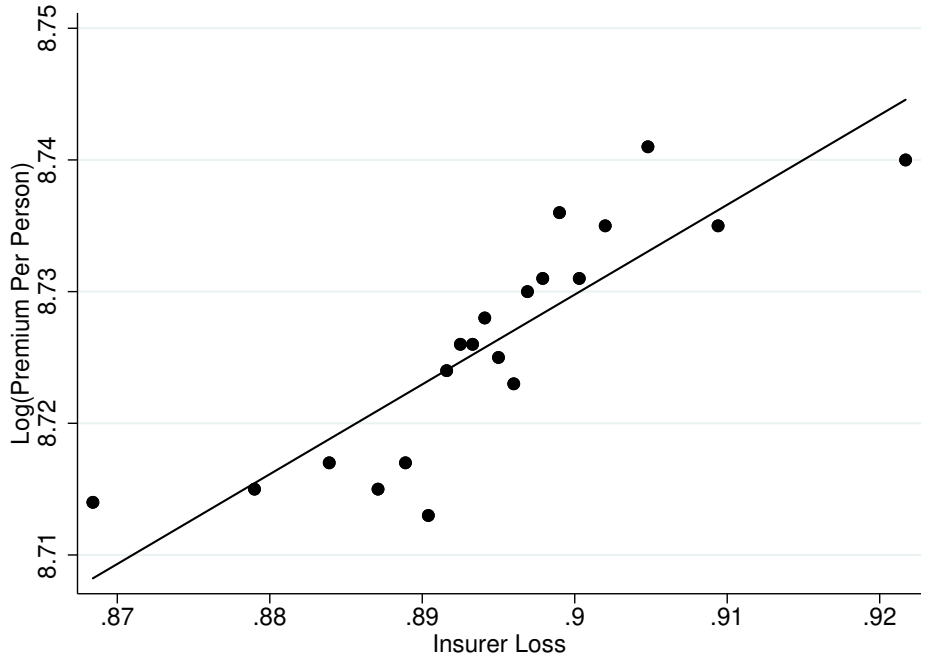


FIGURE I
Distribution of Instrumental Variable, Insurer Losses

This figure displays the distribution of our main instrumental variable, *Insurer Loss*, matched to firms in Form 5500.

Panel A: First Stage: Insurer Loss and Log(Premium Per Person)



Panel B: Second Stage: Predicted Log(Premium Per Person) and Firm Employment

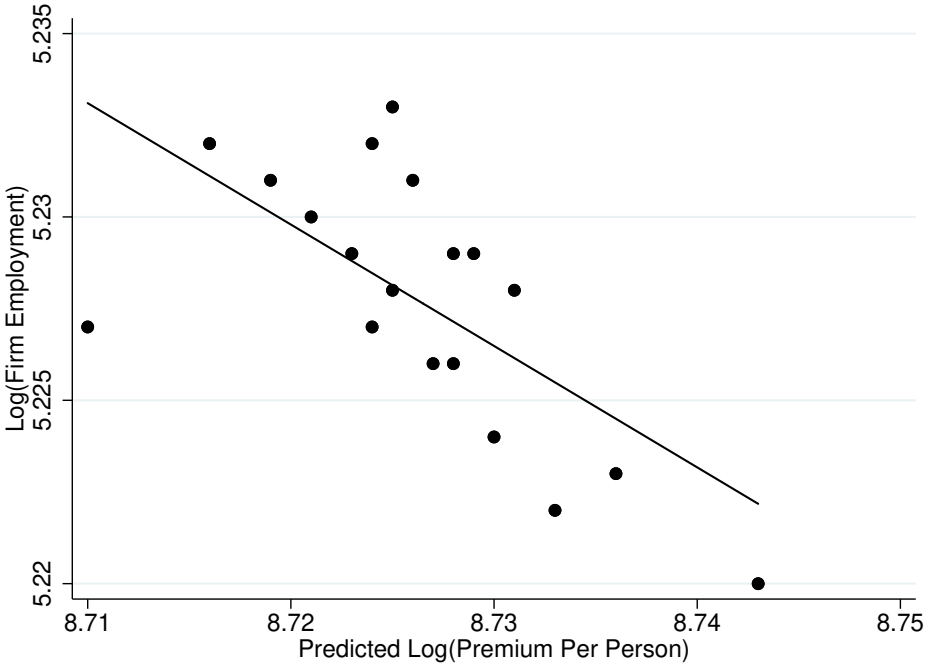


FIGURE II
Binscatter Representation of Instrumental Variable Estimation

Panel A is a binned scatter plot of our main endogenous variable, *Log(Premium per Person)*$_t$, against its instrumental variable, *Insurer Loss*. Panel B is a binned scatter plot of natural log of firm employment against *Predicted Log(Premium per Person)*$_t$. *Predicted Log(Premium per Person)*$_t$ is the predicted outcome variable from regressing *Log(Premium Per Person)*$_t$ on *Insurer Loss*$_{t-3\ to\ t-1}$ along with firm and year fixed effects. We absorb the firm and year fixed effects from all four variables used in the plots.

TABLE I
SUMMARY STATISTICS

Variable	Mean	Std. Dev.	P10	Median	P90
Firm-Year Sample					
Insurer Loss	0.8946	0.02214	0.8695	0.8936	0.9206
Insurer Other States Loss	0.8970	0.03528	0.8686	0.8873	0.9229
Premium per Person (in $)	6763	3138	3715	5926	11130
Log(Premium per Person)	8.726	0.4235	8.22	8.687	9.318
#Employees	270.2	352.9	68	188	502
Log(Employees)	5.228	0.8657	4.22	5.236	6.219
#Participants	393.3	597.9	116	254	740
Log(Participants)	5.624	0.7504	4.762	5.541	6.608
Worker Retention Rate	0.7659	0.1227	0.6272	0.7853	0.8895
Insurance Participants/Employees	1.344	0.7224	0.6554	1.153	2.236
(Premium/Claims)	1.388	1.011	0.9286	1.236	1.710
Claims per Person	5710	10410	2645	4774	9421
Log(Claims per Person)	8.476	0.541	7.881	8.471	9.151
$1(\textit{Switch Insurer})_{t-1 \textit{ to } t+1}$	0.2152	0.411	0	0	1
Worker-Year Sample					
$1(\textit{Separated})_t$	0.1063				
$1(\textit{Separated})_{t+1}$	0.2403				
$1(\textit{Unemployed})_t$	0.01835				
$1(\textit{Unemployed})_{t+1}$	0.04844				
$1(\textit{at Staffing Firm})_t$	0.009132				
$1(\textit{at Staffing Firm})_{t+1}$	0.01647				
$1(\textit{Separated \& Wage Drop})_t$	0.0716				
$1(\textit{Separated \& Wage Drop})_{t+1}$	0.1174				
$\textit{Wage Growth}_t$ (All)	0.02645	0.4733	-0.285	0.06961	0.4212
$\textit{Wage Growth}_t$ (Retained)	0.0639	0.3581	-0.1793	0.0716	0.4006
Past Income (Low Income)	22510	7185	13880	21790	31340
Past Income (Med Income)	40060	11840	27190	37240	56410
Past Income (High Income)	114900	296900	47020	76090	183900
Past Income	61180	181200	18970	39550	104400
Log(Past Income)	10.66	0.7122	9.851	10.59	11.56

This table presents summary statistics for the key variables used in our study using the sample matched to IRS data. Statistics are rounded to four significant digits, unless they are integers smaller than 1,000.

TABLE II
HEALTH INSURANCE PREMIUMS AND FIRM EMPLOYMENT

Panel A: First-Stage Results, Premium per Person

Dep. Var.:	*Log(Premium per Person)$_t$*			
	(1)	(2)	(3)	(4)
Insurer Loss$_{t-3\ to\ t-1}$	0.6347***	0.8290***	0.6560***	0.8533***
	(7.33)	(8.22)	(7.44)	(8.10)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes			
State-Year FE		Yes		
Industry-Year FE			Yes	
State-Industry-Year FE				Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	92000	88000	88500	86500
Cragg-Donald F Stat	53.68	67.68	55.41	65.62

Panel B: Second-stage Results, Firm Employment

Dep. Var.:	*Log(Employees)$_t$*				*Log(Retained)$_t$*	*Log(NewHires)$_t$*
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Premium per Person)$_t$	-0.2955***	-0.2117**	-0.2740**	-0.1674*	-0.2758**	-0.1389
	(-2.69)	(-2.26)	(-2.57)	(-1.85)	(-2.46)	(-0.64)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes				Yes	Yes
State-Year FE		Yes				
Industry-Year FE			Yes			
State-Industry-Year FE				Yes		
Estimation Type	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Observations	92000	88000	88500	86500	91500	91500

This table presents results from estimating the effect of health insurance premiums on the number of employees using instrumental variable approach. Observations are at the firm (EIN)-year level. Panel A (B) presents the first (second)-stage results for the instrumental variable regressions. In Panel A, the dependent variable is the natural logarithm of premium per participant. In Panel B, the dependent variable is the log number of employees in columns (1)–(4), the log number of employees retained from the previous year in (5), and the log number of new hires in (6). In columns (1), (5), and (6), we include firm and year fixed effects. In columns (2), we include firm and state-year fixed effects. In columns (3), we include firm and industry-year fixed effects. In columns (4), we include firm and state-industry-year fixed effects. Standard errors are corrected for clustering at the firm level. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE III
HEALTH INSURANCE PREMIUMS AND JOB SEPARATION ACROSS WORKER PAST INCOME

Dep. Var.:	$1(Separated)_t$		$1(Separated)_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.2610***	0.3402***	0.2743***	0.3854***
	(4.52)	(7.01)	(3.53)	(7.03)
Log(Premium per Person)$_t$×*Med Income*	0.0979**	0.1813***	0.0506	0.2064***
	(2.16)	(5.03)	(0.74)	(4.85)
Log(Premium per Person)$_t$×*High Income*	-0.0593		-0.1448**	
	(-1.49)		(-2.14)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18430000	18440000	18430000	18440000

This table presents results estimating the heterogeneous effect of health insurance premiums on worker job separation depending on workers' past income levels. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where interactions between log premium per person and worker past earning tertile indicators are instrumented with interactions between lagged insurer losses and worker past earning tertile indicators, following Equations 4 and 5. The two stages are estimated simultaneously. The dependent variable is an indicator of whether the worker is separated with their $t-1$ employer in year t and in year $t+1$. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IV
HEALTH INSURANCE PREMIUMS AND UNEMPLOYMENT ACROSS WORKER PAST INCOME

Dep. Var.:	$1(Unemployed)_t$		$1(Unemployed)_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.1147***	0.1872***	0.0885**	0.1542***
	(5.62)	(8.36)	(2.27)	(5.91)
Log(Premium per Person)$_t$×*Med Income*	0.0231*	0.0949***	0.0348	0.0917***
	(1.69)	(6.34)	(0.97)	(4.39)
Log(Premium per Person)$_t$×*High Income*	-0.0714***		-0.0723**	
	(-5.75)		(-2.28)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18430000	18440000	18430000	18440000

This table presents results estimating the heterogeneous effect of health insurance premiums on worker unemployment depending on workers' past income levels. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where log premium per person and its interaction terms with worker earnings are instrumented with interactions between lagged insurer losses and worker past earning tertile indicators, following Equations 4 and 5. The two stages are estimated simultaneously. The dependent variable is an indicator of whether the worker is unemployed in year t and in year $t+1$. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE V
HEALTH INSURANCE PREMIUMS AND PROBABILITY OF SEPARATION WITH A LARGE WAGE DROP ACROSS WORKER PAST INCOME

Dep. Var.:	$1(Separated\ \&\ Wage\ Drop)_t$		$1(Separated\ \&\ Wage\ Drop)_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.1515***	0.2022***	0.1208***	0.1510***
	(5.07)	(7.12)	(3.05)	(4.88)
Log(Premium per Person)$_t$×*Med Income*	0.0571**	0.1019***	0.0140	0.0532**
	(2.49)	(4.70)	(0.41)	(2.13)
Log(Premium per Person)$_t$×*Low Income*	-0.0331*		-0.0526	
	(-1.70)		(-1.58)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18430000	18440000	18430000	18440000

This table presents 2SLS results estimating the heterogeneous effect of health insurance premiums on the wage decline upon job separation depending on workers' past income. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where interactions between log premium per person and worker past earning tertile indicators are instrumented with interactions between lagged insurer losses and worker past earning tertile indicators, following Equations 4 and 5. The two stages are estimated simultaneously. The dependent variable is *Separated & Wage Drop*, which equals one if an individual separates from his previous employer (as of year $t-1$) in year t and their year t earnings relative to the prior five-year average drops to the bottom quintile of the sample distribution, zero otherwise. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE VI
HEALTH INSURANCE PREMIUMS AND PROBABILITY OF WORKING FOR STAFFING FIRMS ACROSS WORKER PAST INCOME

Dep. Var.:	$1(at\ Staffing\ Firm)_t$		$1(at\ Staffing\ Firm)_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$ × *Low Income*	0.05207***	0.06054***	0.02767	0.04273***
	(4.52)	(5.39)	(1.61)	(3.53)
Log(Premium per Person)$_t$ × *Med Income*	0.01910**	0.03500***	-0.005073	0.02067**
	(2.32)	(3.97)	(-0.34)	(2.09)
Log(Premium per Person)$_t$ × *High Income*	-0.01030		-0.02817	
	(-1.47)		(-1.55)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18350000	18350000	17580000	17590000

This table presents 2SLS results estimating the heterogeneous effect of health insurance premiums on workers' probability of moving to staffing firms based on past income. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where interactions between log premium per person and worker past earning tertile indicators are instrumented with interactions between lagged insurer losses and worker past earning tertile indicators, following Equations 4 and 5. The two stages are estimated simultaneously. The dependent variable is *1(at Staffing Firm)*, which equals one if the EIN on workers' W2 has an NAICS code of 5613 in year t in columns (1) and (2) or in year $t+1$ in (3) and (4). *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. In Panel A, we use all workers matched with an employer in our sample in year $t-1$. In Panel B, we only use workers that are retained by their $t-1$ employers. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE VII
HEALTH INSURANCE PREMIUMS AND WAGE GROWTH ACROSS WORKER PAST INCOME

Dep. Var.:	$Wage\ Growth_t$			
Sample:	All Workers		Retained Workers	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	-0.2648***	-0.3743***	-0.1774***	-0.2684***
	(-3.94)	(-6.03)	(-3.09)	(-5.04)
Log(Premium per Person)$_t$×*Med Income*	-0.0096	-0.1070**	0.0428	-0.0353
	(-0.18)	(-2.35)	(0.93)	(-0.94)
Log(Premium per Person)$_t$×*High Income*	0.0261		0.0069	
	(0.46)		(0.13)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18430000	18440000	15580000	15590000

This table presents 2SLS results estimating the heterogeneous effects of health insurance premiums on experiencing job separation with a large wage decline depending on workers' past income. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where interactions between log premium per person and worker past earning tertile indicators are instrumented with interactions between lagged insurer losses and worker past earning tertile indicators, following Equations 4 and 5. The two stages are estimated simultaneously. The dependent variable is *Wage Growth*, which is the difference between the log wage in year t and log of the $t-5$ to $t-1$ average for each worker. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. In columns (1)–(2), we use all workers matched with an employer in our sample in year $t-1$. In columns (3)–(4), we only use workers that are retained by their $t-1$ employers. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE VIII
FIRM- AND WORKER-LEVEL ANALYSES
USING INSURERS' LOSSES FROM OTHER ATATES AS INSTRUMENT

Panel A: Firm-Level, Both Stages

2SLS Stage:	1st Stage	2nd Stage
Dep. Var.:	*Log(Premium per Person)*$_t$	*Log(Employees)*$_t$
	(1)	(2)
Insurer Other States Loss$_{t-3\ to\ t-1}$	0.4692***	
	(6.76)	
Log(Premium per Person)$_t$		-0.3256***
		(-2.63)
Firm FE	Yes	Yes
State-Industry-Year FE	Yes	Yes
Estimation Type	2SLS	2SLS
Observations	63500	63500
Cragg-Donald F Stat	107.50	

Panel B: Individual-Level, Second Stage

Dep. Var.:	1(*Separated*)$_t$		1(*Unemployed*)$_t$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.2287**	0.4297***	0.1806***	0.2514***
	(2.24)	(3.69)	(3.56)	(4.35)
Log(Premium per Person)$_t$×*Med Income*	0.1495*	0.3427***	0.0487	0.1377***
	(1.93)	(2.77)	(1.63)	(2.94)
Log(Premium per Person)$_t$×*High Income*	-0.1196*		-0.0808***	
	(-1.78)		(-3.30)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	13610000	15160000	13610000	15160000

This table presents 2SLS results using an alternative instrument based solely on insurers' premiums and claims from outside the focal employer's state. Panel A presents firm-level results using this alternative instrument. Column (1) presents the first-stage estimates. Column (2) presents the second-stage result with firms' log of employee counts as the outcome variable. Panel B repeats our worker-level analyses from Tables III and IV using this alternative instrument. We estimate the heterogeneous effect of health insurance premiums on worker job separation and unemployment depending on workers' past income levels. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where interactions between log premium per person and worker past earning tertile indicators are instrumented with lagged insurer losses from states other than the focal employer's state and its interaction terms with worker past earning tertile indicators. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IX
HEALTH INSURANCE PREMIUMS AND WORKER INSURANCE TAKE-UP

Dep. Var.:	*Log(Insurance Participants)$_t$*			*(Insurance Participants/Employees)$_t$*		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Premium per Person)$_t$	-0.7736***	-0.7667***	-0.7558***	-0.6279***	-0.7173***	-0.6226***
	(-6.05)	(-6.76)	(-6.04)	(-4.03)	(-5.12)	(-4.07)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes		
State-Year FE		Yes			Yes	
Industry-Year FE			Yes			Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Observations	84500	84500	84500	80500	80500	80500
Cragg-Donald F Stat	151.60	203.50	155.70	140	187.90	144.30

This table presents 2SLS results estimating the effect of health insurance premiums on employees' insurance take up. In columns (1)–(3), the dependent variable is the log number of health insurance plan participants. In columns (4)–(6), the dependent variable is the ratio of plan participants to employees. We include firm fixed effects and year fixed effects in columns (1) and (3), firm fixed effects and state-by-year fixed effects in columns (2) and (4), and firm fixed effects and industry-by-year fixed effects in columns (3) and (6). We do not include firms that file Form 5500 Schedule D Part 2 as these firms do not report the number of participants for these firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE X
HEALTH INSURANCE TAKE-UP AND WORKER RETENTION RATE

Dep. Var.:	*Worker Retention Rate*$_t$		*Worker Retention Rate*$_{t+1}$	
	(1)	(2)	(3)	(4)
(Insurance Participants/Employees)$_{t-1}$	0.02736***	0.02425***	0.03255***	0.03070***
	(37.39)	(21.18)	(33.61)	(20.62)
Year FE	Yes	Yes	Yes	Yes
Firm FE		Yes		Yes
Estimation Type	OLS	OLS	OLS	OLS
Observations	155000	145000	155000	145000

This table presents results estimating the relationship between lagged health insurance take-up rate in year $t-1$ and worker retention rate in years t and $t+1$. Observations are at the firm-year level. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE XI
VARIABLE DEFINITION

Variable	Description
Insurer Loss	Insurers' loss ratio as defined in Section 3.2
Insurer Other States Loss	Insurers' loss ratio as defined in Section 3.2, but with insurers' financial data in states other than the focal firm's state
Log(Premium per Person)	Natural log of total firm-level health insurance premiums divided by the number of participants
Log(Employees)	Natural log of the firm-level number of employees
Log(Retained)	Natural log of the firm-level number of retained employees from the previous year
Log(NewHires)	Natural log of the firm-level number of newly hired employees
Low (Med, High) Income	*Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively
$1(\textit{Separated})_t$	Indicator that equals one if a worker's earnings from their $t-1$ employer fall below federal minimum wage at 20 hours per week for 52 weeks
$1(\textit{Unemployed})_t$	Indicator that turns to one if a worker's earnings fall below federal minimum wage at 20 hours per week for 52 weeks and the worker does not file 1099 forms
$1(\textit{Separated \& Wage Drop})_t$	Equals one if a worker leaves their $t-1$ employer and if their earnings relative to the prior five-year average is in the bottom quintile of year t
$1(\textit{at Staffing Firm})_t$	Indicator for employment at a staffing firm (NAICS code 5613) in year t
$\textit{Wage Growth}_t$	Measures the log difference between a worker's wages in year t and their prior five-year average (excluding zeros)
Past Income	Average earnings during the previous five years (excluding years with zero earnings)
Log(Past Income) (std)	Natural log of average earnings during $t-5$–$t-1$ (excluding years with zero earnings), standardized to have mean of zero and standard deviation of one
Insurance Participants	Number of health insurance participants at the firm-year level
Insurance Participants/Employees	Ratio of health insurance participant count to employee count
Worker Retention Rate	Ratio of retained workers to previous total employment
Log(Claims per Person)	Natural log of firm-level total health insurance claims divided by the number of participants
Premium/Claims	Firm-level total premiums divided by total claims
1(Switch Insurer)	Indicator for firm switching health insurer
1(Staffing Firm)	Indicator that equals one if the NAICS code of the firm is 5613

IA. Internet Appendix

Table IA.1
Health Insurance Premiums and Firm Employment, at Parent Firm Level

Dep. Var.:	*Log(Employees)$_t$*			
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$	-0.3043***	-0.1878**	-0.2909**	-0.1643*
	(-2.58)	(-1.97)	(-2.52)	(-1.78)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes			
State-Year FE		Yes		
Industry-Year FE			Yes	
State-Industry-Year FE				Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	82500	82500	82500	81000
Cragg-Donald F Stat	123.10	178	126.10	171.50

This table presents the second stage of 2SLS estimation of the effect of health insurance premiums on parent firm-level employment. Observations are at the parent firm-year level. The dependent variable is the log number of employees. In column (1), (5), and (6), we include firm and year fixed effects. In column (2), we include firm and state-year fixed effects. In column (3), we include firm and industry-year fixed effects. In column (4), we include firm and state-industry-year fixed effects. Standard errors are corrected for clustering at the parent firm level. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IA.2
HEALTH INSURANCE PREMIUMS, FIRM EMPLOYMENT, AND JOB SEPARATION ACROSS WORKER PAST INCOME, OLS

Panel A: Firm Employment, OLS

Dep. Var.:	*Log(Employees)*$_t$			
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$	-0.0337***	-0.0334***	-0.0325***	-0.0305***
	(-6.39)	(-6.32)	(-6.19)	(-5.82)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes			
State-Year FE		Yes		
Industry-Year FE			Yes	
State-Industry-Year FE				Yes
Estimation Type	OLS	OLS	OLS	OLS
Observations	92000	88000	88500	86500

Panel B: Individual Separation Probability, OLS

Dep. Var.:	1(*Separated*)$_t$		1(*Separated*)$_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.0508***	0.0455***	0.0559***	0.0404***
	(19.05)	(21.65)	(15.09)	(16.90)
Log(Premium per Person)$_t$×*Med Income*	0.01863***	0.0182***	0.0290***	0.0167***
	(8.43)	(12.93)	(8.62)	(9.90)
Log(Premium per Person)$_t$×*High Income*	0.0023		0.0154***	
	(0.95)		(4.12)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	OLS	OLS	OLS	OLS
Observations	18430000	18440000	18430000	18440000

This table presents OLS results. Panel A presents firm-level results of how health insurance premiums are related to firm-level employment, similar to columns (1)–(4) of Panel B in Table II. The outcome variable is firms' log of employee counts. Observations are at the firm-year level. Panel B presents the OLS analysis of how insurance premiums are related to workers' separation probabilities across worker income distribution, similar to worker-level analyses from Tables III. Observations are at the worker-year level. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level in both panels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IA.3
HEALTH INSURANCE PREMIUMS AND WORKER JOB SEPARATION,
INTERACTING WITH CONTINUOUS PAST INCOME

Dep. Var.:	$1(Separated)_t$		$1(Separated)_{t+1}$	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$	0.1005**		0.0572	
	(2.41)		(0.89)	
Log(Premium per Person)$_t$×*Log(Past Income) (Std)*	-0.1263***	-0.1147***	-0.1567***	-0.1136***
	(-5.84)	(-7.30)	(-5.31)	(-6.69)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	18430000	18440000	18430000	18440000

This table presents results estimating the heterogeneous effect of health insurance premiums on worker job separation depending on workers' past income levels. Observations are at the worker-year level. We present the second-stage results of the instrumental variable regressions, where log premium per person and its interaction terms with worker past earnings are instrumented with lagged insurer losses and its interaction terms with worker past earnings. The dependent variable is an indicator of whether the worker is separated from their $t-1$ employer in year t and in year $t+1$. Controls include workers' log of past average wages. Log of past average wages is the log of the average earnings of a worker between year $t-5$ and $t-1$, excluding years with zero earnings, standardized to have a mean of zero and standard deviation of one. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IA.4
HEALTH INSURANCE PREMIUMS ARE LOWER FOR STAFFING FIRMS

Dep. Var.:	$Log(Premium\ per\ Person)_t$		
	(1)	(2)	(3)
$1(Staffing\ Firm)$	-0.069***	-0.055***	-0.055***
	(-4.16)	(-3.39)	(-3.40)
Year FE	Yes	Yes	
State FE		Yes	
State-Yr FE			Yes
Estimation Type	OLS	OLS	OLS
Observations	245328	237434	237423

This table examines whether staffing firms have lower health insurance premiums by regressing log premiums per person on a staffing firm indicator (identified using NAICS code 5613). We present three specifications: with year fixed effects in column (1), year and state fixed effects in (2), and state-by-year fixed effects in (3). The sample is firms from Form 5500. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IA.5
INSURER LOSSES VS. FUTURE CLAIMS AND MARKUPS;
PREMIUMS VS. EMPLOYERS' INSURER SWITCHING

Dep. Var.:	(1) *Log(Claims per Person)$_t$*	(2) *Premium$_t$/Claim$_t$*	(3) *1(Switch Insurer)$_{t-1\ to\ t+1}$*
Insurer Loss$_{t-3\ to\ t-1}$	-0.3131	1.7110***	
	(-1.41)	(3.99)	
Log(Premium Per Person)			-0.3374
			(-0.81)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Estimation Type	OLS	OLS	2SLS
Observations	17500	17500	65000
Cragg-Donald F Stat			52.78

This table presents results estimating the correlation between three employer outcomes related to health insurance and lagged insurers' losses. Observations are at the firm-year level. The dependent variable is the natural log of dollar claims per plan participant in year t in column (1), premium divided by claims in year t in column (2), and an indicator for whether the employer switched the insurer from year $t-1$ to $t+1$ in column (3). Insurers' losses are based on data from years $t-3$ to $t-1$. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.

TABLE IA.6
HEALTH INSURANCE PREMIUMS, FIRM EMPLOYMENT, AND THE JOB SEPARATION ACROSS WORKER PAST INCOME, ALTERNATIVE SAMPLES

Panel A: Firm-Level Employment

Dep. Var.:	*Log(Employees)*$_t$					
	Same Insurer $t-1$ & t			Firm Premium<1% of Insurer's		
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Premium per Person)$_t$	-0.2462***	-0.1544*	-0.2288**	-0.2841***	-0.2011**	-0.2628**
	(-2.58)	(-1.89)	(-2.46)	(-2.62)	(-2.20)	(-2.50)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes					
State-Year FE		Yes		Yes		
Industry-Year FE			Yes			Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Observations	82000	78500	79000	90000	86000	86500
Cragg-Donald F Stat	236.8	318.8	239.7	169.6	229.5	172.1

Panel B: Individual-Level Separation Probability

Dep. Var.:	1(*Separated*)$_t$			
	Same Insurer $t-1$ & t		Firm Premium<1% of Insurer's	
	(1)	(2)	(3)	(4)
Log(Premium per Person)$_t$×*Low Income*	0.8059***	0.6030***	0.2802***	0.3524***
	(2.81)	(5.22)	(4.75)	(7.27)
Log(Premium per Person)$_t$×*Med Income*	0.5933**	0.4199***	0.1132**	0.1873***
	(2.06)	(3.76)	(2.34)	(5.27)
Log(Premium per Person)$_t$×*High Income*	0.2408		-0.0469	
	(0.95)		(-1.17)	
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes		Yes	
Individual FE	Yes	Yes	Yes	Yes
State-Industry-Year FE	Yes		Yes	
Firm-Year FE		Yes		Yes
Estimation Type	2SLS	2SLS	2SLS	2SLS
Observations	12610000	12620000	16840000	16850000

This table presents 2SLS results using alternative samples. The first sample consists of firms that maintained the same insurer between years $t-1$ and t. We use this sample in columns (1)–(3) in Panel A and columns (1)–(2) in Panel B. The second sample includes only firm-year observations where a firm's premiums comprise less than 1% of their insurer's total premium revenue in that year. We use this sample in columns (4)–(6) in Panel A and columns (3)–(4) in Panel B. Panel A presents firm-level second-stage results of how health insurance premiums are related to firm-level employment, similar to columns (1)–(3) of Panel B in Table II. The outcome variable is firms' log of employee counts. Observations are at the firm-year level. Panel B presents second-stage results of how insurance premiums are related to workers' separation probabilities across worker income distribution, similar to worker-level analyses from Tables III. Observations are at the worker-year level. *Low Income*, *Med Income*, and *High Income* are indicators for whether workers' average earnings between $t-5$ and $t-1$ fall into the bottom, middle, or top terciles of our sample, respectively. Controls include the tercile indicators. We weigh observations with the inverse of the number of employees at each firm, to reduce the influence of large firms. See Table XI for variable definitions. t-statistics are reported in parentheses. Standard errors are clustered at the firm level in both panels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively.