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SIEPR Discussion Paper No. 16-007

Rejecting the Grand Bargain: What Happens When Large Companies Opt Out of Workers' Compensation?

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March 18, 2016

Abstract:

The “grand bargain” of workers’ compensation, whereby workers relinquished the right to sue their employers in exchange for no-fault occupational injury insurance, was one of the great tort reforms of the Twentieth Century. However, there is one U.S. state that has always permitted employers to decline workers’ compensation coverage, and in which many firms (“nonsubscribers”) have chosen to do so: Texas. This study examines the impact of Texas nonsubscription on fifteen large, multistate nonsubscribers that provided their Texas employees with customized occupational injury insurance benefits (“private plans”) in lieu of workers’ compensation coverage between 1998 and 2010. As economic theory would lead one to expect, nonsubscription generated considerable cost savings. My preferred estimates suggest that costs per worker hour fell by about 44 percent. These savings were driven by a drop in the frequency of more serious claims involving replacement of lost wages, and by a decline in costs per claim. Both medical and wage-replacement costs fell substantially. Although the decline in wage-replacement costs was larger in percentage terms than the drop in medical costs, the latter was equally financially consequential since medical costs comprise a larger share of total costs. The second stage, which compares the effect of nonsubscription across different types of injuries, finds that non-traumatic injury claims were more responsive to nonsubscription than traumatic ones. In part, this disparity reflects the fact that private plans categorically exclude some non-traumatic injuries from the scope of coverage. Yet even those non-traumatic injuries that were *not* excluded from coverage declined more than traumatic injuries, consistent with aggressive claim screening by employers and/or a decline in over-claiming and over-utilization by employees. The third stage examines the effect of nonsubscription on severe, traumatic injuries, which are generally the least susceptible to reporting bias. The sizable and significant decline in such injuries is consistent with an improvement in real safety, although it could also be explained by aggressive claim screening. The final stage of the study probes whether four ubiquitous features of private plans – non-coverage of permanent partial disabilities, categorical exclusion of many diseases and some non-traumatic injuries, capped benefits, and lack of chiropractic care – explain the observed trends. Surprisingly, these features account for little of the estimated cost savings. Although many study participants describe limited provider choice and 24-hour reporting windows as major cost drivers, data limitations preclude me from identifying their respective impacts. Overall, my findings suggest an urgent need for policymakers to examine the economic and distributional effects of converting workers’ compensation from a cornerstone of the social welfare state into an optional program that co-exists with privately-provided forms of occupational injury insurance.

I. Introduction¹

The “grand bargain” of workers' compensation, whereby workers relinquished the right to sue their employers in exchange for no-fault insurance for occupational injuries, was one of the great tort reforms of the Twentieth Century. Every U.S. state adopted a workers' compensation law between 1910 and 1948.² To this day, the program remains the primary conduit of cash benefits, medical care, and rehabilitation services for workers disabled by work-related injuries and illnesses.³ Although the level and duration of benefits vary considerably across states, the hallmark of the system is its near universality. In most U.S. states, virtually every company is required to purchase workers' compensation insurance, whether through a private insurance carrier, a state insurance fund, or self-insurance.⁴ It is an open question whether the transition from a negligence-based tort system to a no-fault strict liability system enhanced workplace safety or allocative efficiency.⁵ Yet given the ubiquity of workers' compensation, most scholars have taken the program's existence for granted and examined how different aspects of regulatory design (such as benefit levels, waiting periods, experience rating,

¹ This project was funded by National Science Foundation Grant No. 0850636. I could not have completed the project without the skilled research assistance of Garth Sheldon-Coulson, Charlie Wysong, Brian Karfunkel, Yo-Jud Cheng, Adam Greenberg, Tim Hyde, Patrick Leahy, Ted Westling, Kristen Altenburger, Rajlakshmi De, Austin Alleman, Alex Weiss, Kathleen Choi, Sarah Levine and Nikhil Saifullah.

² Price V. Fishback & Shawn E. Kantor, *The Adoption of Workers' Compensation in the United States*, 41 J.L. & ECON. 305, 320 (1998).

³ Alan B. Krueger & John F. Burton, Jr., *The Employers' Costs of Workers' Compensation Insurance: Magnitudes, Determinants, and Public Policy*, 72 REV, ECON. STAT. 288 (1990).

⁴ A handful of states with compulsory laws provide exemptions for very small firms with fewer than five employees. See JOSEPH SHIELDS & D.C. CAMPBELL, TEX. DEP'T OF INS., A STUDY OF NONSUBSCRIPTION TO THE TEXAS WORKERS' COMPENSATION SYSTEM: 2001 ESTIMATES 1, 2 n.15 (2002).

⁵ See James R. Chelius, *Liability for Industrial Accidents: A Comparison of Negligence and Strict Liability Systems*, 5 J. LEGAL STUD. 293, 294 (1976) (noting that although a shift to workers' compensation systems apparently lowered the non-motor vehicle machine death rate from 1900-1940, the difficulty of measuring accident prevention costs precludes one from concluding that the latter system is more efficient); Gary T. Schwartz, *Reality in the Economic Analysis of Tort Law: Does Tort Law Really Deter?*, 42 UCLA L. REV. 377, 392 (1994) (noting that from an economic perspective, it is unclear whether tort or workers' compensation systems provide better incentives for workplace safety); Price V. Fishback, *Liability Rules and Accident Prevention in the Workplace: Empirical Evidence from the Early Twentieth Century*, 16 J. LEGAL STUD. 305, 306 (1987) (finding that in coal mining industry, fatal accident rates rose with the shift to workers' compensation in the early Twentieth Century).

choice over medical providers, and medical fee schedules) affect employers' and employees' incentives and, in turn, the frequency, duration, and cost of claims.

This Article explores an issue that has received little attention in prior academic scholarship: the consequences of converting workers' compensation from a compulsory system to a voluntary one. As late as the 1970s, many state laws *were* elective.⁶ By the mid-1970s, however, nearly all states had amended their laws to make participation mandatory.⁷ When South Carolina followed suit in 1997, Texas became the only remaining state in the U.S. with a truly voluntary program, in which a substantial number of firms declined to offer workers' compensation coverage.⁸ By 2012, about 33% of Texas firms – which jointly employed 19% of Texas's workforce – were “nonsubscribers” (firms that opt out of workers' compensation).⁹ Although very small firms (those with 1-4 employees) have always been disproportionately likely to forgo participation, substantial numbers of very large employers (defined as those employing at least 500 workers) began doing so around the turn of the millennium.¹⁰ Wal-Mart's decision to become a nonsubscriber in 2012 made headlines.¹¹ As of October 2012, 17%

⁶ SHIELDS & CAMPBELL, *supra* note 4, at 1. The New York Court of Appeals' famous opinion in *Ives v. South Buffalo Railway Company*, 94 N.E. 431 (N.Y. 1911), which struck down a compulsory workers' compensation statute under the state constitution, encouraged many other states to pass elective laws, while “keeping benefits low and so restricting employers' legal defenses that most employers would 'freely' elect to join the new system.” Christopher Howard, *Workers' Compensation, Federalism, and the Heavy Hand of History*, 16 STUDIES IN AMERICAN POLITICAL DEVELOPMENT 28, 33 (2002). The Supreme Court's ruling in *Mountain Timber Co. v. Washington*, 243 U.S. 219 (1917), upholding the constitutionality of a compulsory law, finally put such constitutional concerns to rest. Interestingly, however, it was not until nearly half a century later that some states made their workers' compensation statutes compulsory.

⁷ Shields & Campbell, *supra* note 4, at x.

⁸ Until 2013, New Jersey was the only other state that technically did not require firms to carry workers' compensation coverage. However, given the highly restrictive nature of the statute, no firms in New Jersey have chosen to opt out. *See Ibid.*, at x, n. 3.

⁹ WORKERS' COMP. RESEARCH GROUP, TEX. DEP'T INS., EMPLOYER PARTICIPATION IN THE TEXAS WORKERS' COMPENSATION SYSTEM: 2012 ESTIMATES 5 (2012) *available at* http://www.tdi.texas.gov/reports/wcreg/documents/2012_Nonsub.pdf.

¹⁰ *Ibid.* at 8.

¹¹ B. Aaronson, *As Large Companies Opt Out, Concerns Grow for Workers' Compensation System*, N.Y. TIMES, April 7, 2012.

of all very large Texas employers had opted out.¹² Almost all of these firms have chosen to provide their Texas employees with customized occupational injury insurance plans (“private plans”) whose features roughly resemble those of workers’ compensation.

The movement to make workers’ compensation voluntary has since begun spreading to other U.S. states. In 2013, Oklahoma passed landmark legislation making it the second state in the country since the 1970s to make participation fully voluntary, although as this writing the law was being challenged on constitutional grounds.^{13,14} In 2015, similar legislation was introduced in Tennessee and South Carolina.¹⁵

The opt-out movement raises fundamental questions about the rationale for and consequences of workers’ compensation. Given that the law received broad-based employer support at the time of its passage¹⁶, why are many large Texas employers relinquishing the benefits of the “grand bargain” and shouldering the risks of tort liability? What are the practical effects of an elective system for nonsubscribers and their employees?

This study examines the real-world consequences of nonsubscription for an important group of Texas employers: large companies that operate in a homogenous manner across many U.S. states. I confine my analysis to this segment of the Texas economy for several reasons.

¹² *Ibid.*

¹³ S.K. Jones, *Oklahoma Governor Signs Workers’ Compensation Overhaul*, INSURANCE JOURNAL, May 8, 2013.

¹⁴ H. Berkes, *Oklahoma Commission Declares Workers’ Comp Alternative Unconstitutional*, NPR, February 29, 2016. Accessed on March 14, 2016 from <http://www.npr.org/sections/thetwo-way/2016/02/29/468611034/oklahoma-commission-declares-workers-comp-alternative-unconstitutional>.

¹⁵ S. Goldberg, *Workers Comp Opt-Out Bill Introduced in Tennessee*, Business Insurance, February 12, 2015. Accessed March 18, 2016 from <http://www.businessinsurance.com/article/20150212/NEWS08/150219930>; S. Goldberg, *South Carolina Considers Workers Comp Opt Out System*, Business Insurance, May 20, 2015. Accessed March 18, 2016 from <http://www.businessinsurance.com/article/20150520/NEWS08/150529987>.

¹⁶ See, e.g., Fishback & Kantor, *supra* note 2 at 307 (noting that employers anticipated reduced uncertainty from accident costs, and were able to pass on much of increased costs to employees through wage offsets); Price V. Fishback & Shawn E. Kantor, *The Political Economy of Workers’ Compensation Benefit Levels, 1910-1930*, 35 EXPLORATIONS IN ECONOMIC HISTORY 109, 111 (1998); Howard, *supra* note 6 at 6 (noting that employers’ concerns about the unpredictability of the court system and the potential for labor unrest induced them to support laws’ passage).

First, large companies were the only size class in which nonsubscription rates increased during the first decade of the twenty-first century, and they are at the forefront of lobbying efforts to spread the nonsubscription option to new jurisdictions.¹⁷ Second, because large companies (by definition) employ many workers who in turn file many claims, they exert an outsized influence on economic productivity and on worker welfare. Third, their large workforces enable one to derive statistically meaningful estimates. Fourth, most large national corporations employ full-time professionals to oversee the administration of occupational injury claims. These executives are not only trained in risk management, but oversee workers' compensation plans across many states and belong to professional organizations that facilitate information sharing. Thus large, multistate firms are the most likely to function as "rational corporate actors" when making the opt-out choice.

Finally and most importantly, analyzing highly granular data from large *multistate* firms with many homogenous facilities allows me to mitigate many obvious sources of selection bias. The only prior econometric study of Texas nonsubscription, by Richard Butler, uses the firm as the unit of analysis.¹⁸ Because the study compares aggregate injury rates across subscribing and nonsubscribing firms, it is inevitably prone to selection bias. For example, Butler's data reveal that nonsubscribers are generally smaller than subscribers, and their employees are disproportionately female, younger, and lower paid. Moreover, the fatality rates reported in the study suggest that in some industries, nonsubscribers are safer than other firms – and indeed, might have opted out of workers' compensation system for that very reason.¹⁹

¹⁷ According to Texas Department of Insurance survey data, the participation rate among companies with 500+ employees nearly doubled from 1996 to 2008 (from 14% to 26%). In contrast, the percentage of nonsubscribers declined in all other employer size classes. See WORKERS' COMP. RESEARCH GROUP, *supra* note 9 at 8.

¹⁸ Butler, Richard J. *Lost Injury Days: Moral Hazard Differences between Tort and Workers' Compensation*, 63 J. RISK AND INS. 405 (1996).

¹⁹ *Ibid* 18 at 406-7, 413, 415, 426. See also SHIELDS & CAMPBELL, note 4 at xi (noting that smaller firms are significantly more likely to be nonsubscribers than large firms).

Unlike Butler's study, I use the *facility-quarter* and the *injury claim*, as opposed to the firm-year, as the units of analysis. Specifically, I analyze highly granular claim- and transaction-level data from fifteen large, multistate nonsubscribers. For each firm, I probe how outcomes differ across the workers' compensation and nonsubscription environments.²⁰ In this manner, I hope to mitigate the selection bias that afflicts firm-level studies.

The first stage of the analysis yields several important findings. First, my best estimates suggest that total injury costs per worker hour are about 44% lower in the nonsubscription environment, falling from about 14¢ to 8¢ per worker hour. This decline is driven by a drop in both medical and wage-replacement costs. (Although legal costs also fall dramatically, they comprise only a trivial share of total costs). Although the fall in wage-replacement costs is much larger in percentage terms, the drop in medical costs has a similar effect on firms' bottom line because medical care constitutes a larger percentage of total costs. Medical and wage-replacement costs per claim decline simultaneously, with my preferred estimates suggesting that overall cost per claim is about 49% lower in the nonsubscription environment. Although there is no significant decline in the frequency of total claims, more serious claims involving replacement of lost wages are about 33% less common in the nonsubscription environment.

The second stage explores the likely prevalence of moral hazard by examining whether some types of injuries fall more dramatically with nonsubscription than others. Since traumatic injuries occur (by definition) at a discrete moment in time and usually have a clear precipitating cause, they are the least susceptible to both under-reporting and over-claiming. They are also the

²⁰ Under workers' compensation laws, workers can be compensated for both injuries and illnesses that are work-related. In practice, however, most workers' compensation claims involve on-the-job injuries rather than illnesses. See, e.g., Ellen R. Peirce & Terry Morehead Dworkin, "Workers' Compensation and Occupational Disease: A Return to Original Intent," 67 Or. L. Rev. 649 (1988). Therefore, although I acknowledge the importance of both types of hazards by making occasional reference to illnesses and/or occupational health, the primary focus of this Article – as with most prior scholarship in the field – is occupational injuries rather than illnesses.

most compatible with evidence-based medicine, and as such, are less likely to trigger unwarranted claim denials or excessive utilization of benefits.²¹ For these reasons, a disproportionate decline in non-traumatic injury claims (and their associated costs) would suggest that moral hazard effect(s) probably explain at least a portion of the cost savings observed. My results bear out this hypothesis in that non-traumatic injury claims are the most responsive to the opt-out choice. This hyper-responsiveness persists even when non-traumatic injuries that many nonsubscribers categorically exclude from the scope of coverage – such as non-inguinal hernias, carpal tunnel syndrome, fibromyalgia, and occupational diseases – are omitted from the analysis.

In the third stage, I isolate the effect of nonsubscription on severe, traumatic injury claims, which are generally regarded as the least susceptible to underreporting and other forms of moral hazard.²² I find that the frequency of such injuries declines substantially (by about 47% in my preferred models) with nonsubscription. Although this finding could be explained by aggressive claim screening, it is also consistent with an improvement in real safety.

The final and most exploratory stage of the study probes causal mechanisms. I examine the likelihood that four highly salient and nearly universal features of private plans – their non-coverage of permanent partial disabilities; caps on total benefits; lack of chiropractic care; and

²¹ See Alison Morantz, *Filing Not Found: The Underreporting of Injuries to Worker Protection Agencies*, unpublished manuscript on file with author.

²² See *Ibid*; Morantz, A., *Coal Mine Safety: Do Unions Make a Difference?* INDUS. & LAB. REL. REV. (2012), Forthcoming; Azaroff, L. S., Levenstein, C., and Wegman, D. H., *Occupational Injury and Illness Surveillance: Conceptual Filters Explain Underreporting*. AMERICAN JOURNAL OF PUBLIC HEALTH 92 (2002), 1421-1429; Park, R., Nelson, N., Silverstein, M., Mirer, F., *Use of medical insurance claims for the surveillance of occupational disease: an analysis of cumulative trauma in the auto industry*. OCC. MED. 34 (1992), 731-737; Dionne, G., and St-Michel, P., *Workers' Compensation and Moral Hazard*. REV. ECON. STAT. 73 (May 1991): 236-244; Morantz, A., and Mas, A., *Does Post-Accident Drug Testing Reduce Injuries? Evidence from a Large Retail Chain*. AM. L. & ECON. REV. (2008), 257; Fan, J., et al., *Underreporting of Work-Related Injury or Illness to Workers' Compensation: Individual and Industry Factors*, NEW J. OF OCCUP. ENV. MED. 48 (2006): 914-922; Rosenman, K. D., et al., *Why Most Workers with Occupational Repetitive Trauma Do Not File for Workers' Compensation*, J. OF OCCUP. ENV. MED 42 (2000): 25-34; Derrig, R., Weisberg, H., & Chen, X., *Behavioral Factors and Lotteries under No-Fault with a Monetary Threshold: A Study of Massachusetts Automobile Claims*. J. RISK INS., 61 (1994), 245-275.

categorical exclusion of some non-traumatic injuries and diseases – account for the bulk of the observed cost savings. Surprisingly, my findings suggest that this is not the case. Although many nonsubscribers contend that two other salient features of private plans – their end-of-shift or 24-hour injury-reporting windows, and their control over the pool of medical providers – play important causal roles, data limitations preclude me from identifying their respective impacts.²³

The remainder of the Article proceeds as follows. Section Two contains a general overview of the Texas workers' compensation system and a brief history of nonsubscription. Section Three highlights several strands of prior workers' compensation scholarship, including past research on nonsubscription. Section Four describes the datasets used throughout the analysis. Section Five describes my research questions and identification strategy. Section Six presents the results. Section Seven, the concluding section, discusses promising directions for future research. Tables and appendices are presented at the end of the paper. Ancillary materials and analysis that space constraints preclude me from including here in their entirety are available on a companion website.²⁴

II. Overview of Texas Workers' Compensation, Nonsubscription, and Private Plans

²³ A reporting period refers to the time window within which an employee must report that they have experienced an injury, in order to be eligible for benefits such as compensation. In contrast, the statute of limitations refers to the time window within which an employee is eligible to file a lawsuit regarding a claim. In Iowa, for example, Chapter 85 of the Workers' Compensation Act (§ 85.23 Notice of Injury) specifies that “[u]nless the employer or the employer's representative shall have actual knowledge of the occurrence of an injury received within ninety days from the date of the occurrence of the injury, or unless the employee or someone on the employee's behalf or a dependent or someone on the dependent's behalf shall give notice thereof to the employer within ninety days from the date of the occurrence of the injury, no compensation shall be allowed.” This requirement is referred to throughout as the “reporting window.” In contrast, the statute of limitations is specified in a different section of the same chapter (§ 85.26 Limitation of Actions), which states that “[a]n original proceeding for benefits under this chapter or chapter 85A, 85B, or 86, shall not be maintained in any contested case unless the proceeding is commenced within two years from the date of the occurrence of the injury for which benefits are claimed or, if weekly compensation benefits are paid under section 86.13, within three years from the date of the last payment of weekly compensation benefits.”

²⁴ See: <http://amorantz.stanford.edu/companions/rejecting-the-grand-bargain/>.

Before describing the characteristics of nonsubscribers and the private plans they offer, it is helpful to lay the groundwork by sketching the basic contours of Texas's workers' compensation statute. Although the elective nature of the law is unique, in most other regards the statute is not unlike those that govern most U.S. jurisdictions. The statute gives injured employees a thirty-day "reporting window" in which to inform their employers that they have been injured on the job, thereby preserving their right to file a claim.²⁵ As in most states, the Texas program provides full coverage of medical costs (with no copays, time limits, or monetary caps), and wage replacement benefits are untaxed.²⁶ Also like the majority of other states, Texas allows employees to select their treating physician unless their employers have taken advantage of legislation permitting them to join Certified Workers' Compensation Networks.²⁷ Employees suffering from temporary total, permanent total, or permanent partial disabilities receive 70-75% of their weekly wage (capped at either 70% or 100% of the state's average weekly wage²⁸) tax-free – a generous reimbursement rate by national standards.²⁹ The statute

²⁵ See OFFICE OF INJURED EMPLOYEE COUNSEL OF THE STATE OF TEX., NOTICE OF INJURED EMPLOYEE RIGHTS AND RESPONSIBILITIES IN THE TEXAS WORKERS' COMPENSATION SYSTEM 2 *available at* <http://www.oiec.texas.gov/documents/ierightsrespeng.pdf> (last accessed December 15, 2015)

²⁶ See INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 3. WORKERS' COMPENSATION MEDICAL BENEFITS AND METHOD OF PHYSICIAN SELECTION AS OF JULY 1, 2008.

²⁷ See *Ibid.* at 3-5. For an overview of the network program, see TEX. DEP'T OF INS., WORKERS' COMP. HEALTH CARE NETWORKS, *available at* <http://www.tdi.texas.gov/wc/wcnet/indexwcnet.html> (last accessed December 15, 2015). If the employee is not in a Workers' Compensation Health Care Network, (s)he may choose any doctor willing to treat her injury. See OFFICE OF INJURED EMPLOYEE COUNSEL OF THE STATE OF TEX., *supra* note 25 at 1.

²⁸ Labor Code § 408.061. For a detailed description of applicable caps on workers' compensation benefits, see <http://www.tdi.texas.gov/reports/wcwg/benefit.html> (last accessed December 15, 2015).

²⁹ Until October 1, 2006, Texas's maximum benefit amounts were relatively low by national standards. Since that date, however, the maximum rates have been increased by more than 40% (to \$773 for temporary total and permanent total disability, and \$541 for permanent partial disability), placing them closer to the middle of the national distribution. See DIV. OF WORKERS' COMP., TEX. DEP'T OF INS., MAXIMUM AND MINIMUM WEEKLY BENEFITS *available at* <http://www.tdi.texas.gov/wc/employee/maxminbens.html> (last accessed December 15, 2015). However, the maximum periods applicable to most injury types (104 weeks for temporary total disability, 401 for unlisted permanent total disabilities, and 300 weeks for permanent partial disability) remain relatively short by national standards. See INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 4. BENEFITS FOR TEMPORARY TOTAL DISABILITY PROVIDED BY WORKERS' COMPENSATION SYSTEMS AS OF JULY 1, 2008; INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS

imposes a 7-day waiting period, requiring a worker to miss seven calendar days of work before receiving any wage replacement benefits. However, the first week's benefits can be recouped retroactively if the absence persists for at least fourteen days.³⁰ Like most other states, the law also mandates compensation for occupational hearing loss.³¹

Cost per claim in Texas has fallen markedly in recent decades. In 2001, Texas had among the highest reported cost per claim among the fourteen states included in the annual Workers Compensation Research Institute (WCRI) cost benchmarking study.³² The average total figure, at \$5,320, was 67.5% above the group median.³³ The respective percentages of claims involving permanent partial disabilities, lump-sum payments, and/or at least a week of lost time were also unusually high. Beginning in 2002, however, both medical costs and indemnity payments per claim began to plummet. By 2004, average total cost per claim was only 6.3% above the 14-state median; and among claims involving over a week of lost time, average cost was 7.7% *below* the median.³⁴ Since the mid-2000s, the cost structure of Texas's workers' compensation system has been unremarkable by national standards.³⁵ The fact that

COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 5. BENEFITS FOR PERMANENT TOTAL DISABILITY PROVIDED BY WORKERS' COMPENSATION SYSTEMS AS OF JULY 1, 2008; INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 6. BENEFITS FOR PERMANENT PARTIAL DISABILITY PROVIDED BY WORKERS' COMPENSATION SYSTEMS AS OF JULY 1, 2008 (respectively).

³⁰ The Texas legislature reduced the length of the "retroactive period" on September 1, 2005 (Texas Workers' Compensation Act § 408.082) from 28 days to 14 days. Thirteen of the fifteen companies studied in this Article had opted out by this date. The 14-day provision is relevant only to two of the participants that nonsubscribed most recently. Texas previously had one of the longest "retroactive periods" applied in any state, but now has a period that falls in the middle of the distribution. See INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 13. INITIAL PAYMENTS, WAITING PERIODS, RETROACTIVE PAYMENTS AND TIMEFRAMES FOR TTD AS OF JULY 1, 2008.

³¹ See INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND THE WORKERS COMPENSATION RESEARCH INSTITUTE, WORKERS' COMPENSATION LAWS, 2ND EDITION, TABLE 10. COVERAGE OF OCCUPATIONAL HEARING LOSS AS OF JULY 1, 2008.

³² See Eccleston, Radeva, Telles, Yang, and Tanabe (2009, 3).

³³ Telles, Wang and Tanabe (2004, 202).

³⁴ *Ibid.*, 77.

³⁵ *Ibid.*, 11, 15, 17.

costs per claim declined during the study period complicates my identification strategy, a point to which I return in Section Five.

Texas collected no data on the opt-out sector for the first eight decades after passing its first workers' compensation law's law in 1913.³⁶ In the early 1990s, however, the Texas Workers' Compensation Research Center and Texas Department of Insurance (TDI) sponsored periodic surveys of employers and employees to learn more about the prevalence, attitudes, and attributes of nonsubscribers. These surveys contain several noteworthy findings. First and foremost, most large nonsubscribers offer occupational injury benefit plans ("private plans") to their employees. In 2012, for example, an estimated 82% of large nonsubscribers – which employed about 88% of all injured workers in the nonsubscription sector – offered private plans.³⁷ Secondly, unlike workers' compensation, private plans typically provide wage-replacement benefits to injured employees from the very first day of lost work.³⁸ Third, nonsubscribers reported higher levels of satisfaction with their occupational injury plans than did firms that subscribed to workers' compensation.³⁹ Fourth, 14% of nonsubscribers overall, and 63% of large nonsubscribers, reported including mandatory arbitration provisions in their plans for the adjudication of tort claims.⁴⁰ Finally, although only 35% of injured employees knew their

³⁶ See SHIELDS & CAMPBELL, *supra* note 4 at 3.

³⁷ WORKERS' COMP. RESEARCH GROUP, TEX. DEP'T INS., EMPLOYER PARTICIPATION IN THE TEXAS WORKERS' COMPENSATION SYSTEM: 2012 ESTIMATES 22 (2012) *available at* http://www.tdi.texas.gov/reports/wcreg/documents/2012_Nonsub.pdf. The Texas Department of Insurance reports that although only 33% of nonsubscribers offer occupational injury insurance plans, 75% of employees who work for nonsubscribers are covered by them, suggesting most nonsubscribers that do *not* offer private plans are relatively small. WORKERS' COMP. RESEARCH GROUP, TEX. DEP'T INS., EMPLOYER PARTICIPATION IN THE TEXAS WORKERS' COMPENSATION SYSTEM: 2014 ESTIMATES 22 (2012) *available at* <http://www.tdi.texas.gov/reports/wcreg/documents/Nonsub.pdf>.

³⁸ See WORKERS' COMP. RESEARCH GROUP, TEX. DEP'T INS., EMPLOYER PARTICIPATION IN THE TEXAS WORKERS' COMPENSATION SYSTEM: 2004 ESTIMATES (October 2004), p. 30 (noting that 75% of private plans have no waiting period for receipt of wage-replacement benefits). See also Butler, *supra* note 18 at 411-12.

³⁹ See WORKERS' COMP. RESEARCH GROUP, *supra* note 9 at 16-18.

⁴⁰ *Ibid*, 32.

employer was a nonsubscriber before accepting the job, 65% acquired this knowledge before they were injured.⁴¹

Table A presents a detailed comparison of Texas workers' compensation with the private plans offered by the fifteen participants in this study. As expected given the TDI survey results, all private plans offer first-day coverage of wage-replacement benefits as opposed to the seven-day waiting period that precedes the receipt of such benefits under workers' compensation. Also unlike workers' compensation, the majority of the participants' plans include fixed (per-person) caps on total benefits. Finally, most offer a wage replacement rate of 85-100% and do not cap the maximum value at the state's average weekly wage. On its face, this provision compares favorably with workers' compensation, which only replaces 70-75% of lost wages and caps its benefits at 70-75% of the state's average weekly wage. Yet since private plan benefits count as taxable income and workers' compensation benefits do not, the net effect of nonsubscription on weekly wage replacement will depend on each worker's wage and marginal tax rate.

The methods for resolving disputes also differ between workers' compensation and nonsubscription. Workers' compensation appeals are handled through an administrative adjudicatory process. Under private plans, however, the dispute resolution process depends on the nature of the claim. Claims challenging a benefit determination are governed by the Employee Retirement Income Security Act of 1974 (ERISA), and as such initially go through a formal appeals process within the company. Once this internal appeals process has been exhausted, an adverse benefits determination claim can be challenged in federal district court. Meanwhile, most plans mandate arbitration for the resolution of tort claims (alleging employer

⁴¹ WORKERS' COMP. RESEARCH GROUP, *supra* note 38 at 23. See Texas Labor Code § 406.005.

negligence as a proximate cause of injury).⁴² Many plans also include “final compromise and settlement” provisions specifying that an injured employee must accept whatever settlement is offered at the end of arbitration, or receive no benefits at all.⁴³

Many other features of private plans are remarkably homogeneous. All limit employees’ choice of medical care provider. None compensates permanent partial disabilities or chiropractic care. Most also categorically exclude some non-traumatic injuries (such as non-inguinal hernias, cumulative trauma if the employee has worked less than 180 days, carpal tunnel syndrome, chronic fatigue syndrome and fibromyalgia) and many occupational diseases (such as any caused by mold, fungi, pollen, or asbestos) from the scope of coverage.

The majority of private plans also include more discretionary grounds for denying claims or terminating benefits in particular cases. These provisions typically depend on the conduct of the worker just before or after the injury took place and/or the nature of the injury. For example, private plans uniformly include an employee’s failure to report an injury to a supervisor by the end of the work shift or within 24 hours as a basis for claim denial.⁴⁴ Many plans only provide coverage for injuries that fit their definition of an accident: the injury must have “occurred by accident” and “from unknown causes.”⁴⁵ Many plans also reserve the right to deny a claim if the

⁴² A majority of nonsubscribers in Texas in 2012 (according to TDI, 2012 *supra* note 29) and a majority of nonsubscribers in this study select arbitrators registered with the American Arbitration Association or the National Arbitration Forum for arbitration. Texas law has also abolished the “unholy trinity” of common law defenses to tort liability: the fellow-servant rule, assumption of risk, and contributory negligence. See Texas Labor Code § 406.033.

⁴³ An employee who accepts benefits under a nonsubscription plan does not automatically forfeit her right to sue in tort. Moreover, a cause of action may not be waived by an employee before his or her injury or death. See Texas Labor Code § 406.033(e). However, a cause of action may be waived by an employee after the employee’s injury if he or she voluntarily signs a waiver more than 10 days after reporting the injury and after a medical evaluation from a nonemergency doctor. See Texas Labor Code § 406.033(f).

⁴⁴ Thirteen of the fifteen study participants have “good cause” provisions in their nonsubscription plans, which allow an employee to collect benefits for injuries they did not report within 24 hours if the claims administrator determines that good cause existed for their failure to provide notice in a timely matter.

⁴⁵ For example, a *Houston Press* article reported that truck driver Andrew Ellis found that a torn meniscus he suffered while unloading pipes would not be covered by his nonsubscribing employer since his description of his knee “giving out” did not meet the definition of an accident or an injury. Ellis was ultimately awarded a settlement after arbitration, but he received no benefits until 33 months after his injury. Flynn, Megan. “Don’t Fall Down on the

employee failed to comply with safety policies or engaged in “inappropriate behavior” such as scuffling or horseplay, and such behavior was a proximate cause of his/her injury. Plans also frequently decline to cover injuries sustained as the result of an employee being assaulted by a third party for reasons other than his or her employment. Other common discretionary bases for terminating benefits (after a claim is filed) include an employee’s refusal to submit to a drug or alcohol test; failure to seek approval for all medical care; consultation with a non-approved physician; refusal to allow an employer representative to accompany him/her to doctor’s appointments; persistent non-responsiveness to treatment; tardiness or non-appearance at scheduled doctors’ appointments; failure to check in with supervisors at required intervals; untruthfulness to or failure to cooperate with the plan administrator; and bad-faith failure to comply with plan provisions. In addition, medical benefits can be terminated if an employee is fired for gross misconduct and wage-replacement benefits can be terminated if an employee is fired for any reason besides being laid off. One study participant’s plan reserves the right to terminate wage-replacement benefits if the employee is fired for any reason at all.

Although Texas’ Workers’ Compensation Act protects employees who file workers’ compensation claims from retaliatory discharge, employees of nonsubscribers enjoy no similar protection under state law. At the time of this writing, the Texas Supreme Court had expressly declined to extend such statutory protections to employees of nonsubscribers.⁴⁶ Thus the only legal recourse for a worker who is terminated in retaliation for reporting an injury is to file an

Job in Texas: Employers Don’t Have to Provide Injury Coverage." *Houston Press*. 2 Feb. 2016. Accessed from <http://www.houstonpress.com/news/don-t-fall-down-on-the-job-in-texas-employers-don-t-have-to-provide-injury-coverage-8120319>.

⁴⁶ See *Texas Mexican Railway Co. v. Bouchet*, 963 S.W.2d 52 (Tex 1998), holding that Section 8307c of the Texas Workers’ Compensation Act did not provide a cause of action to an employee of a nonsubscribers who was allegedly terminated for reporting an injury claim. *Mexican Railway* appears to be good law in Texas, and a careful search of other legal materials revealed no non-statutory sources of authority to the contrary.

anti-retaliation claim under ERISA Section 510.⁴⁷ However, such claims must be brought in federal court⁴⁸ and offer fewer remedies than those available under state law.⁴⁹

III. Key Themes in Prior Literature

Empirical research on workers' compensation has burgeoned since the 1980s, partly in response to public concern over the system's rising costs and perceived inefficiencies. Although a comprehensive review of existing scholarship is beyond the scope of this article, several lines of scholarly inquiry merit brief discussion.

First, numerous studies have confirmed the existence of moral hazard effects throughout the workers' compensation system. So-called "risk-bearing" moral hazard predicts that employees will take more risks on the job, *ex ante*, as benefit levels increase. In contrast, "claims-reporting" moral hazard refers to the expectation that a worker will be more likely to file an injury claim (including for a feigned or off-the-job injury) as benefit levels increase. Consistent with the existence of both effects, nearly all studies have found that increasing benefits or shortening waiting periods increases the frequency, cost, and duration of claims.⁵⁰

⁴⁷ Under section 510 of ERISA, 29 U.S.C. § 1140, "It shall be unlawful for any person to discharge, fine, suspend, expel, discipline, or discriminate against a participant or beneficiary for exercising any right to which he is entitled under the provisions of an employee benefit plan."

⁴⁸ See 29 U.S.C. § 1132(e) (federal courts have exclusive jurisdiction over claims arising under Subchapter I of ERISA, with limited exceptions); *Tolle v. Carroll Touch, Inc.*, 977 F.2d 1129, 1133-34 (7th Cir. 1992) (ERISA Section 510 claims do not fall under 29 U.S.C. § 1132(e)'s exception to exclusive federal jurisdiction); *Eichorn v. AT&T Corp.*, 484 F.3d 644, 651-53 (3d Cir. 2007) (citing *Tolle*).

⁴⁹ Punitive damages are not available under ERISA. See 29 U.S.C. § 1132(a)(3). However, punitive damages are available under Texas Workers' Compensation. See Texas Labor Code § 451.002.

⁵⁰ See James R. Chelius, *The Influence of Workers' Compensation on Safety Incentives*, 35 INDUS. & LAB. REL. REV. 235 (1982); John D. Worrall & David Appel, *The Wage Replacement Rate and Benefit Utilization in Workers' Compensation Insurance*, 49 J. RISK AND INS. 361 (1982); Richard J. Butler & John D. Worrall, *Workers' Compensation: Benefit and Injury Claims Rates in the Seventies*, 65 REV. OF ECON. AND STAT. 580 (1983); John W. Ruser, *Workers' Compensation Insurance, Experience-Rating, and Occupational Injuries*, 16 RAND J. ECON. 487 (1985); John D. Worrall & Richard J. Butler, *Benefits and Claim Duration*, in WORKERS' COMPENSATION BENEFITS: ADEQUACY, EQUITY, AND EFFICIENCY 57-70 (John D. Worrall & Richard Butler eds., 1985); Richard J. Butler & John D. Worrall, *Work Injury Compensation and the Duration of Nonwork Spells*, 95 ECON. JOURNAL 714 (1985); Ronald Ehrenberg, *Workers' Compensation, Wages and the Risk of Injury*, in NEW PERSPECTIVES IN WORKERS' COMPENSATION 71-96 (John F. Burton ed. 1988); Richard J. Butler & John D. Worrall, *Claims*

Second, the compensation of permanent partial disability⁵¹ (PPD) claims has been one of the most complex and controversial areas of workers' compensation reform. Although composing only a third of workers' compensation cases, PPD claims reportedly comprise about two thirds of total costs.⁵² However, one California-based study found that PPD claimants at private, self-insured firms (which are, on average, considerably larger than commercially insured firms) returned to work more quickly and were more likely to remain employed than PPD

Reporting and Risk Bearing Moral Hazard in Workers' Compensation, 52 J. RISK AND INS. 191 (1991); Thomas J. Kniesner & John D. Leeth, *Separating the Reporting Effects from the Injury Rate Effects of Workers' Compensation Insurance: A Hedonic Simulation*, 42 J. POL. ECON. 280 (1989); Alan B. Krueger, *Incentive Effects of Workers' Compensation Insurance*, 41 J. PUB. ECON. 73 (1990); Alan B. Krueger, *Workers' Compensation Insurance and the Duration of Workplace Injuries* (Nat'l Bureau of Econ. Research, Working Paper No. 3253, 1990); John W. Ruser, *Workers' Compensation and Occupational Injuries and Illnesses*, 9 J. LABOR ECON. 325 (1991); Richard J. Butler, *Economic Determinants of Workers' Compensation Trends*, 61 J. RISK AND INS. 383 (1994); Bruce D. Meyer et al., *Workers' Compensation and Injury Duration: Evidence from a Natural Experiment*, 85 AM. ECON. REV. 322 (1995); Robert Kaestner & Anne Carroll, *New Estimates of the Labor Market Effects of Workers' Compensation Insurance* 63 S. ECON. J. 635 (1997); Denis Bolduc et al., *Workers' Compensation, Moral Hazard, and the Composition of Workplace Injuries* 37 J. HUM. RESOURCES 623 (2002); Geetha Waehrer & Ted Miller, *Restricted Work, Workers' Compensation, and Days Away from Work*, 38 J. HUM. RESOURCES 964 (2003); Frank Neuhauser & Steven Raphael, *The Effect of Increase in Workers' Compensation Benefits on the Duration and Frequency of Benefit Receipt*, 86 REV. OF ECON. AND STAT. 288 (2004). *But see* Alan B. Krueger *Incentive Effects of Workers' Compensation Insurance*, 41 J. PUB. ECON. 73 (1990) (finding that higher benefits are not associated with higher injury claims among female CPS respondents); Alan B. Krueger & John F. Burton, *The Employers' Costs of Workers' Compensation Insurance: Magnitudes, Determinants, and Public Policy*, 72 REV. OF ECON. STAT. 228 (1990) (finding costs to be less responsive to benefit levels than previous estimates, and in some cases not significantly different from unit elastic); Darius N. Lakdawalla et al., *How Does Health Insurance Affect Workers' Compensation Filing?*, 45 ECON. INQUIRY 286 (2007) (finding that level of benefits offered by employer did not affect respondents' likelihood of filing claim in NLSY data). In a related vein, Robert Smith interprets the fact that a disproportionate number of workers' compensation claims for sprains and strains are filed on Mondays (a disparity that does not exist for harder-to-conceal injuries like cuts and lacerations) as evidence that workers are "post-dating" weekend back injuries and strains to obtain workers' compensation coverage. Robert S. Smith, *Mostly on Monday: Is Workers' Compensation Covering Off-the-Job Injuries?*, in *BENEFITS, COSTS, AND CYCLES IN WORKERS' COMPENSATION INSURANCE* 115-127 (Philip S. Borba & David Appel eds. 1989). A more recent empirical study, however, has disputed the existence of this so-called "Monday effect." *See* David Card & Brian McCall, *Is Workers' Compensation Covering Uninsured Medical Costs?*, 49 INDUS. & LAB. REL. REV. 690 (1996).

⁵¹ Permanent partial disabilities are injuries that permanently impair a worker's physical capacity in some fashion, but do not prevent him/her from working. The question of whether the injured worker must also prove some loss of earnings is controversial and varies widely across states.

⁵² Figure 3, "Types of Disabilities in Workers' Compensation Cases with Case Benefits, 2004," *Workers' Compensation: Benefits, Coverage, and Costs, 2007*, National Academy of Social Insurance (2009) at 9, reproduced from *Annual Statistical Bulletin*, NCCI 2008, Exhibits X and XII. It should be noted that PPD costs are interpreted very broadly here, so as to include all cases that are closed with lump sum settlements, as well as all temporary total disability payments received by PPD claimants.

claimants at other firms, suggesting that PPD's disproportionate effect on costs is somewhat attenuated in large companies.⁵³

A third salient theme is that the greater the proportion of injury costs borne by the firm, the lower the frequency of claims. For example, although an increase in statutory benefits increases claims-reporting moral hazard, there is an offsetting effect. Since compensating injuries becomes more costly with such a change, a rise in benefits can also spur firms to invest more heavily in safety.⁵⁴ Empirical studies also confirm that employees of self-insured firms who file temporary total disability claims return to work more quickly than their counterparts at smaller, non-experience-rated firms.⁵⁵ This vein of scholarship implies that *ceteris paribus*, the more costs a firm bears for on-the-job injuries, the more it is likely to invest in safety enhancements and return-to-work programs.

Fourth, as economic theory predicts, employees effectively “pay” for a portion of their workers’ compensation benefits through lower wages. Although scholars have derived different estimates of the wage-benefit tradeoff, all studies have confirmed its existence, suggesting that workers are sufficiently well informed about workers’ compensation to exchange at least some portion of their wages for the insurance benefits they receive.⁵⁶

⁵³ RAND Institute for Civil Justice, “Permanent Disability at Private, Self-Insured Firms: A Study of Earnings Loss, replacement and Return to Work for Workers’ Compensation Claimants,” (2001) at xv & 7.

⁵⁴ See Chelius (1982), *supra* note 50; Michael J. Moore & Kip W. Viscusi, *Social Insurance in Market Contexts: Implications of the Structure of Workers’ Compensation for Job Safety and Wages*, in INSURANCE ECONOMICS 399-422 (Georges Dionne ed. 1992); Kniesner, *supra* note 50; Kaestner, *supra* note 50. *But see* Fishback (1987), *supra* note 50 at 306 (finding that adoption of workers’ compensation in mining industry in early 1900s increased rates of fatal injuries, presumably because of the rise in moral hazard associated with rising compensation).

⁵⁵ See Krueger, NBER Working Paper No. 3253 (1990), *supra* note 50.

⁵⁶ See Kaestner, *supra* note 50; Moore & Viscusi (1989), *supra* note 50; Kip W. Viscusi & Michael J. Moore, *Workers’ Compensation: Wage Effects, Benefit Inadequacies, and the Value of Health Losses* 69 REV. ECON. STAT. 249 (1987).

Fifth, medical care is generally more expensive in the workers' compensation sector than in the group health care system.⁵⁷ Several authors have hypothesized that medical providers engage in price discrimination, charging price-insensitive workers' compensation patients more money for the same care.⁵⁸ Yet a study of claim-level data concluded that these cost differences were driven instead by higher utilization rates and reliance on more costly providers.⁵⁹ Relatedly, two scholars have examined whether allowing claimants to select their own physicians ("provider choice") increases medical costs in the workers' compensation system. The studies reached opposite conclusions, however, leaving the question unsettled.⁶⁰

Texas nonsubscription has been the subject of two prior academic studies. Using aggregate company-level data from 1992-94, Butler (1996) compares fatality rates, nonfatal claims rates, injury durations, and rates of chronic injuries across subscribing and nonsubscribing firms. He finds that in most sectors, fatal injury rates vary little across the two groups, suggesting that "real" safety levels are similar overall. Yet he does find significant differences in several other important outcome measures. First, nonsubscribers report slightly higher frequencies of non-fatal injury rates, which he suggests is best explained by their elimination of the seven-day waiting period. Secondly, nonsubscribers report fewer chronic injuries, and claims of all types tend to be of shorter duration in the nonsubscription environment. Butler

⁵⁷ See Joseph A. Fields & Emilio C. Venezian, *Medical Cost Development in Workers' Compensation*, 58 J. RISK AND INS. 497 (1991), Laurence C. Baker & A.B. Krueger, *Twenty-four-Hour Coverage and Workers' Compensation Insurance* 12 HEALTH AFF. 271 (1993); Karen Roberts & Susan Zonia, *Workers' Compensation Cost Containment and Health Care Provider Income Maintenance Strategies*, 61 J. RISK AND INS. 117 (1994); David L. Durbin et al., *Workers' Compensation Medical Expenditures: Price vs. Quantity*, 63 J. RISK AND INS. 13 (1996).

⁵⁸ See Fields, *supra* note 57; Baker, *supra* note 57. See also Roberts, *supra* note 57 (finding that health care providers successfully circumvented fee schedules by doing more in less time and exploiting textual ambiguities).

⁵⁹ See Durbin, *supra* note 57.

⁶⁰ Compare Leslie I. Boden & John W. Ruser, *Workers' Compensation "Reforms," Choice of Medical Care Provider, and Reported Workplace Injuries*, 85 REV. ECON. AND STAT. 923 (2003) (finding that that state-enforced limits on provider choice did not lower the frequency of nonfatal injuries reported to the Bureau of Labor Statistics) with David Neumark et al., *The Impact of Provider Choice on Workers' Compensation Costs and Outcomes*, 61 INDUS. LAB. REL. REV. 121 (2007) (finding that limiting provider choice lowered costs and shortened time spent out of work, although it was also, somewhat paradoxically, associated with higher levels of employee satisfaction and similar rates of physical recovery.)

speculates that nonsubscribers' elimination of PPD benefits could explain the decline in average claim duration as well as the fall in chronic injury claims, since nonsubscribers may discourage employees from seeking treatment for pre-existing conditions and deter them from prolonging their claims.⁶¹

Butler's analysis underscores not only the disparate incentives faced by workers in the subscribing and nonsubscribing sectors, but also the difficulty of disentangling the effects of firm self-selection, employee-induced moral hazard, and employer-induced safety effects. Since all of the data upon which Butler relies is at the firm level and is confined to Texas, he lacks the capacity to control for cross-firm, let alone cross-facility, disparities in underlying risk.⁶² Moreover, the time period analyzed (1992-1994) predates the mass exodus of large, multistate companies from workers' compensation.

The only other academic study of nonsubscription, Morantz (2011), summarizes the results of a phone survey administered to 54 large, multistate nonsubscribers (about 89% of all firms identified as meeting the study's inclusion criteria) in 2009. Nearly all participants cited cost savings as their main motivation for opting out. Most were pleasantly surprised by the magnitude of these savings, which reportedly exceeded fifty percent, and by the scarcity of costly tort judgments. The survey also revealed remarkable homogeneity among plan provisions and nearly universal reliance on mandatory arbitration for the resolution of tort claims.

Despite the scarcity of academic work on the subject, nonsubscription has been the subject of a growing number of industry studies, practice guides, and newspaper articles. For example, an industry-funded study released in 2012 highlights nonsubscribers' emphasis on expediting workers' return to work, their ability to screen out injuries that are *not* exclusively

⁶¹ Butler, *supra* note 18 at 412, 426.

⁶² *Ibid.* at 407.

work-related, and their capacity to deter over-claiming and over-utilization as key advantages over workers' compensation. It also cites employers' control over the pool of providers and their enforcement of a 24-hour reporting window as key plan features that reduce fraudulent claims while expediting the provision of medical care.⁶³ Other industry reports and practice guides echo these themes, citing myriad advantages of private plans over workers' compensation.⁶⁴ On the other hand, a news analysis released jointly in 2015 by National Public Radio and ProPublica characterizes nonsubscribers' cost savings as coming at the expense of injured employees. Based on a series of interviews and showcasing personal narratives from injured workers, the article contends that the categorical exclusion of certain injuries (such as non-inguinal hernias) shifts costs onto group health care plans or taxpayer-funded social insurance programs and even, in some cases, leaves injured workers with no remedy at all. The article also highlights the constraints that mandatory arbitration, final settlement provisions, and other procedural restrictions impose on workers' right to obtain appropriate care and appeal company determinations they believe are unjust. Other editorials and news articles have voiced similar concerns.⁶⁵

My access to a unique dataset with extraordinarily granular claims-level data enables me to take up several of the empirical questions that Butler (1997) and Morantz (2010) left unanswered. I estimate the magnitude of cost savings and draw several conclusions regarding

⁶³ Peter Rousmaniere, "Worker's Compensation Opt-Out: Can Privatization Work?" Sedgwick, November 2012, pp. 21-23 & 50.

⁶⁴ See, e.g., Chris Patterson and John Colyandro, "Workers' Compensation: Making It Work for Texans," Policy Perspective (Feb. 1, 2005), available at <http://www.txccri.org/content/2005-02-workers.pdf>; Peter Rousmaniere and Jack Roberts, "What Employers Need to Know about the New Oklahoma Law," Sedgwick, May 2013; Nathan Bacchus et al., "Alternatives to Traditional Workers' Compensation Systems," Risk and Insurance Management Society, 2015; Partnersource, "Oklahoma Option," <http://www.partnersource.com/oklahoma-oklahoma-option-challenge-rejected-by-supreme-court/>.

⁶⁵ Peter Rousmaniere, "Opt-Out: A Painful Reassessment," *WorkComp Central* (Nov. 23, 2015), available at <https://www.workcompcentral.com/columns/show/id/ea3c7f0a9b525b9be4eb8c32507ea402a4ba5df5>; Thomas A. Robinson, "2016 Emerging Issues: Will 2016 Be the Year Opt-Out Legislation Catches Fire?," *Lexis-Nexis* (2015); Flynn, *supra* note 45.

how these savings are achieved. The primary limitation of the study is that I cannot draw any definitive conclusions about the ultimate efficiency and distributional consequences of nonsubscription. Distinguishing between observationally equivalent forms of moral hazard – and more broadly, calculating the welfare effects of private plans on injured workers – would require access to a broader array of data sources than I possess. Consequently, several of the empirical controversies raised by a diverse array of stakeholders remain unresolved. Yet in helping to quantify the cost savings that accrue to nonsubscribers and identifying their most likely sources, I aim to bring current trends into sharper focus and prioritize questions for future empirical investigation.

IV. Description of Data

Fifteen large, multistate firms that were Texas nonsubscribers for at least some portion of the study period (1998-2010) contributed data to the present study. Like most nonsubscribers, all participants provide their employees with private plans that include medical and wage-replacement benefits. Although confidentiality restrictions preclude me from disclosing their identities, their diverse corporate attributes make them prime candidates for a research study. Nine are retail chains, three are manufacturers, and three are services firms.⁶⁶ Although varying significantly in size and geographic scope, all would be deemed “large” within their respective industry groupings.⁶⁷ Each operates at least fifteen (and typically hundreds) of homogenous

⁶⁶ I use the same broad industry groupings described in Morantz (2010). The manufacturing industry grouping includes firms that manufacture a wide range of products; the retail industry grouping includes restaurants, big-box retailers, department stores, gas stations, and supermarkets; and the services industry grouping includes hotel and transportation companies.

⁶⁷ As described more fully in Morantz (2010), I did not impose uniform size and dispersion thresholds across industry groupings. Rather, I divided the population of nonsubscribers into six groupings – manufacturing firms; retail chains; other retail chains (such as department stores, gas stations, and “big-box” retailers); hotel chains; transportation companies; and other services companies (such as assisted living facilities, nursing homes, and banks)

facilities in at least five U.S. states.⁶⁸ Table B describes the participants' characteristics in further detail, although some of the information has been blurred to ensure non-identifiability. (As noted earlier, Table A presents detailed information on the characteristics of the participants' private plans.)

Despite my capacity to analyze data at the claim level, selection bias remains a potential concern. For example, could it be that only the most *successful* large, multistate firms that declined workers' compensation in Texas agreed to join my study? I do not believe this form of selection bias is likely to skew my findings. First of all, the study participants comprise a very sizable fraction - nearly a quarter - of all large, multistate nonsubscribers.⁶⁹ Secondly, when I examined the results of the Morantz (2011) phone survey administered to almost the entire population (54 out of 61 firms), the study participants' responses differed little from those of the other surveyed firms.⁷⁰ In short, I have every reason to believe that the firms included in the

- and selected separate minimum thresholds for each group in such a way that only the largest and most geographically dispersed firms in each grouping were deemed eligible for inclusion in the study.

⁶⁸ In the transportation industry (which belongs to the "services" sector), the term "facility" actually refers to a distribution center or "hub" from which job assignments originate. For all other industries, a "facility" refers to a brick-and-mortar establishment, such as a retail store.

⁶⁹ I compiled a list of all large, multistate Texas nonsubscribers whose identity could be gleaned from public and private sources, yielding a total of 61 firms.

⁷⁰ For a description of the content and results of the phone survey, see Morantz (2010). I performed t-tests to determine whether the survey responses of the fifteen study participants differed from the responses of the other 39 nonsubscribers included in the survey. For most survey questions, I found no statistically significant difference between the two groups. For example, I found no significant disparities in industry classification; number of employees; number of states of operation; year of nonsubscription; frequency of claims; reasons for becoming a nonsubscriber; provisions of voluntary plan; likelihood of offering various other fringe benefits; percentage of union facilities (if any); likelihood of using a third-party administrator to process claims; whether the nonsubscription program was deemed a success; estimated magnitude of cost savings; or likelihood of having paid out any claims exceeding \$500,000. For the handful of questions for which the two groups' responses *did* significantly differ - in other words, I could reject (at a 5% level) the null hypothesis that the 15 participants were drawn from the same population as the other large, multistate nonsubscribers surveyed - the study participants were, if anything *more* likely to cite adverse effects from nonsubscription. Specifically, study participants were more likely than others to report "educating employees," "resistance from management," and "educating management" as burdens of nonsubscription; more likely to report at least one "negative surprise" associated with nonsubscription; more likely to report "employees' willingness to sue" as a negative surprise; and more likely to reporting having "had trouble with litigation after nonsubscription." Study participants were also less likely than others to consult with other companies during the nonsubscription process; less likely to cite "control over program benefits" and more likely to cite "faster injury reporting" as a "benefit of nonsubscription"; less likely to use internal committees for dispute

study are reasonably representative of the entire group of large, multistate firms that opted out of workers' compensation in Texas during the study period.

A different formulation of the selection bias concern is that *all* nonsubscribers are fundamentally different from other firms. For example, what if only the *safest* large, multistate firms self-selected into the nonsubscription sector? There is scant empirical support for this hypothesis, since the study participants' BLS-reportable injury rates differ little from the injury rates of other firms in their respective industry groupings.⁷¹ Yet even if this form of selection bias does exist this would not undermine the relevance of my findings. The treatment examined in this study is *not* the abolition of workers' compensation, but rather the shift from a compulsory law to an elective one. In any jurisdiction, it is reasonable to assume that some firms are inherently better equipped to shoulder the risks of tort liability than others. *But only in an elective regime can these firms self-select out of workers' compensation and adopt their own private plans.* So even in the presence of firm-level self-selection, the elective nature of the statute has, in a meaningful sense, "caused" any observable disparities in the frequency and cost of workplace injuries.

resolution; less likely to systematically track costs per claim; and more likely to report phasing in nonsubscription "as soon as preparations were complete."

⁷¹ To explore this form of selection bias, the last row of Table B compares the BLS-reportable injury rate of each study participant to the comparable rate for all firms in its respective industry grouping. Of the fifteen firms, one falls into the first (i.e., safest) quartile; seven fall into the second quartile; two (for which quartile cutoffs were unavailable) fall in the upper half of the distribution; two (for which quartile cutoffs were also unavailable) fall in the bottom half of the distribution; one falls into the third (second-most-dangerous) quartile; and two fall into the fourth (i.e., worst) safety quartile. However, the BLS benchmarks are biased in a fashion that almost certainly overstates the relative safety of the study participants. The problem is that the BLS data is based on the size of each establishment in isolation, not the firm as a whole. For example, a local, stand-alone grocery store employing 20 workers would be included in the same size category as a grocery store employing 20 workers that belongs to a national supermarket chain. Given the well-established negative correlation between injury rates and firm size, the BLS benchmarks are bound to overstate the frequency of injuries for large firms like those included in this study (e.g., see Harrington 1988; McVittie et al. 1997; Morse et al. 2004; Ruser 1985; Worrall and Butler 1988). Therefore, although I cannot rule out the possibility that the study participants are safer than other multistate firms, any such disparities are probably modest in magnitude.

For analytic purposes, the fifteen participants fall into two different groups. Ten firms (2-4, 6-7, and 10-14) provided me with a dataset encompassing at least one year *before* the private plan went into effect, as well as some portion of the subsequent period. I call these the “panel” firms. The remaining five firms (1, 5, 8-9, and 15), which I call the “cross-sectional” firms, could only provide me with data from *after* the date of opt-out.

The study relies on three interlinked data files. As is shown in Table B, the specific years for which data are available differ widely across firms, as do the exact structure and scope of each dataset. At a minimum, however, each study participant provided me with the following:

(1) *Texas Nonsubscription Claims File*: This file contains detailed information on all occupational injury claims filed by Texas employees during the period of nonsubscription.⁷² A “claim” is defined as a reported injury for which a worker received medical treatment from an outside health care provider, for which the employer compensated the employee for loss of work, and/or for which the employer incurred other direct costs.⁷³ Two categories of reported injuries are *not* considered claims and therefore are not analyzed here. First, injuries that generated no payments – either because the report was deemed illegitimate or because a doctor determined that the injury was not work-related – are excluded from the analysis. Secondly, injuries that received only first-aid treatment (sometimes administered by an on-duty nurse practitioner) and did not trigger the opening of a claim are also excluded.

⁷² Company 10 is unique insofar as it “staggered” the implementation of its private plans across its Texas-based facilities. Therefore, for this company, the Texas Nonsubscription Claims File contains information on all claims filed by Texas facilities during the period that these facilities were covered by the voluntary plan.

⁷³ A small percentage (about 2%) of all claims have positive total costs but no medical costs. Of these, about ten percent contain only wage-replacement costs, about thirty percent contain only legal costs, and the remaining sixty percent contain other (miscellaneous) expenses. (These percentages are very similar among the ten study participants that provided me with panel data.) In even rarer instances, reported injuries with no wage-replacement or medical payments are included in the dataset due to the presence of other payment types, such as legal costs.

The information available for each claim includes the date and type of injury; the facility (and state) in which it occurred; total costs paid, including medical payments and any wage-replacement costs⁷⁴; and basic claimant demographics. For most companies, claim-level costs can be subdivided into more finely grained categories such as legal expenses⁷⁵, chiropractic care, etc. However, to calculate total costs paid by a fixed maturation date, claim-level financial information is not sufficient; costs must be tallied at the transactional level. A “transaction” is a single payment (cashed check) attached to a claim that was disbursed for a specific purpose, such as the provision of chiropractic care, reimbursement for lost wages, or payment of legal expenses. Of the fifteen study participants, thirteen provided me with transaction-level data in addition to claim-level data (all companies except 6 and 7).

(2) *Workers' Compensation Claims File*: This file contains claim-level information (as well as, for thirteen of the fifteen companies, transaction-level data) on all workers' compensation claims filed throughout the study period.⁷⁶ The file typically contains the same data fields as the Texas Nonsubscription Claims File.

(3) *Hours File*: The hours file contains data on the total number of hours worked per month (or quarter) at each of the company's facilities nationwide.

⁷⁴ In a few instances, breaking down each claim onto medical, wage-replacement, and legal costs required me to make minor adjustments to the dataset. For example, ten companies use a payment category called “Medical-Legal,” which includes the cost of medical exams conducted for purposes of litigation. I opt to treat these payments as legal costs, since they presumably would not have been conducted in the absence of a lawsuit. Secondly, in our transaction-level data, a single transaction occasionally encompasses two different cost types (such as medical and wage-replacement costs). The study participants’ third party administrators (who process claims on their behalf) explained that these combined transactions represent instances of subrogation, reimbursement, or settlement, in which a single payment was subdivided into smaller cost “buckets” for accounting purposes. In such cases, I treat each cost “bucket” as its own transaction. For example, if a participant were to make a single \$1000 payment on 1/1/2010 encompassing \$500 in wage-replacement costs and \$500 in medical costs, I would treat this as two different transactions: a \$500 medical payment made on 1/1/2010, and a \$500 wage-replacement payment made on 1/1/2010.

⁷⁵ Tort judgments (if any) are included in legal expenses.

⁷⁶ For Company 10, this file also includes information on all workers’ compensation claims filed by employees of Texas-based facilities that were still subscribing to workers’ compensation during the period when some of the company’s facilities had already adopted private plans.

I also utilized three smaller datasets to augment those just described. First, I obtained cost benchmark data from WCRI with average total costs, average wage-replacement costs, and average medical costs per claim for the twenty states included in their annual survey.⁷⁷ Secondly, I assembled a dataset indicating whether each state's laws limit an employee's initial choice of medical provider.⁷⁸ Finally, I compiled a dataset on reporting windows – the logged number of days in which each state requires an employee to report an injury to his/her employer – for each year and state.⁷⁹

⁷⁷ Cost benchmarks are available through The Workers' Compensation Research Institute (WCRI). Their "CompScope Benchmarks" studies provide total and indemnity (wage-replacement) costs and their "The Anatomy of Workers' Compensation Medical Costs and Utilization" studies provide medical costs. I used the 1st-13th editions to obtain estimates from 1998-2010. To calculate its cost benchmarks, WCRI takes all claims that have injury dates within a 12 month period (October 1 – September 30), then evaluates each of those claims on March 1 of the following year (resulting in a "cohort" of claims with an average maturity of 12 months). In the regressions including the WCRI benchmarks, I only included those 20 states for which WCRI benchmarks were available (AR, CA, CT, FL, GA, IA, IL, IN, LA, MA, MD, MI, MN, NC, NJ, PA, TN, TX, VA, WI).

⁷⁸ I coded limited initial medical provider (LIMP) as a dummy variable in which "1"=limited initial provider choice and "0"=no limits on choice of initial medical provider. I used the WCRI National Inventory: Table 1 "Common Cost Containment Strategies," as my initial data source for the years 1998, 2001, and 2008. However, because the National Inventory relies exclusively on survey data, I researched state statutes to verify the Inventory's accuracy and to supply codes for the intervening (non-surveyed) years. In the process of comparing the National Inventory with state statutes, I identified (and corrected) coding errors involving six states (CT, LA, MS, VT and WY), which were later confirmed by Ramona Tanabe of WCRI.

⁷⁹ The dataset lists the number of days in which an employee is required to notify his/her employer of an occupational injury. I primarily relied on a document entitled "Workers Compensation Claims Timelines" published by the Property Casualty Insurers Association of America (PCI), but also examined individual states' statutory language on notification limits to confirm the accuracy of the PCI data. For states with a range of notification limits (e.g., 21 to 180 days), I used the upper bound (i.e. 180 days). If the statute required an employee to notify his/her employer of an injury "immediately" (or used similar language this effect), the variable was coded as zero. If there was any ambiguity in the statutory language – for example, some statutes listed two different reporting windows – I called the state workers' compensation agency directly to clarify which limit the agency actually followed. Finally, before using this data field for analytic purposes, I added one to the reporting window, and then took the natural logarithm of this sum. In other words, I used $\ln(\text{reporting window} + 1)$ as a model covariate, which is referred to as " $\ln(\text{RW}+1)$ " in Table 10. Ten states – Arizona, Arkansas, Connecticut, Hawaii, Kentucky, Massachusetts, Nebraska, Vermont, Washington, and West Virginia – specify an immediate notification window. South Dakota and Wyoming impose a three-day window, and Colorado imposes a four-day window. All other states grant claimants at least seven days in which to notify their employers of occupational injuries. Interestingly, although a few states statutorily required injuries to be reported immediately or within a few days, phone conversations with state personnel indicated that such restrictions were rarely enforced by state administrative personnel. I contacted workers' compensation agencies in all fifty states and asked to speak with an expert in the legal or claims management department about the enforcement of statutory reporting windows on the reporting of injuries. I then posed a series of question such as "What if the employee notifies the employer 1 day after the notification limit?" and "Is there ever a point where the claim is no longer considered?" in an effort to determine whether the statutory reporting windows were strictly enforced. Of the 16 states with notification limits under 15 days in their state statutes, only South Dakota claimed to strictly adhere to its three-business-day injury reporting policy.

V. Research Questions and Identification Strategy

The effect of nonsubscription on the frequency of claims is theoretically indeterminate. On one hand, first-day coverage of wage replacement benefits and the absence of any cap on weekly reimbursement rates may exacerbate both risk-bearing and claims-reporting moral hazard, increasing the frequency of claims (especially for relatively minor injuries). On the other hand, nonsubscribers' newfound exposure to tort liability may strengthen their incentives to implement costly safety improvements, which should have the opposite effect. Moreover, as noted earlier, the categorical and discretionary exclusions that private plans typically contain give nonsubscribers the *de facto* flexibility to leave some injuries uncompensated. Not only can they deny claims for permanent partial disabilities, many diseases, and some non-traumatic injuries, but they can also strictly enforce 24-hour reporting windows for covered injuries. The net effect of these cross-cutting factors on the frequency of claims is hard to predict.

The effect of nonsubscription on cost per claim is likewise uncertain. On one hand, all nonsubscribers (with the exception of companies 5 and 12) offer a weekly wage replacement rate of 85-100%, which exceeds the 70-75% rate available under workers' compensation and will tend to increase the firm's per-claim costs. First-day wage replacement coverage and the absence of any cap on weekly benefits will also tend to increase costs per claim. On the other hand, nonsubscribers' elimination of permanent partial disability benefits and chiropractic care; their imposition of monetary caps on total benefits; their inclusion of myriad discretionary grounds for terminating benefits; and their unfettered access to cost-containment strategies (such as limited provider choice) will tend to *lower* costs per-claim.

Legal costs are subject to similarly offsetting effects: although mandatory arbitration may reduce attorneys' fees for ordinary claims, nonsubscribers' exposure to negligence-based tort suits may prove costly in exceptional cases.

Under fairly minimal assumptions – such as profit maximization, sufficient information to reasonably forecast future costs, a reasonably lengthy time horizon, minimal agency costs, etc. – nonsubscription should be a profit-maximizing choice. Indeed, given the substantial transition and transaction costs involved in adopting a voluntary plan, one would expect such cost savings to be substantial. Yet even if one takes the existence of cost savings as a foregone conclusion, the *magnitude* of these savings – and the manner in which they are achieved – remain open questions. Understanding *how* and *why* nonsubscribers save money may provide clues about the distributional consequences of nonsubscription and highlight avenues for future research.

Toward this end, I pose four interrelated questions:

1. Does nonsubscription generate significant cost savings for large, multistate firms that choose to opt out and, if so, how large are these savings? Are they driven by a fall in claim frequency, costs per claim, or both? Are total, medical, wage-replacement, and legal costs equally affected?
2. Do these the latter trends vary by the type of injury? In particular, are non-traumatic injuries more responsive to nonsubscription than other claims? If so, does this disparity persist if one omits from the comparison non-traumatic injuries that private plans categorically exclude from coverage?
3. Are the trends observed in severe and traumatic injuries, which are the least prone to reporting bias, consistent with any change in real safety?

4. Do four of the most salient features of private plans – non-compensation of permanent partial disabilities; categorical exclusion of many diseases and some non-traumatic injuries from coverage; caps on total benefits; and lack of chiropractic care – account for the lion’s share of cost savings?

In the first stage, my goal is to isolate the relationship between nonsubscriber status and claim frequency, total costs per worker hour, and costs per claim. To analyze claim frequency, I estimate negative binomial regression models in which the dependent variable is the number of injury claims with positive costs as of one year from the date of injury. The unit of analysis is the facility-quarter, the exposure term is hours worked, and standard errors are clustered at the facility level. The covariate of interest is the nonsubscription dummy, which takes on a value of “1” in facility-quarters that pertain to the nonsubscription regime, and a value of zero in facility-quarters that pertain to the workers' compensation regime. I exponentiate the right-hand side coefficients to obtain incidence rate ratio (IRR) coefficient estimates. Facility-quarters with zero hours worked are excluded from the sample.

Credibly identifying nonsubscription’s effects on cost per worker hour and cost per claim poses more formidable modeling challenges. The difficulty is that in each case, some observations accrue zero costs, and the data-generating process governing whether any costs are paid (the extensive margin) may differ from that governing the *magnitude* of those costs (the intensive margin). For example, whether a facility incurs *any* costs during a given quarter will depend at least in part on underlying safety levels (whether any employees are injured), whereas the magnitude of costs may depend predominantly on the quality of medical treatment, efficacy of return-to-work programs, availability of restricted work, etc. Similarly, whether a claim

accrues any wage-replacement costs depends on the severity of the injury, which in turn depends on underlying safety. However, the *magnitude* of wage-replacement costs is more predominantly a function of the quality of medical care provided. In short, to derive unbiased estimates, I must account for the possibility that nonsubscription affects *both* the extensive and intensive cost margins, but through distinct programmatic channels.

Toward this end, I employ a two-step modeling procedure similar to that outlined in Buntin and Zaslavsky (2003). The first step focuses on the extensive margin, using a probit model to determine whether nonsubscription significantly predicts the likelihood of *any* costs being paid. Next, I devote attention to the intensive margin by modeling the effect of nonsubscription on the *magnitude* of paid costs. Although there is some debate in the literature regarding the relative merits of OLS and Generalized Linear Models (GLM) for the second stage, I opt to mitigate the potential biases that afflict OLS⁸⁰ by employing a GLM model, which yields unbiased estimates when the (covariate) coefficients are transformed back to their raw scale.⁸¹ Since GLM estimates are generally less precise than OLS, my modeling approach will, if anything, tend to *understate* the statistical significance of my findings.⁸² Implementation of GLM models also

⁸⁰ Although ordinary least squares estimation is the most straightforward approach, it has important shortcomings. First, the distribution of nonzero expenditures exhibits heavy right skewness, suggesting that the assumption of linearity is inappropriate. Visual inspection of the residuals of ordinary least squares regression on programmatic costs confirmed that their distribution is non-normal and their magnitude increases dramatically with the predicted value of costs per worker hour in my data. Under these conditions, two methodological assumptions of OLS – linearity and normality – are not satisfied. Although logging the dependent variable mitigates the right skewness in the distribution, it also biases the coefficient estimates downwards when they are transformed back to the raw (unlogged) scale, a problem known as “retransformation bias.” Unbiased estimates on the original scale cannot be recovered by exponentiation without application of a “smearing estimator”, but this technique requires empirically intractable assumptions. (See Naihua Duan, *Smearing Estimate: A Nonparametric Retransformation Method*, 78 JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION 6 (1983); Willard Manning & John Mullahy, *Estimating Log Models: To Transform, or Not to Transform?*, 20 JOURNAL OF HEALTH ECONOMICS (2001). It also has other undesirable properties, such as the assumption of homoscedastic errors. See David Blough & Scott Ramsey, *Using Generalized Linear Models to Assess Medical Care Costs*, 1 HEALTH SERVICES AND OUTCOMES RESEARCH METHODOLOGY 2 (2000).

⁸¹ Willard Manning & John Mullahy, *Estimating Log Models: To Transform, or Not to Transform?*, 20 JOURNAL OF HEALTH ECONOMICS (2001).

⁸² *Ibid.*

requires the choice of a model family to characterize the (typically heteroskedastic) relationship between the mean and variance. I select the gamma model family for all cost analyses, because the modified Park diagnostic test confirms that the variance of programmatic costs is proportional to the square of its mean.⁸³ The second structural component of the GLM, the link function, describes the mathematical relationship between the linear predictors (model covariates) and the mean of the dependent variable. In accordance with prior literature,⁸⁴ I employ the logarithmic link function to mitigate the right skewness in the distribution of costs.

The model I ultimately use to derive cost estimates incorporates the results of this two-step procedure. If the probit model indicates that nonsubscription significantly affects the likelihood of *any* costs being incurred, I follow Manning and Mullahy (2001) in using the results of both the probit *and* GLM models to compute average predicted costs. In this context, the GLM model restricts the sample to claims (or facility-quarters) with positive costs of the designated cost type, and I generate bootstrapped standard errors to confirm the statistical significance of the predicted estimates.⁸⁵ However, if the first step fails to provide any statistically significant evidence of an extensive margin effect, I disregard the extensive margin and rely exclusively on the GLM model to compute predicted costs. In this scenario, the sample includes all claims (or facility-quarters that include claims) with positive total costs.⁸⁶

⁸³ Ibid.

⁸⁴ See, for example, Amy Finkelstein, *The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare*, 122 THE QUARTERLY JOURNAL OF ECONOMICS 1 (2007); Elham Mahmoudi & Gail Jensen, *Has Medicare Part D Reduced Racial/Ethnic Disparities in Prescription Drug Use and Spending?*, HEALTH SERVICES RESEARCH (2014).

⁸⁵ Wooldridge, J. (2010). *Econometric Analysis of Cross Section and Panel Data* (2nd ed., pp. 438-439). Cambridge, Massachusetts: The MIT Press.

⁸⁶ Not all claims with positive *total* costs include costs for all cost types. Thus, for example, a few claims with zero medical costs (but positive total costs) are included in medical cost models, some with zero wage-replacement costs (but positive total costs) are included in wage-replacement cost models, etc.

The other details of the estimation strategy used to estimate costs are straightforward. In the GLM models of costs per worker hour, the dependent variable is inflation-adjusted costs paid per hour worked, calculated as of twelve months from the date of injury, for all injuries sustained in a given facility and quarter. Coefficients are presented as incidence rate ratios (IRR). The covariate of interest is the nonsubscription dummy. The models also include state, company and quarter dummies. Standard errors are clustered on company-facility. The GLM models of costs per claim are identical in all these respects, except that the unit of analysis is the injury claim instead of the facility-quarter, and the dependent variable is all inflation-adjusted costs paid as of twelve months from the date of injury.

Another aspect of nonsubscription that is ripe for empirical investigation is its effect on return to work. Many study participants cited a decline in lost work time as a major benefit. Unfortunately, I cannot directly accurately measure the length of lost-work spells in my data. I observe only the stream of benefits received, not the date(s) on which employees were actually working. Nor can I observe the date, if any, on which an employee was terminated, let alone the circumstances surrounding any such termination. To use the date(s) during which benefits were received as a proxy for the dates of employment would introduce considerable bias into my estimates. Suppose, for example, that benefits were terminated on a certain day. This could indicate an injured employee returned to work, but it could also indicate that she quit, was terminated (under circumstances that terminated her benefits), or even died. Conversely, the continuation of medical benefits does not imply that an employee remained employed at the company. As noted in Table A, there are circumstances in which employees can continue to receive medical benefits even after his/her separation from the company. Thus despite its

obvious policy importance, I cannot credibly investigate the relationship between nonsubscription and lost work time.

Given the inherent complexity of the trends examined, I consider numerous possible threats to validity. First, the fact that costs declined in the Texas workers' compensation system shortly after the turn of the millennium (approximately 2001 to 2004) complicates my identification strategy, at least for firms that opted out just before or during this period. The concern is that I might erroneously attribute a decline in costs to the adoption of a nonsubscription plan, when the drop merely reflected a pervasive, statewide decline in the cost of workplace injuries.⁸⁷

As a first step, I mitigate this problem by augmenting each model with state- and year-specific cost benchmarks, for wage-replacement, medical, and total costs, respectively, published by WCRI (I use total cost benchmarks for legal cost models, since WCRI does not publish legal cost benchmarks). Derived from a broad and comprehensive sample of workers' compensation claims, these benchmarks are widely regarded as the gold standard for comparing the cost of workers' compensation costs across states. Including benchmarks, however, comes at a price: they are only available for 20 states, so data from the remaining 30 states must be dropped.⁸⁸ Moreover, no benchmarks are available for the *frequency* of claims. My preferred estimates include benchmarks in all models that estimate costs (i.e., costs per worker hour and costs per claim), but exclude them in models of claim frequency. As a robustness check, however, I estimate *all* model specifications with and without benchmarks to ensure that their inclusion (or

⁸⁷ This concern is not as strong as it may appear, since many of the statutory reforms that led to the decline would not directly reduce costs outside the workers' compensation system. For example, the office transferred regulatory authority to a new agency, created a new Office for Injured Employee Counsel, increased reimbursement rates for workers' compensation providers and permitted employers opt in to new health care networks.

⁸⁸ These twenty states – Arkansas, California, Connecticut, Florida, Georgia, Iowa, Illinois, Indiana, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, New Jersey, North Carolina, Pennsylvania, Tennessee, Texas, Virginia, and Wisconsin – include eight of the ten most populous states in the country (the exceptions are New York and Ohio), and generally viewed as highly indicative of national trends.

omission) does not change my core findings. As noted earlier, a detailed description and results of these robustness checks and results obtained are presented on the companion website.⁸⁹

In another attempt to account for potentially confounding trends over time, I probe whether company-specific trends that preceded the date of opt out (and perhaps motivated the choice to exit workers' compensation) could be driving my results. I conduct falsification tests with placebo (fake) dummies that take on, for each company, a value of "1" a fixed number of quarters *before* the true opt-out date, and all subsequent quarters. The companion website contains a detailed description of the procedure employed and the results obtained.

A second methodological complexity arises from the fact that only ten firms provided me with data on claims arising before and after the date of nonsubscription. For these companies, I can simultaneously exploit both cross-sectional variation (across states) and variation over time (before and after the date of opt-out). But for the remaining five cross-sectional companies, I can only exploit cross-sectional variation. *Ceteris paribus*, one might expect models that rely exclusively on panel data to yield more credible estimates, since one can more confidently distinguish the "Texas effect" from the "nonsubscription effect" for all firms in the sample. Yet since I am reluctant to discard data from the five cross-sectional participants, which are also large household-name companies, I opt to present two sets of estimates: one using data from the entire sample, and the other relying exclusively on data from the panel firms.⁹⁰ I regard the latter as my preferred estimates.

As a third robustness check, I estimate the identical set of models on several different samples with slightly different inclusion criteria. The alternative samples include: a) costs paid

⁸⁹ See companion website at: <http://amorantz.stanford.edu/companions/rejecting-the-grand-bargain>.

⁹⁰ Panel companies 6 and 7 did not provide transaction-level cost data, and therefore are not included in any of the cost analysis conducted in stage one or subsequent stages, although they are included in all models of claim frequency.

as of 36 (instead of 12) months from the date of injury, b) *closed* (instead of all) claims, c) *incurred* instead of paid costs, and d) data from 13 or 14 companies, after all observations from one or two randomly-chosen study participants have been dropped for the dataset.

Finally, I explore the possibility that for some unknown reason (such as selection bias or model misspecification), any apparent effect of nonsubscription on cost per worker hour is merely a statistical artifact. Following Donohue and Ho (2007), I employ a procedure called “randomization inference” to assess the likelihood of model misspecification or sampling error.

Conducting all of these robustness checks enables me to assess how much confidence can justifiably be placed in the findings from the first stage. In addition, for the benefit of the interested reader, I re-estimate the stage one models for each study participant individually. (All of these results are available on the companion website.)

The second stage of the analysis considers whether some types of injuries are more responsive to nonsubscription than others. In particular, I test whether claims that are the *most* susceptible to over-claiming and excessive benefit utilization by employees, and/or aggressive claim screening and termination of benefits by employers, explain a disproportionate share of cost savings. If so, this would suggest that at least some of the decline in cost per worker hour is probably attributable to moral hazard.⁹¹ An important threshold question, however, is *which* injuries are the most susceptible. Although there is widespread agreement in the occupational safety literature that some workplace injuries are more amenable to “evidence-based medicine” than others, a consensus has not yet emerged regarding the best differentiating criterion. As a

⁹¹ Moral hazard is not the only conceivable explanation for any observed disparity between traumatic and non-traumatic injuries. In theory, the safety measures (or medical care providers) utilized by nonsubscribers could be uniquely effective in lowering the cost and frequency of non-traumatic injuries. Yet absent a compelling reason to suspect that that is the case – and given the abundance of prior scholarship confirming the prevalence of moral hazard effects under workers’ compensation – a finding that non-traumatic injury claims fell disproportionately would, *ceteris paribus*, point to the existence of moral hazard.

preliminary measure, I estimate all of the stage one models on two pairs of subsamples that past literature strongly suggests differ in their relative vulnerability to moral hazard effects: “strains and sprains” versus all other injuries, and traumatic versus non-traumatic injuries.⁹² I also estimate the same models on four different subsamples that make even finer-grained distinctions between injury types.⁹³ While all of these approaches reveal similar patterns, the traumatic versus non-traumatic distinction is most informative.⁹⁴ Therefore, in the second stage of the study, I explore whether the trends identified in the first stage differ significantly between traumatic and non-traumatic injuries.

Any hyper-responsiveness of non-traumatic injuries to the opt-out choice could be attributed to two different factors. First, as noted earlier, private plans categorically exclude some injuries – most of which are non-traumatic – from the scope of coverage. Secondly, private plans contain discretionary provisions that nonsubscribers may use to deny claims or terminate benefits in case-specific circumstances. My focus here is on the latter causal pathway, which implies that *even non-traumatic claims that are theoretically compensable* may be denied coverage more often than other claims. Thus before estimating the second-stage models, I purge the dataset of any workers’ compensation claims for injuries that were categorically excluded by the firm’s voluntary plan. In effect, this procedure mimics a scenario in which such injuries are not compensable under *either* regime, focusing the comparison on non-traumatic injuries that are theoretically compensable under *both* regimes.

I estimate three different models to carry out these comparisons. First, I examine the average marginal effect of nonsubscription on the *percentage of costs per worker hour that arise*

⁹² Butler, R., Durbin, D., & Helvacian, N., *Increasing claims for soft tissue injuries in workers' compensation: Cost shifting and moral hazard*. J. RISK UNCERTAINTY 13 (1996), 73-87.

⁹³ See Morantz (2015), *Filing Not Found: Which Workplace Injuries Go Unreported?*, unpublished manuscript on file with author. See companion website for a detailed explanation of the injury classification scheme used here.

⁹⁴ See Part 5: Injury Type Analyses on the companion website for the models estimated in the preliminary analysis.

from non-traumatic injuries using a fractional logit model implemented with a GLM, specified with a binomial family and a logit link function, as outlined in Papke and Wooldridge (1996). I hypothesize that in the presence of moral hazard, the percentage of costs arising from non-traumatic injuries will be significantly lower in the nonsubscription environment. Secondly, I use a GLM model, specified with the gamma family and a log link, to test *whether nonsubscription lowers cost per non-traumatic claim more than it lowers cost per traumatic claim*. In these models, the coefficient of interest is the interaction between the non-traumatic nature of the injury and the nonsubscription dummy. A significant negative effect would suggest that the provision and/or utilization of benefits are also prone to moral hazard. Finally, I use a fractional logit model to estimate the average marginal effect of nonsubscription on the *percentage of all claims arising from non-traumatic injuries*. If nonsubscription depresses the comparative frequency of non-traumatic injury claims, this would again be consistent with the presence of moral hazard in the filing and/or screening of claims.

The third stage of the study explores the possibility that nonsubscription affects the underlying prevalence of workplace injuries, as opposed to merely the likelihood that claims are filed. For this portion of the analysis I restrict the sample to injuries that are both severe and traumatic since this is the subset least susceptible to underreporting and other forms of moral hazard. As defined here, this category includes amputations, concussions, fractures, brain damage, and enucleation (loss of an eye). I use a negative binomial model to test whether these injuries fall significantly with nonsubscription. Taken at face value, an affirmative finding would suggest that nonsubscription improves real safety. Yet since the discretionary grounds for exclusion from coverage enumerated in Table A (and the limited protection against retaliatory

discharge under ERISA) apply to all these injuries, a significant decline could also be explained, at least in part, by aggressive claim screening on the part of nonsubscribers.

The final stage tries to tease out the likelihood that four highly publicized features of nonsubscription explain the observed cost savings. The potential value of excluding some diseases and non-traumatic injuries from the scope of coverage is self-evident, and the cost impact of permanent partial disability coverage,⁹⁵ chiropractic care⁹⁶ and unfettered choice over medical providers⁹⁷ has figured prominently in policy debates over workers' compensation. Thus one might expect the elimination of these benefits to yield substantial savings. Yet since nonsubscribers bundle all four of these programmatic elements (and many others) into their private plans, isolating their effects on total cost savings is far from straightforward.

I use a unique exploratory technique in an effort to estimate the cost impact of these four salient plan characteristics. I attempt, in effect, to retroactively "level the playing field" by manipulating the dataset to include only those cost components that are compensable under *both* workers' compensation and private plans. For example, to simulate the effect of eliminating PPD and chiropractic coverage, I remove all PPD and chiropractic payments from each workers' compensation claim. To purge the dataset of the influence of benefits caps, I likewise remove any costs that exceed such cap(s) from each workers' compensation claim. Finally, I remove all costs due to injuries that are categorically excluded from private plans. Once the dataset is

⁹⁵ M. Berkowitz and J. Burton, *Permanent Disability Benefits in Workers' Compensation*, KALAMAZOO, MI: W. E. UPJOHN INSTITUTE FOR EMPLOYMENT RESEARCH (1987); Y. Park & R. Butler, *Permanent partial disability awards and wage loss*, 67 JOURNAL OF RISK AND INSURANCE 331 (2000).

⁹⁶ J. Nyiendo, *Disabling Low Back Oregon Workers' Compensation Claims. Part III: Diagnostic Treatment Procedures and Associated Costs*, 14 JOURNAL OF MANIPULATIVE AND PHYSIOLOGICAL THERAPEUTICS 287 (1991); T. Carey, A. Garrett, A. Jackman, C. McLaughlin, J. Fryer & D. Smucker, *The Outcomes and Costs of Care for Acute Low Back Pain Among Patients Seen by Primary Care Practitioners, Chiropractors, and Orthopedic Surgeons*, 333 J. THE NEW ENGLAND JOURNAL OF MEDICINE 913 (1995).

⁹⁷ E.J. Bernacki & S.P. Tsai, *Managed Care for Workers' Compensation*, 38 JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE. 1091 (1996); A. Cheadle, G. Franklin, K. Cain, J. Joseph, K. Kyes, C. Madden, L. Murphy, R. Plaeger-Brockway & M. Weaver, *Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project II: Medical and Disability Costs*, 37 MEDICAL CARE 982 (1999).

transformed in this way, I re-estimate the programmatic cost models presented in Stage One of the analysis to see whether much, if any, of the cost disparity remains. If the coefficient on the “nonsubscription” dummy in the counterfactual models remains large and significant, I construe this as evidence that the purged characteristic likely explains little of the observed variation in outcomes. If conversely, the estimated effect of nonsubscription shrinks or vanishes entirely, I infer that the characteristic in question plays an important causal role.

I refer to these re-estimated models “counterfactual models” since they are intended to approximate the effect of purging workers’ compensation of specific programmatic attributes so the scope of benefits more closely resembles that available under a company’s private plan.

Importantly, this procedure cannot account for two indirect yet important effects of nonsubscription. First, the counterfactual models do not capture more dynamic, long-term changes in utilization. For example, employees of nonsubscribers who can no longer access certain benefits provided under workers’ compensation – such as chiropractic care – may, over time, increase their utilization of covered benefits, such as physical therapy. Yet if anything, my inability to account for these dynamic substitution effects will likely *overstate* the impact of each programmatic attribute on costs per worker hour, and in turn *understate* the residual (unexplained) impact of the private plan, captured by the nonsubscription dummy.

Secondly and more subtly, the counterfactual models do not account for the possibility that the *mix* of injury claims, such as the respective proportions of traumatic and non-traumatic injury claims, changes with the opt-out choice. If the composition of injury claims changes with nonsubscription – and if, moreover, the four programmatic features examined affect certain injury types more than others – this could also bias my estimates. But the direction of any such bias will depend on both the changes in injury mix and the composition of costs for each injury

type. If the frequency of non-traumatic injuries *declines* with nonsubscription – and if, moreover, the four programmatic features examined comprise a disproportionately large share of costs for these injuries – then simply treating the frequency of such claims as fixed will overestimate the likely cost savings associated with the elimination of these plan features. For example, if chiropractic care is especially costly among low back injuries, and the proportion of low back injury claims falls with nonsubscription, then the counterfactual model will overstate the effect of eliminating chiropractic coverage on costs per worker hour. Again, if anything, the counterfactual models will tend to understate the magnitude of the unexplained (residual) effect of nonsubscription.

Private plans contain other unique features that could give rise to significant cost savings. For example, as noted earlier, every single study participant retained control over the pool of medical providers. Although scholarly literature on the subject is inconclusive, many study participants described control over provider choice as an integral component of their cost containment strategy.

Another universal feature of private plans is their inclusion of 24-hour or end-of-shift reporting windows (as opposed to the much longer windows provided in workers' compensation laws⁹⁸). The length of reporting windows could affect the frequency, composition and cost of claims in numerous ways. The (negative) relationship between the rapidity of injury reporting and total cost per claim noted in several industry studies – a correlation that I also observe, at least for some injury types, in my dataset⁹⁹ – is well known among the study participants and

⁹⁸ In thirty-seven states, the statutory reporting window ranges from 7 to 730 days. Ten of the remaining thirteen states (Arizona, Arkansas, Connecticut, Hawaii, Kentucky, Massachusetts, Nebraska, Vermont, Washington and West Virginia) specify that injuries should be reported “immediately”; two (South Dakota and Wyoming) indicate that they should be reported within three days; and one (Colorado) specifies a four-day reporting window.

⁹⁹ See the companion website for further details on my attempts to replicate these industry studies and the results obtained.

other industry stakeholders.¹⁰⁰ Medical literature supports the idea that delayed provision of medical treatment can increase medical costs and delay employees' return to work.¹⁰¹ Many study participants opined that short reporting windows also deter illegitimate claims and bring hazards to light more quickly. Yet short reporting windows may also increase nonsubscribers' ability to deny compensation to legitimate yet late-reported claims.¹⁰² At least 6.5% of the nonsubscription claims in my dataset were reported more than 24 hours after the triggering injury, indicating that claim administrators *do* process some late-reported claims. Yet this figure varies widely between study participants, ranging from zero to 15 percent.¹⁰³ It is possible that some *bona fide* yet untimely filed claims were denied because the claim administrator determined that the good cause exception did not apply. Whatever the net welfare effects of short reporting windows on injured workers, there are myriad reasons to hypothesize that they affect claim frequency and cost per claim.

¹⁰⁰ Glen-Roberts Pitruzzello, "The High Cost of Delays: Findings on a Lag-Time Study," The Hartford Financial Services Group, Summer Issues Report 2000 and Thomas Sheppard, "The Relationship Between Accident Report Lag and Claim Cost in Workers Compensation Insurance," National Council on Compensation Insurance, Workers Compensation 2015 Issues Report. Some insurance companies in other states instruct their clients to encourage shorter reporting times, with 24 hours as a goal. See "Lag Time" from Workers' Compensation Trust in Connecticut, <https://www.wctrust.com/Members/Claims-Administration/Lag-Time/>. However, no other state enforces a 24-hour reporting window.

¹⁰¹ See, e.g., Terry L. Blackwell, Stephen J. Leierer, Stephanie Haupt & Angeliki Kampitsis, "Predictors of Vocational Rehabilitation Return-to-Work Outcomes in Workers' Compensation," *Rehabilitation Counseling Bulletin* 46:2, pp. 108-114 (2003); Stephen J. Hunter et al., "Predicting Return to work: A Long-Term Follow-Up Study of Railroad Workers After Low Back Injuries," *Spine* 23(21), November 1, 1998, pp. 2319-28; Kucera et al. (2009); Patricia Sinnott, "Administrative Delays and Chronic Disability in Patients with Acute Occupational Low Back Injury," *Journal of Occupational Environmental Medicine*, June 2009; 51(6):690-9; Gerald F. Kominski, "Return to Work and Degree of Recovery Among Injured Workers in California's Workers' Compensation System," *Journal of Occupational and Environmental Medicine* 2008; 50: 296-305.

¹⁰² As discussed earlier, this concern is mitigated by the fact that thirteen study participants' private plans specify that the failure to report an injury within 24 hours is only disqualifying if the Claim Administrator determines that the claimant did *not* have good cause for the failure to give timely notice. However, I cannot observe how strictly the good cause provision (if any) is construed in individual cases.

¹⁰³ The 6.5% figure was the (average) lower bound among the ten companies for which a reporting date was provided. Interestingly, one of the companies that did approve some late-reported claims had no good-cause provision in its private plan, suggesting that the policy have been applied informally. See companion website for further details.

Yet because I cannot purge the datasets of the influence of either short reporting windows or limits on provider choice, counterfactual models cannot be constructed. Since reporting window length and the extent of provider choice vary considerably across states, I tried an alternative approach. I assembled a dataset indicating, for each state and year, whether the workers' compensation system limited an employee's choice of medical provider, and the length of the statutory reporting window. I then added these as covariates to my regression models in an effort to control for their influence, and ascertain what remaining impact, if any, nonsubscription exerted on total cost per worker hour.

VI. Results

Table C displays mean values for the basic outcomes examined.¹⁰⁴ Average costs per worker hour and costs per claim are all substantially lower in the nonsubscription environment, although the exact size of the discrepancies depends on the group of companies analyzed. Claim frequency is consistently lower under nonsubscription in the all-company sample, but is only lower for claims with wage-replacement and legal costs in the panel-company sample. This quick glimpse at the raw data suggests that there are indeed important differences between the workers' compensation and nonsubscription regimes.¹⁰⁵

¹⁰⁴ To calculate the figures in the top row, I calculated, for each facility-quarter with nonzero hours, the mean inflation-adjusted costs per worker-hour for all claims with positive total costs paid as of twelve months from the date of injury. To calculate the figures in the middle row, I calculated the mean inflation-adjusted costs per claim for all claims with positive costs in the first 12 months after the date of injury. Finally, the bottom row presents the average frequency of claims with positive costs (of each designated type) within the first 12 months per quarter. Only facility-quarters with nonzero hours worked are included in the sample. An alternative method of computing descriptive statistics, in which I average first across state-specific means and then across company-specific means (rather than across all individual observations) is presented in Part 2: Specification Robustness Checks on the companion website.

¹⁰⁵ The National Academy of Social Insurance (NASI) reports annually, for each U.S. state and year, average medical benefits as a proportion of total (medical plus cash) benefits among companies of all sizes. To explore whether the composition of costs in our sample resembles that in NASI's database, I calculated average medical costs as a proportion of total benefits for each year and workers' compensation regime in my dataset, and then compared these figures to those listed in NASI's annual reports. For workers' compensation claims originating in

Table 1 more formally probes the effect of nonsubscription on cost per worker-hour. The upper panel displays the coefficient estimates for the panel-company sample, upon which I focus the discussion that follows. (The lower panel displays results from the all-company sample, which I include as a robustness check) Since nonsubscription significantly affects the extensive margin in all panel-company models, the predicted statistics in the top panel are constructed using the results from both the first-stage probit and the second-stage GLM.

The results displayed in Table 1 are robust and dramatic. Total predicted cost per worker-hour plummets 44 percent, from about 14 cents per worker-hour under workers' compensation to about 8 cents per worker-hour under nonsubscription. This trend is partly driven by a highly significant and dramatic decline in predicted wage-replacement costs, which fall by about 74 percent, saving employers about 2 cents per worker hour. The percentage decline in medical costs is only 28 percent, but since medical care comprises a larger share of total costs, the predicted net savings in medical costs is also about 2 cents per worker hour. Although legal costs decline by a remarkable 84 percent, their effect on the participants' bottom line is relatively trivial in both regimes.¹⁰⁶

Texas, the range of annual values in my dataset (54.7-75.5%) is markedly higher than that reported by NASI (39.4-62.1%). The range of annual values for all states in my dataset *besides* Texas, (58.7-74.2%), is also significantly higher than NASI's reported range for the same states (42.3-49.3%). Even if I confine the comparison to the 20 states for which WCRI cost benchmarks are available, the sample upon which the empirical analysis primarily relies, the range of annual proportions in my data (58.9-77%) is noticeably higher than that reported by NASI (46.8-52.6%). To probe these disparities, I spoke with Ishita Sengupta, the lead author on NASI's 2012 report. She speculated that the discrepancy could be explained by the fact that our sample, unlike NASI's, consists exclusively of large companies. Alternatively, the disparity could be driven by differences in the proportion of blue-collar claimants in the two samples. (Given the nature of the companies examined, my sample contains relatively few blue-collar workers.). To the best of my knowledge, however, there are no scholarly articles or industry studies examining the relationship between medical cost shares and (respectively) employer size and occupation. Thus as of this writing, I cannot fully account for the fact that the share of medical costs in total costs is generally higher among the study participants than among the firms in NASI's database.

¹⁰⁶ Interestingly, the omission of WCRI benchmarks only slightly alters these coefficient estimates. The strong similarity between the two sets of estimates provides some reassurance that workers' compensation reforms undertaken in Texas shortly after the turn of the millennium have not seriously compromised the validity of my identification strategy.

Table 2 explores whether these trends are partly driven by a fall in cost per claim. As discussed earlier, the methodology used to predict costs per claim closely tracks that used to model total cost per worker hour. The results are equally striking: nonsubscription nearly halves total cost per claim, saving employers about \$1900 per claim. Although wage replacement costs fall more than medical costs in percentage terms (76% versus 35%), the predicted decline in medical costs is somewhat larger in absolute terms (\$836 versus \$706). The percentage drop in legal costs is the largest of all (95%), but only saves employers \$166 per claim.

Table 3 uses negative binomial models to investigate changes in claim frequency per facility-quarter. Although claim frequency does not decline overall in the panel sample, more serious claims involving wage replacement costs fall by 33%. Claims with legal costs also fall by about 52 percent, yet are infrequent in both regimes. Claims with medical costs *increase* in the panel sample by 5 percent, consistent with an increase in both risk-bearing and claims-reporting moral hazard. The simultaneous *increase* in claims with medical costs and *decrease* in more serious claims involving loss of work is intriguing. Perhaps some employees, in response to 24-hour or end-of-shift reporting windows, are erring on the side of caution in reporting even minor injuries. This pattern is also consistent with a story in which some injuries that would accrue wage-replacement costs under workers' compensation are incurring only medical costs under private plans.

Overall, the first stage of the inquiry confirms the expectation that nonsubscription dramatically reduces the cost to employers of workplace injuries. The companion website summarizes the various robustness checks and falsification tests described in Section Five. The results are generally reassuring, suggesting that the stage one findings are very unlikely to be statistical artifacts.

In the second stage, I test whether non-traumatic injuries – which are presumed to be the most vulnerable to moral hazard – respond disproportionately to the opt-out choice. If so, this could mean that nonsubscribers are using the discretionary exclusions displayed in Table A to aggressively screen out claims and terminate benefits, or perhaps are especially adept at expediting claim resolution and return to work for non-traumatic injuries. (As noted earlier, non-traumatic injuries that are *categorically* excluded from each participant’s voluntary plan are dropped from the sample before the analysis is begun.) Any hyper-sensitivity of non-traumatic injuries to the opt-out choice could also reflect, at least in part, employees’ lessened capacity to file illegitimate claims or over-utilize benefits in the nonsubscription environment.

As is shown in Table 4, nonsubscription significantly depresses (by about 10%) the percentage of total costs per worker hour arising from non-traumatic injuries. The interaction term in Table 5 likewise indicates that *ceteris paribus*, nonsubscription depresses total costs per claim for non-traumatic injuries a great deal (about 35%) more than it does for traumatic ones. Finally, Table 6 indicates that nonsubscription significantly lowers (by more than 7%) the proportion of all claims arising from non-traumatic injuries. Adding categorically-excluded injuries back into the dataset and re-running the analysis has little effect on the coefficient estimates, suggesting that the categorical exclusion of certain non-traumatic injuries and diseases from coverage is not a major cost driver.¹⁰⁷

Viewed as a whole, then, the second-stage findings are strongly suggestive of moral hazard effects. However, I cannot ascertain which *types* of moral hazard are most prevalent.

The third stage probes the possibility that nonsubscription induces an improvement in workplace safety. As is revealed in Table 7, nonsubscription does significantly lower the frequency of severe, traumatic accident claims. The magnitude of the predicted decline, about

¹⁰⁷ Results of these models are presented on the companion website.

47% for total claims and 59% for claims with positive wage-replacement costs, is quite substantial. Taken at face value, this result provides strong evidence for a real safety effect, which is precisely what economic theory would lead one to expect. Nonsubscribers are, at least in theory, internalizing all of the costs associated with workplace accidents (including tort liability), which should induce them to invest more in safety-enhancing technologies. Yet in practice, private plans contain numerous discretionary grounds for excluding claims from coverage and/or terminating benefits. Employees of nonsubscribers also enjoy more limited protections from retaliatory discharge. Thus the significant fall in severe and traumatic injury claims could also be explained by aggressive claim screening and/or termination of employees who report their injuries.

In the fourth stage of the analysis, I consider whether four salient attributes that distinguish private plans from workers' compensation – non-coverage of permanent partial disabilities, capped benefits, lack of chiropractic care, and categorical exclusion of some diseases and some non-traumatic injuries – could explain the observed trends. As explained more fully in Section 5, I drop all of the costs associated with such provisions from each workers' compensation claim before estimating my counterfactual models of cost per worker hour. Alongside the estimated coefficients, Table 8 displays the coefficients from the original total cost per worker hour models (from Table 1). The results suggest that even in combination, these four plan features account for relatively little of the cost savings. Even when all four factors are accounted for, nonsubscription is still predicted to lower total cost per worker hour by more than 35 percent in the counterfactual model.

Finally, I sought to explore the importance of two other programmatic features that differentiate private plans from worker's compensation: limited provider choice and 24-hour

reporting windows. Given the impossibility of constructing counterfactual models that are free from the influence of these plan features, I tried instead to include them as covariates in my regression models. I first assembled a dataset with dummy variables indicating, for each state and year, whether a state limited an employee's choice of medical provider. Secondly, I compiled a second dataset with continuous variables reflecting the length of each state's statutory reporting window. I then included both variables in my regression models (separately and in combination) in an effort to determine what remaining influence, if any, nonsubscription would have on total cost per worker hour.

Unfortunately, however, this strategy proved unworkable in practice. The root of the problem is that state- and year-specific measures of provider choice and reporting windows vary across states, but do not vary over time. Their effect is subsumed by the state dummies. Although by excluding one or two state dummies I was able to obtain coefficient estimates for both variables, their magnitude, significance, and even sign fluctuated depending on which dummies were excluded. I considered several other ways to overcome this identification problem, but none was ultimately successful.¹⁰⁸ In short, although large nonsubscribers often characterize limits on provider choice and/or short reporting windows as key drivers of cost savings, my data do not permit me to empirically test this claim.

Viewed against the backdrop of prior workers' compensation literature, the results of the fourth stage are surprising. The counterfactual models provide scant support for the view that nonsubscribers' uniform elimination of PPD and chiropractic coverage, their categorical

¹⁰⁸ First, I tried iteratively dropping one or more state dummies from the model in an effort to reduce the collinearity in the dataset enough to obtain estimates and then examine the stability of their sign and magnitude. Secondly, I tried to capture the most important components of overall variation using Principal Components Analysis. Third, I used Least Absolute Shrinkage and Selection Operator (LASSO) regression. Finally, I simply omitted all state dummies from the model and tried to specify (any) conditions under which the resulting coefficient on the nonsubscription dummy would be unbiased. See companion website for a more detailed summary of the various methodologies attempted and the results obtained.

exclusion of many non-traumatic injuries and illnesses, and their frequent imposition of monetary caps on total benefits are the primary drivers of programmatic cost savings. Whether nonsubscribers' universal imposition of 24-hour reporting windows or their control over the pool of medical providers play important causal roles remains an open question.

VII. Discussion

Although participation in the workers' compensation system is compulsory for virtually all private-sector employers, Texas's unique law – the only truly elective statute in the U.S. – offers a valuable opportunity to explore the path not taken. About one-third of Texas firms have opted out of the workers' compensation system, a phenomenon known as nonsubscription. Given their deep pockets, one might expect large firms to be particularly averse to lawsuits by injured employees. Yet the prevalence of nonsubscription has, to the contrary, grown rapidly among the nation's largest employers. As of this writing, recent developments – including the recent passage of an opt-out law in Oklahoma and the introduction of similar bills in Tennessee and South Carolina – suggest that the opt-out movement is gathering momentum.^{109,110}

Why are large employers choosing to forgo the benefits of tort immunity, and what are the practical consequences for those firms that become nonsubscribers? Such questions have received virtually no prior scholarly attention.

As a first step toward filling this gap, I examine detailed occupational-injury claims data from fifteen large, multistate nonsubscribers. The study participants comprise almost a quarter of the entire population of large companies that were Texas nonsubscribers, and operated homogenous facilities across a number of U.S. states, between 1998 and 2010. All offered their

¹⁰⁹ S.K. Jones, *Oklahoma Governor Signs Workers' Compensation Overhaul*, INSURANCE JOURNAL, May 8, 2013.

¹¹⁰ R. Ellis, *Oklahoma Supreme Court Upholds New Workers' Compensation Law*, NEWSOK, March 4, 2014.

employees private plans whose benefits roughly resembled (yet also differed from) those available through workers' compensation. My analysis sheds new light on four different aspects of the opt-out phenomenon.

First, I find that total programmatic costs per worker-hour are about 44% lower in the nonsubscription environment. Although the fall in wage-replacement costs is larger in percentage terms, the decline in medical costs is equally consequential because of the outsized impact of medical expenses on total costs. These cost savings are driven by a marked (33%) decline in wage-replacement claims and a 49% drop in cost per claim.

Secondly, I find that non-traumatic injury claims respond more to the opt-out choice than traumatic injury claims, a disparity that persists even when one accounts for the fact that most private plans exclude some non-traumatic injuries and occupational diseases from the scope of coverage. This finding is consistent with more aggressive claim screening and termination of benefits. On the other hand, it is also consistent with more expeditious claim resolution and return to work for non-traumatic claims, and with a reduction in employee over-claiming and over-utilization in the opt-out environment.

The third stage of the study explores whether the data are consistent with a decline in real injury rates. Confining attention to the subset of severe, traumatic injuries that are least prone to moral hazard and reporting bias, I find a sizable and statistically significant decline in claim frequency. This result is consistent with an improvement in real safety levels. However, since private plans include discretionary, case-by-case bases for denying a claim, and provide relatively weak protections from retaliatory discharge, the disparity could also be explained by more aggressive screening of actual (or potential) claims.

The final stage tries to isolate the effect of four ubiquitous plan features – caps on total benefits, non-coverage of permanent partial disabilities, lack of coverage for chiropractic care, and categorical exclusion of some non-traumatic injuries and many diseases – on firms’ bottom line. Surprisingly, these factors seem to explain little of the observed cost savings. I am unable to test the effect of two other salient programmatic features, limited provider choice and 24-hour reporting windows, that many participants identified as major cost drivers.

My findings point toward several promising areas of future research. First, it is critical to identify which specific characteristics of private plans are producing the lion’s share of cost savings. The 24-hour and end-of-shift reporting windows, which have received no attention at all in prior scholarship, merit especially careful scrutiny. If they do indeed play an important causal role, the question is why. Are they primarily screening out fraudulent claims, expediting the provision of medical care, or making it harder for injured employees to file timely claims? If the first two effects predominate, state lawmakers could consider shortening injury-reporting windows or more strictly enforcing those that already exist under workers’ compensation laws. Yet if the third effect predominates, then short reporting windows may leave many injured workers with no adequate remedy. Cumulative injuries are especially prone to such concerns, since an employee may not even know she was injured on the job until days after the triggering incident(s).¹¹¹

Secondly, it is important to determine whether the costs of treating and compensating many workplace injuries and illnesses – especially those that are categorically excluded from the scope of many private plans – are being shifted onto other compensation systems. For example,

¹¹¹ For example, the ProPublica article reports that a nursing assistant named Rebecca Amador felt a small pinch in her back after supporting a patient’s weight only to find herself hardly able to breathe from the pain the next morning, after the 24 hour reporting window had passed. She was denied coverage. Grabell, Michael, and Howard Berkes. "Inside Corporate America’s Campaign to Ditch Workers’ Comp." *ProPublica*. 14 Oct. 2015. Accessed from <https://www.propublica.org/article/inside-corporate-americas-plan-to-ditch-workers-comp>.

one legal commentator has described several scenarios in which costs could be shifted onto Medicare and Medicaid.¹¹² If nonsubscription causes costly claims to migrate to group health care plans or taxpayer-funded benefit programs, then the *net* effect of nonsubscription on economic productivity and worker welfare is ambiguous. Studies on the prevalence of claim migration and cost shifting are needed to shed light on this important question.

Third, to round out the picture of the opt-out sector, it is vital to understand the behavior of small- and medium-sized nonsubscribers. Smaller firms with fewer workers and shallower pockets may utilize their right to opt out of workers' compensation in very different ways than the large, multistate employers who contributed data to this study. Indeed, many decline to provide their workers with any form of occupational injury insurance at all.

Finally, more research is needed to understand nonsubscription's impact on worker welfare. Some ubiquitous features of private plans – such as first-day coverage of lost earnings and wage replacement rates that are not capped by the state's average weekly wage – are more favorable to injured workers than workers' compensation. The decline in severe, traumatic injury claims also leaves open the possibility that nonsubscription can spur an improvement in real workplace safety. On the other hand, some employees clearly fare worse under nonsubscription. For example, those who suffer from permanent partial disabilities, most occupational diseases, and non-traumatic injuries that are excluded from coverage are unambiguously worse off. Even workers whose injuries are theoretically compensable may find their claims denied, or their benefits cut off prematurely, under one of many discretionary plan exclusions. Finally, given the comparative weakness of ERISA's anti-retaliation protections, one

¹¹² Jordan, Jennifer C. "Opt Outs to Workers' Compensation: The Real Disconnect in What Is Being Said and What is Being Implemented," LexisNexis, January 22, 2016. Accessed on March 2, 2016, from <http://www.lexisnexis.com/legalnewsroom/workers-compensation/b/recent-cases-news-trends-developments/archive/2016/01/22/opt-outs-to-workers-compensation-the-real-disconnect-in-what-is-being-said-and-what-is-being-implemented.aspx>.

cannot rule out the possibility that some nonsubscribers preemptively terminate workers whose injuries seem likely to result in significant loss of work. For these reasons, probing whether the opt-out choice is (or least has the potential to become) a Pareto improvement whose benefits accrue to *both* employers and employees, or is merely a redistribution of economic surplus from employees (and taxpayers) to employers, is a vitally important topic for future inquiry.

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Table A: Description of Nonsubscription Plans

	TEXAS WC	NONSUB
PLAN TYPE		
Statutory	Yes	None
ERISA	No	All
REPORTING DEADLINE		
30 days	Yes	None
24 hours	No	8/15 Firms
End of shift	No	7/15 Firms ^a
CAP ON TOTAL BENEFITS		
	No	14/15 Firms (Max=\$500K/Min=\$150K/Median=\$225K)
MEDICAL BENEFITS		
100% reimbursement rate	Yes	All
Maximum dollar amount	No	1/15 Firms (\$300K)
Coverage for chiropractic care	Yes	None
Maximum number of weeks	No	13/15 Firms (Max=120/Min=104/Median=120)
MEDICAL PROVIDER		
Employee has choice of medical provider	Yes ^b	None
DISPUTE RESOLUTION PROCESS		
Mandatory arbitration of tort claims	No	14/15 Firms
Final compromise & settlement provision	No	12/15 Firms
Other	Yes ^c	1/15 Firms ^d
DISABILITY BENEFITS		
Waiting period (number of days)	7 ^e	None
Maximum number of weeks	401 ^f	15/15 Firms (Max=520/Min=52/Median=120)
Maximum weekly dollar amount	773 ^g	4/15 Firms (Max=\$1000/Min=\$600/Median=\$800)
% of average weekly wage (AWW)	70-75% ^h	Max=100%/Min=70%/Median=85%
Permanent partial disability benefits	70% ⁱ	None
DISMEMBERMENT BENEFITS		
	70-75% ^j	14/15 Firms (Max=\$500K/Min=\$100K/Median=\$150K)
DEATH BENEFITS		
Cap on death benefits	75% ^k	14/15 Firms (Max=\$500K/Min=\$100K/Median=\$150K)
Multiple of annual pay, if applicable	No	4/15 Firms (Max=10x/Min=6x/Median=8.25x)

^a Although several companies' plans include an end-of-shift reporting deadline, several company officials suggested that in practice, they do not enforce them strictly, but instead enforce a 24-hour reporting window.

^b Unless the employer is a member of a Workers' Compensation medical network (Texas Labor Code §408.031).

^c The employee must submit to a benefits review conference, followed by arbitration. The employee can opt for a contested case hearing in lieu of arbitration. If desired, appeals and requests for judicial review can be filed with the Appeals Panel and the State County Court, respectively (Texas Labor Code §410).

^d Dispute resolution procedures are not enumerated in one plan.

^e First week of benefits are paid retroactively if the disability lasts longer than 14 days. The retroactive period was shortened from 28 days to 14 days effective September 1, 2005 (Texas Labor Code §408.082, Texas Insurance Code chapter 1305).

^f Under Texas workers' compensation, employees that earn less than \$8.50/hour receive wage replacement benefits at a rate of 75% of lost wages for the first 26 weeks of disability and 70% of lost wages thereafter (untaxed). All other employees receive wage replacement at 70% of lost wages (Texas Labor Code §408.103). Although in theory the wage replacement rate is 70-75%, the proportion may be much lower for higher-income workers, because the weekly benefit level is capped at the State Average Weekly Wage (SAWW) (Texas Labor Code §408.061). However, workers' compensation benefits are untaxed, whereas nonsubscription benefits are taxed.

^g Claimants are eligible to receive up to 104 weeks of wage replacement benefits for a temporary disability. At 104 weeks, maximum medical improvement (MMI) is established, and the claimant will receive 3 weeks of permanent income benefits for each percentage of impairment, up to a maximum of 401 weeks (Texas Labor Code §408.121-129).

^h The max weekly income benefit is set annually at 100% of the State Average Weekly Wage (Texas Labor Code §408.061). In 2006, the method for calculating the SAWW was revised, resulting in an increase in the max weekly benefit, so that fewer workers are constrained by the statutory cap. See Eccleston, Stacey M., Evelina Radeva, Carol A. Telles, Rui Yang, and Ramona P. Tanabe. 2009. Monitoring the impact of reforms in Texas: CompScope benchmarks. 9th edition. Cambridge, MA: Workers Compensation Research Institute.

ⁱ 70% AWW, up to \$541 for 297 weeks.

^j 70-75% of AWW. For a single dismemberment, the claimant can receive permanent partial disability benefits (70% AWW for up to 297 weeks, subject to maximum of 70% of the SAWW) (Texas Labor Code §408.121-129). For multiple dismemberments, the claimant can receive permanent total disability benefits (75% of AWW for life, with an increase of 3% per year, subject to a maximum of 100% of the SAWW) (Texas Labor Code §408.161-162).

^k 75% of pre-injury pay.

Table A: (continued) Description of Nonsubscription Plans

PROVISION	TEXAS WC	NONSUB
		<i># Companies with Provision (out of 15)</i>
PROTECTION FROM RETALIATORY DISCHARGE	Statutory	ERISA section 510 ^a
CATEGORICAL EXCLUSIONS FROM COVERAGE:^b	None	
• Hernias, unless such hernia is inguinal and did not exist in any degree prior to the injury	-	10
• Diseases or harm resulting from airborne contaminants not commonly found in company's working environment, such as pollen, fungi, or mold	-	14
• Any damage or harm arising out of the use of or caused by asbestos, or asbestos fibers or products	-	12
• Any cumulative trauma, unless employee has worked >180 days of continuous, active employment	-	12
• Degeneration that could be result of poor posture/long-term use of a keyboard or cell phone, such as carpal tunnel syndrome	-	11
• Diagnostic labels that imply generalized musculoskeletal aches & pains such as fibrositis, fibromyalgia, myositis, chronic fatigue syndrome, etc.	-	11
DISCRETIONARY GROUNDS FOR EXCLUSION FROM COVERAGE:^c	None	
• Injury was not reported within 24 hours and Claim Administrator does not determine good cause exists for failure to give timely notice	-	8
• Injury was not reported within 24 hours (whether or not there was good cause for late reporting)	-	1
• Injury was not reported by end of shift and Claim Administrator does not determine good cause exists for failure to give timely notice	-	5
• Injury was not reported by end of shift (whether or not there was good cause for late reporting)	-	1
• Injury was caused by an "accident" that did <i>not</i> "occur by chance" and/or "from unknown causes"	-	11
• Failure to comply with safety policies or request assistance was a proximate cause of injury	-	2
• Injury arose out of an act of a third person because of "personal reasons" and not directed at the participant as an employee of, or because of his or her employment by, the employer	-	13
• "Scuffling," horseplay, or similar inappropriate behavior was a proximate cause of injury	-	14
DISCRETIONARY GROUNDS FOR SUSPENSION/TERMINATION OF BENEFITS:^d	None	
• Failure to accept final compromise & settlement provision	-	12
• Termination for gross misconduct	-	15
• Termination for reason other than lay-off (lose wage-replacement benefits only)	-	12
• Termination for any reason besides gross misconduct (lose wage-replacement benefits only)	-	1
• Refusal to submit to drug or alcohol test	-	13
• Failure to get prior approval for all medical, non-emergency care	-	10
• Use of non-approved physician or facility for non-emergency care	-	13
• Refusal to submit to an exam if the Claim Administrator requests a second opinion	-	11
• Persistent nonresponsiveness to treatment, including nonresponsiveness due to the need for behavioral modification recommended by the treating physician	-	14
• Failure to provide accurate information to, or follow directions of, treating physician	-	14
• Failure/refusal to let employer representative accompany claimant to doctor's appointment	-	14
• Missing or arriving late to a scheduled appointment (first missed appointment results in warning)	-	14
• Engaging in injurious practice(s) that hinders recovery from injury	-	14
• Failure to periodically report to team leader and/or supervisor as directed	-	14
• Failure to immediately notify team leader and/or supervisor if cleared for work	-	14
• Receipt of any benefits under any workers' compensation law	-	13
• Untruthfulness regarding any required information in employment or injury reporting process	-	14
• Untruthfulness to or failure to cooperate with the Claims Administrator	-	14
• Failure or refusal to comply with any plan provision(s) or rule(s) or demonstration of bad faith in connection with the administration of the plan	-	14

^a See pages 11-12 for a discussion of ERISA.

^b Categorical exclusions from coverage are specific injury categories which nonsubscription plans explicitly identify as being excluded from the scope of coverage.

^c Discretionary grounds for exclusion from coverage refers to case-specific circumstances which can result in an injury not being covered, if strictly enforced by the company.

^d Discretionary grounds for suspension or termination of benefits are provisions which, if strictly enforced by firms, can trigger the termination of benefits. If not otherwise specified then both medical and wage-replacement benefits can be terminated.

Table B: Major Characteristics of Study Participants

COMPANY NO.	1	2	3	4	5	6	7	8
Sector	Retail	Retail	Retail	Retail	Retail	Retail	Retail	Retail
# US states	>40	>40	>40	>40	>40	>20	>20	>20
# facilities nationwide ^a	>500	>1000	>1000	>1000	>1000	>100	>100	>1000
# facilities in Texas	>50	>100	>100	>100	>100	>50	>50	>100
Annual WC claims nationwide	>1000	>1000	>15000	>1000	>1000	>1000	>500	>1000
Annual claims in Texas (WC & NS)	>100	>100	>1000	>100	>50	>500	>100	>500
Group Health Insurance/Life Insurance for Employees	FT/FT	All/All	All/All	FT/FT	FT/FT	All/None	FT/None	All/Don't Know
Short Term/Long Term Disability Coverage for Employees	FT/FT	All/FT	All/All	FT/FT	FT/FT	All/None	FT/FT	FT/FT
Wellness Program/In-House First-Aid Clinics	no/no	no ^b /no	yes/yes	yes/yes	no/yes	no/no	no/yes	yes/yes
Any Union Facilities	no	no	no	no	no	no	no	yes
Years of "pre-" data/Years of "post-" data	0/10.40[3.33] ^c	7.16/2.33	5.09/5.25	4.66[2.33] ^c /2.25	0/8.80[4.75] ^c	5.49/5.83	5.92/4.24	0/6.67
BLS-reportable injury rate (relative quartile) ^d	2nd quartile	above mean	4th quartile	4th quartile	below mean	2nd quartile	above mean	3rd quartile

COMPANY NO.	9	10 ^e	11	12	13	14	15
Sector	Retail	Mfg.	Mfg.	Mfg.	Services	Services	Services
# US states	>10	>40	>20	>10	>20	>20	>5
# facilities nationwide ^a	>1000	>100	>15	>50	>100	>100	>15
# facilities in Texas	>100	>10	>10	>3	>10	>10	>5
Annual WC claims nationwide	>100	>1000	>100	>1000	>1000	>1000	>50
Annual claims in Texas (WC & NS)	>100	>100	>100	>100	>100	>100	>20
Group Health Insurance/Life Insurance for Employees	All/All	FT/All	All/All	All/All	All/All	All/All	All/All
Short Term/Long Term Disability Coverage for Employees	All/All	All/All	All/All	All/All	All/All	All/All	All/All
Wellness Program/In-House First-Aid Clinics	no/no	yes/yes	yes/no	no/yes	no/yes	no/yes	no/no
Any Union Facilities	no	yes	yes	no	yes	no	no
Years of "pre-" data/Years of "post-" data	0/5.82	10.81/7.83	9.00[5.50] ^c /3.50	4.91[2.00] ^c /4.65	5.50[3.50] ^c /3.00	1.22/4.75	0/4.31
BLS-reportable injury rate (relative quartile) ^d	below mean	2nd quartile	2nd quartile	2nd quartile	2nd quartile	2nd quartile	1st quartile

^a Facilities counts include storage warehouses and distribution centers, but exclude corporate headquarters and branch offices. For Company 14, a facility represents an account that the company services. For Company 15, a facility represents a regional "terminal" to which many employees are assigned.

^b Company 2 began to implement several elements of a wellness program in 2007, but did not implement a single comprehensive program until after the study period. Less than 20% of claims from company 2 included in the study post-date the implementation of these elements

^c Number of years for cost analysis [frequency analysis].

^d Quartiles are relative to sub-industry. Companies in the 1st quartile have the lowest injury rates in their industries, companies in the 4th quartile have the highest injury rates in their industries. For industries with very low injury rates, quartiles are unavailable and the table reflects whether the injury rate was above or below the industry mean. Owing to the limits of the available data, it is only possible to compare the companies' OSHA-reportable claim rates to the relevant sub-industry quartiles during the post-nonsubscription period. Accordingly, in order to capture the relative safety level of the companies in the workers' compensation regime (as opposed to the nonsubscription regime), I restricted the calculation of this statistic to states other than Texas when possible. Quartile boundaries for sub-industries were obtained from the Bureau of Labor Statistics website (<http://www.bls.gov/iif/oshsum.htm>). The BLS data is stratified by establishment employment size, which is defined as average employment by location or average employment by state depending on the survey administered by the BLS. In each case, I compared the company's rates to those of companies within the same establishment employment size stratum, defined by the average number of full-time worker equivalents employed at each location (a full-time worker is defined as 2,000 hours worked per year). Quartile statistics for 2009 were not available at the time of writing.

^e Company 10 staggered the implementation of its voluntary plans across its Texas-based facilities.

Company Characteristics: Company characteristics presented in the table represent characteristics during the years for which I include claims data from each company.

Computation of Quartile Statistics: Companies 1, 10, 12, 13, 15: the quartile statistic is based on all locations in 2008. *Company 2:* the quartile statistic is based on a sample of 5 locations outside of Texas in 2009 and BLS injury rate quartile data from 2008. *Company 3:* the quartile statistic is based on data from 2005; the company's claim rate fell into the fourth quartile. The data necessary to make the comparison between the company's OSHA-reportable claim rate and the BLS sub-industry quartiles are available for that year only. *Company 4:* the quartile statistic is based on all locations from 1/1/2009 - 3/31/2009 and BLS data from 2008. *Company 5:* the quartile statistic is based on a sample of locations in all states in 2009 and BLS data from 2008. *Company 6:* the quartile statistic is based on a sample of 9 locations outside of Texas in 2008 and 2009, and BLS data from 2008. *Company 7:* the quartile statistic is based on a sample of 110 locations outside of Texas in 2007 and 2008. *Company 8:* the quartile statistic is based on data from 2002 - 2008 (the injury rate steadily decreased from 2003 - 2008, but stayed in the 3rd quartile). *Company 9:* the quartile statistic is based on all locations from 1/1/2009 - 3/18/2009 and BLS data from 2008. *Company 11:* the quartile statistic is based on a sample of 3 locations outside of Texas in 2009 and BLS data from 2008. *Company 14:* the quartile statistic is based on all locations in 2009 and BLS data from 2008.

Definition of FT: FT refers to full-time and salaried employees.

Table C: Descriptive Statistics

		All Companies			Panel Companies		
		WC non-TX	WC TX	Nonsub TX	WC non-TX	WC TX	Nonsub TX
Mean Costs per Worker-Hour	Total	\$0.132	\$0.127	\$0.109	\$0.126	\$0.127	\$0.088
	Wage-Rep.	\$0.034	\$0.029	\$0.007	\$0.029	\$0.029	\$0.017
	Medical	\$0.083	\$0.077	\$0.087	\$0.080	\$0.077	\$0.060
	Legal	\$0.006	\$0.003	\$0.002	\$0.006	\$0.003	\$0.006
Mean Costs per Claim	Total	\$3446.26	\$4454.18	\$2092.36	\$3395.17	\$4454.18	\$2116.34
	Wage-Rep.	\$904.23	\$1039.34	\$267.66	\$832.69	\$1039.34	\$263.01
	Medical	\$2177.88	\$2838.75	\$1637.94	\$2176.23	\$2838.75	\$1702.73
	Legal	\$132.65	\$84.07	\$26.52	\$125.92	\$84.07	\$13.78
Mean Frequency of Claims	Total	1.376	1.305	0.645	1.682	1.305	1.837
	Wage-Rep.	0.245	0.263	0.086	0.292	0.263	0.254
	Medical	1.324	1.256	0.625	1.615	1.256	1.778
	Legal	0.078	0.062	0.011	0.093	0.062	0.047

Mean Costs per Worker-Hour: To generate the costs per worker-hour presented above, I calculate the average cost per worker-hour across all facility-quarters with nonzero hours worked. Costs are categorized into four groups: Total Costs, Wage-Rep. (Wage-Replacement) Costs, Medical Costs, and Legal Costs. These costs are calculated as of 12 months from the date of injury and adjusted for inflation, for injuries sustained during a given facility-quarter. I present the average cost per worker-hour for all companies and panel companies under workers' compensation (WC - inside and outside of Texas) and under nonsubscription.

Mean Costs per Claim: To generate the costs per claim presented above, I calculate the average inflation-adjusted costs per claim (as of 12 months from the date of injury) for all claims with non-negative payments within the first 12 months of the injury date. Costs are categorized into four groups: Total Costs, Wage-Rep. Costs, Medical Costs, and Legal Costs. I present the average costs per claim for all companies and panel companies under workers' compensation (WC - inside and outside of Texas) and under nonsubscription. Note: There are a small number of claims that have positive costs for which no costs are paid in the first 12 months. Including these claims in the sample before calculating the mean values presented in the table affects the values only slightly.

Mean Frequency of Claims: To generate the claim frequencies presented above, I calculate the average frequency of claims across all facility-quarters with nonzero hours worked. There are four categories of claim frequencies: number of Total Claims, number of Wage-Rep. (Wage-Replacement) Claims, number of Medical Claims, and number of Legal Claims. Each reflects the number of claims with positive paid costs in that category as of 12 months from the date of injury, for injuries sustained in a given facility-quarter. If a claim has accrued both Wage-Rep. and Medical costs, for example, it is included in both categories. I present the average claim frequency per quarter for all companies and panel companies under workers' compensation (inside and outside of Texas) and under nonsubscription.

Companies Used in Descriptive Statistics: Two different groups of companies are included in the analyses. In Mean Costs per Worker-Hour and Mean Costs per Claim analyses, all company statistics include data for all 13 companies that provided transaction-level cost data (all but 6 & 7). Panel statistics include data from the 8 companies that additionally provided data from at least one year before the date of nonsubscription (2, 3, 4, 10, 11, 12, 13, & 14). In Mean Frequency of Claims statistics, all company statistics include data for all 15 companies that provided claims data and panel models include the 10 from among this group that provided data from at least one year before the date of nonsubscription (2, 3, 4, 6, 7, 10, 11, 12, 13, & 14). All legal statistics exclude company 13 due to lack of data, and additionally the frequency of legal claims statistics exclude companies 6 & 7.

Sample: In Mean Costs per Worker-Hour and Mean Frequency of Claims, the sample includes all facility-quarters with nonzero hours and claims with positive paid costs within the first 12 months after the date of injury, excluding quarters and injuries less than one calendar year before a company's data was pulled. In Mean Costs per Claim, the sample includes claims with non-negative paid costs within the first 12 months after the date of injury and excludes injuries sustained less than one calendar year before a company's data was pulled. All company and panel statistics include data from 1998Q1 - 2010Q1.

Table 1: Effect of Nonsubscription on *Costs per Worker-Hour*

Panel Companies	Total Costs	Wage-Rep. Costs	Medical Costs	Legal Costs
Nonsubscription Dummy †	[0.027***/0.518***] [(0.01)/(0.04)]	[-0.042***/0.373***] [(0.01)/(0.04)]	[0.027***/0.663***] [(0.01)/(0.05)]	[-0.028***/0.285***] [(0.01)/(0.11)]
Average Predicted Hourly Costs: WC	\$0.136	\$0.034	\$0.084	\$0.010
Average Predicted Hourly Costs: NS	\$0.076	\$0.009	\$0.060	\$0.002
Average Predicted Cost Savings	\$0.06	\$0.024	\$0.024	\$0.008
Average Predicted Percent Savings	44.16	73.50	28.37	84.19
Percentage of Facility Quarters with Zero Costs	47.7	81.4	48.5	92.7
All Companies	Total Costs	Wage-Rep. Costs	Medical Costs	Legal Costs
Nonsubscription Dummy †	0.004/0.527*** (0.01)/(0.05)	[-0.050***/0.262***] [(0.01)/(0.02)]	0.009/0.758*** (0.01)/(0.07)	[-0.036***/0.560*] [(0.00)/(0.19)]
Average Predicted Hourly Costs: WC	\$0.150	\$0.050	\$0.088	\$0.008
Average Predicted Hourly Costs: NS	\$0.079	\$0.008	\$0.067	\$0.002
Average Predicted Cost Savings	\$0.071	\$0.042	\$0.021	\$0.006
Average Predicted Percent Savings	47.27	84.35	24.18	80.74
Percentage of Facility Quarters with Zero Costs	53.4	84.6	54.8	80.9

Other Model Covariates: State dummies, company dummies, quarter dummies, and WCRI benchmarks.

† I used an algorithm described in Section 5: Research Questions and Identification Strategy to estimate the predicted hourly costs for each regime. If the first-stage probit yielded a statistically significant extensive margin at the 5% level, then I used the results of both the probit and the second-stage GLM to generate predicted statistics. I then used a bootstrapping method, described in Woolridge (2010), to obtain standard errors and significance levels for the average predicted hourly costs presented for these models. In these cases, the second-stage GLM was performed only on facility-quarters with positive costs of that cost type. However, if the first-stage probit did not yield a statistically significant extensive margin at the 5% level, then I estimated a GLM on the sample of all facility-quarters, regardless of whether or not there are positive costs of that type. In these cases, predicted statistics are generated solely from the results of the GLM. See Section 5. Research Questions and Identification Strategy for fuller explanation of the methodology. Predicted statistics presented that were calculated from both a probit and GLM are significant at the 1% level for all cost types, except the predicted statistics for legal costs were insignificant in the all-company sample.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Probit average marginal effects are presented (the first coefficient) and generalized linear model (GLM) coefficients are presented as incidence rate ratios (IRR), and standard errors are clustered on facility. Unique facility-quarters are the unit of analysis.

Model: I use probit models in the first stage and generalized linear models (GLMs), specified with the gamma family and a log link in the second stage. See Section 5: Research Questions and Identification Strategy for complete description of methodology.

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All company models include data for all 13 companies that provided transaction-level cost data (all but 6 & 7). Panel models include data from the 8 companies that not only provided transaction-level cost data, but also data from at least one year before the date of nonsubscription (2, 3, 4, 10, 11, 12, 13, 14). Legal Cost regressions exclude company 13 due to lack of data.

States Used in Analysis: The sample is restricted to the 20 states for which there are WCRI benchmarks of average costs per claim: AR, CA, CT, FL, GA, IA, IL, IN, LA, MA, MD, MI, MN, NC, NJ, PA, TN, TX, VA, & WI.

Dependent Variable: Each dependent variable reflects costs paid per worker-hour, calculated as of 12 months from the date of injury, adjusted for inflation, for injuries sustained during a given facility-quarter. There are four dependent variables: Total Costs, Wage Rep. (Wage-Replacement) Costs, Medical Costs, and Legal Costs.

Covariate Notes: WCRI benchmarks of average costs per claim for 20 states from 1997-2009 are included. Each model includes WCRI benchmarks only for the cost type of the dependent variable, with the exception of legal costs; WCRI does not include average legal costs information, so legal cost models use WCRI average total cost benchmarks instead.

Sample: The sample includes all facility-quarters with nonzero hours and claims with non-negative paid costs within the first 12 months after the date of injury and excludes quarters and injuries less than one calendar year before a company's data was pulled. All company and panel models include data from 1998Q1 - 2010Q1.

Predicted Statistics: Average Predicted Hourly Costs indicate the mean predicted costs per hour for workers' compensation (WC) and nonsubscribers (NS) across all facility-quarters within the regression sample. Average Predicted Cost Savings represents the mean difference between the workers' compensation and nonsubscription predicted costs. Average Predicted Percent Savings represents the mean of the predicted percent savings under nonsubscription (relative to workers' compensation) calculated for each facility-quarter in the sample.

Robustness Checks: As a robustness check, I ran the above models on various samples. First, I used a sample with costs per worker hour calculated as of 36 months from the date of injury. Second, I used a sample with incurred costs per worker hour calculated over the lifetime of all open and closed claims. Next, I used a sample of costs per worker hour calculated over the lifetime of closed claims. In addition, I ran a series of robustness tests, including specification and falsification tests, that are presented and discussed on the companion website. None of these tests gave me reason to believe that the results presented here are statistical artifacts. Per-company results are also presented on the companion website.

Table 2: Effect of Nonsubscription on *Costs per Claim*

Panel Companies	Total Costs	Wage-Rep. Costs	Medical Costs	Legal Costs
Nonsubscription Dummy †	0.511*** (0.03)	$[-0.059^{***}/0.368^{***}]$ $[(0.01)/(0.04)]$	-0.004/0.655*** (0.00)/(0.04)	$[-0.031^{***}/0.101^{***}]$ $[(0.01)/(0.03)]$
Average Predicted Costs per Claim: WC	\$3869.89	\$939.19	\$2423.19	\$175.37
Average Predicted Costs per Claim: NS	\$1977.44	\$233.68	\$1587.07	\$8.94
Average Predicted Cost Savings	\$1892.45	\$705.50	\$836.13	\$166.43
Average Predicted Percent Savings	48.90	75.97	34.51	95.20
Percentage of Claims with Zero Costs	0.0	82.1	3.1	95.2
All Companies	Total Costs	Wage-Rep. Costs	Medical Costs	Legal Costs
Nonsubscription Dummy †	0.455*** (0.03)	$[-0.045^{***}/0.291^{***}]$ $[(0.01)/(0.02)]$	-0.007*/0.602*** (0.00)/(0.03)	$[-0.037^{***}/0.319^{***}]$ $[(0.00)/(0.09)]$
Average Predicted Costs per Claim: WC	\$4014.50	\$1112.31	\$2399.70	\$183.58
Average Predicted Costs per Claim: NS	\$1825.95	\$241.67	\$1445.02	\$22.86
Average Predicted Cost Savings	\$2188.55	\$870.65	\$954.68	\$160.72
Average Predicted Percent Savings	54.52	78.82	39.78	88.29
Percentage of Claims with Zero Costs	0.0	82.2	5.1	94.1

Other Model Covariates: State dummies, company dummies, quarter dummies, and WCRI benchmarks.

† I used an algorithm described in Section 5: Research Questions and Identification Strategy to estimate the predicted hourly costs for each regime. If the first-stage probit yielded a statistically significant extensive margin at the 5% level, then I used the results of both the probit and the second-stage GLM to generate predicted statistics. I then use a bootstrapping method, described in Woolridge (2010), to obtain standard errors and significance levels for the average predicted hourly costs presented for these models. In these cases, the second-stage GLM is performed only on claims with positive costs of that cost type. However, if the first-stage probit does not yield a statistically significant extensive margin at the 5% level, then I estimate a GLM on the sample of all claims, regardless of whether or not there are positive costs of that type. In these cases, predicted statistics are generated solely from the results of the GLM. See Section 5. Research Questions and Identification Strategy for fuller explanation of the methodology. Predicted statistics presented that were calculated from both a probit and GLM are significant at the 1% level for all cost types. All claims have positive total costs, and so a single-stage GLM was performed for total costs and predicted statistics were generated from that GLM.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. GLM coefficients are presented as incidence rate ratios (IRR), probit Average Marginal Effects are presented, and standard errors are clustered on facility. Unique claims are the unit of analysis.

Model: The model is a generalized linear model (GLM), specified with the gamma family and a log link.

Companies Used in Analysis: Due to data limitations, two different groups of companies are included in the above analyses. All-company models include data for all 13 companies that provided transaction-level cost data (all but 6 & 7). Panel models include data from the 8 companies that not only provided transaction-level cost data, but also data from at least one year before the date of nonsubscription (2, 3, 4, 10, 11, 12, 13, 14). Legal Cost regressions exclude company 13 due to lack of data.

States Used in Analysis: The sample is restricted to the 20 states for which there are WCRI benchmarks of average costs per claim: AR, CA, CT, FL, GA, IA, IL, IN, LA, MA, MD, MI, MN, NC, NJ, PA, TN, TX, VA, & WI.

Dependent Variable: There are four dependent variables: Total Costs, Wage-Rep. (Wage-Replacement) Costs, Medical Costs, and Legal Costs. Each reflects costs paid, calculated as of 12 months from the date of injury, adjusted for inflation.

Covariate Notes: WCRI benchmarks of average costs per claim for 20 states from 1997-2009 are included. Each model includes WCRI benchmarks only for the cost type of the dependent variable, with the exception of legal costs; WCRI does not include average legal costs information, so legal cost models use WCRI average total cost benchmarks instead.

Sample: The sample includes all claims with positive total costs and non-negative payments for cost-types other than total within the first 12 months of the injury date and excludes injuries sustained less than one calendar year before a company's data was pulled. All-company and panel models include data from 1998Q1 - 2010Q1.

Predicted Statistics: Average Predicted Costs per Claim indicates the mean costs per claim for workers' compensation (WC) and non-subscription (NS) across all claims within the regression sample. Average Predicted Cost Savings represents the mean difference between the workers' compensation and nonsubscription predicted costs per claim. Average Predicted Percent Savings represents the mean predicted percentage savings under nonsubscription (relative to workers' compensation) calculated for each claim in the sample.

Robustness Checks: As a robustness check, I ran the above models on various samples. First, I used a sample with costs per claim calculated as of 36 months from the date of injury. Second, I used a sample with incurred costs per claim calculated over the lifetime of all open and closed claims. Next, I used a sample of costs per claim calculated over the lifetime of closed claims. In addition, I ran a series of robustness tests, including specification and falsification tests, that are presented and discussed on the companion website. None of these tests gave me reason to believe that the results presented here are statistical artifacts. Per-company results are also presented on the companion website.

Table 3: Effect of Nonsubscription on *Claim Frequency*

Panel Companies	Total Claims	Wage-Rep. Claims	Medical Claims	Legal Claims
Nonsubscription Dummy	1.020 (0.02)	0.673*** (0.04)	1.053** (0.03)	0.483*** (0.09)
Average Predicted Frequency Per Quarter: WC	1.650	0.291	1.583	0.090
Average Predicted Frequency Per Quarter: NS	1.684	0.196	1.667	0.043
Average Predicted Decline	N/A	0.095	-0.084	0.047
Average Predicted Percent Decline	N/A	32.69	-5.30	51.74
All Companies	Total Claims	Wage-Rep. Claims	Medical Claims	Legal Claims
Nonsubscription Dummy	0.932*** (0.02)	0.609*** (0.03)	0.958** (0.02)	0.308*** (0.04)
Average Predicted Frequency Per Quarter: WC	1.297	0.234	1.247	0.073
Average Predicted Frequency Per Quarter: NS	1.209	0.142	1.195	0.022
Average Predicted Decline	0.089	0.091	0.052	0.050
Average Predicted Percent Decline	6.83	39.06	4.16	69.20

Other Model Covariates and Exposure Term: State dummies, company dummies, and quarter dummies. Hours worked per facility-quarter is the exposure term.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Coefficients are presented as incidence rate ratios (IRR), and standard errors are clustered on facility. Unique facility-quarters are the unit of analysis.

Model: The model is a negative binomial regression.

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 15 companies that provided claims data. Panel models include the 10 companies from among this group that provided data from at least one year before the date of nonsubscription (2, 3, 4, 6, 7, 10, 11, 12, 13, 14). Legal Cost regressions exclude companies, 6, 7 & 13 due to lack of data.

States Used in Analysis: All 50 states are included.

Dependent Variable: There are four dependent variables: number of Total Claims, number of Wage-Replacement Claims, number of Medical Claims, and number of Legal Claims. Each reflects the number of claims with positive paid costs in that category as of 12 months from the date of injury, for injuries sustained during a given facility-quarter. If a claim has accrued both Wage-Rep. and Medical costs, for example, it will be included in both categories.

Sample: The sample includes all facility-quarters with nonzero hours worked and claims with non-negative paid costs within the first 12 months from the injury date and excludes quarters and injuries sustained less than one calendar year before a company's data was pulled. All-company and panel models include data from 1998Q1 - 2010Q1.

Predicted Statistics: Average Predicted Frequency per Quarter indicates the mean number of claims for workers' compensation (WC) and nonsubscription (NS) across all facility-quarters within the regression sample. Average Predicted Decline represents the mean difference between the workers' compensation and nonsubscription predicted frequency per quarter. Average Predicted Percent Decline represents the mean of the predicted percentage declines in number of claims under nonsubscription (relative to workers' compensation) calculated for each facility-quarter in the sample.

Robustness Checks: As a robustness check, I ran the above models on various samples. First, I used a sample with number of claims with positive paid costs per facility-quarter as of 36 months from the date of injury. Second, I used a sample with number of claims with positive incurred costs per facility-quarter over the lifetime of all open and closed claims. Next, I used a sample of number of closed claims with positive incurred costs per facility-quarter. In addition, I ran a series of robustness tests, including specification and falsification tests, that are presented and discussed on the companion website. None of these tests gave me reason to believe that the results presented here are statistical artifacts.

Table 4: Average Marginal Effect of Nonsubscription on Percent of Costs per Worker Hour that Arise from Non-Traumatic Injuries

Companies		Total	Wage-Rep.	Medical	Legal
Panel	Nonsub	-0.096*** (0.01)	-0.178*** (0.02)	-0.098*** (0.01)	-0.130*** (0.05)
All	Nonsub	-0.091*** (0.01)	-0.180*** (0.02)	-0.096*** (0.01)	-0.177*** (0.04)

Other Model Covariates: State dummies, company dummies, quarter dummies, total hours worked and total costs per hour per facility-quarter.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Coefficients are presented as average marginal effects (AME). Standard errors are clustered on facilities. Unique facility-quarters are the unit of analysis.

Average Marginal Effects: The results presented are the average nonsubscription effect on the predicted proportion of costs per worker hour due to non-traumatic injuries. The unit of measurement is percentage of costs per worker hour.

Model: The model is a generalized linear model, specified with the Bernoulli family and a logit link (Fractional Logit).

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 13 companies that provided transaction-level cost data (all but 6 & 7). Panel models include data from the 8 companies that not only provided transaction-level cost data, but also data from at least one year before the date of nonsubscription (2, 3, 4, 10, 11, 12, 13, 14). Legal Cost regressions exclude company 13 due to lack of data.

States Used in Analysis: All 50 states are included in the analysis.

Dependent Variable: The dependent variable is the proportion of costs per worker-hour per cost type due to non-traumatic injuries as-of 12 months from the date of injury, summed from the transactions file and adjusted for inflation.

Categorical Exclusions: Categorical exclusions are injuries which are likely not covered in the nonsubscription environment. Categorical exclusions are company-specific and were extracted from nonsubscription plan documents. Costs due to categorically excluded injuries are removed from the dependent variable.

Sample: The sample includes only facility-quarters with positive costs of each cost type. For example, only claims with positive medical costs are included in the numerator and denominator of the proportion (dependent variable) used in medical models. All-company and panel models include data from 1998Q1 - 2010Q1.

Robustness Checks: As a robustness check, I ran four different specifications of the model. The first specification includes neither costs per worker hour nor total hours worked as covariates. The second specification only includes total hours worked, the third variation only includes costs per worker hour, and the fourth specification includes both as covariates. Although only the results from the fourth specification are presented above, the results from the other three specifications were nearly identical. See Part 5: Injury Type Analyses on website for alternative specifications.

Table 5: Effect of Nonsubscription on Costs per Claim (by Traumatic Nature of Injury)

Companies		Total	Wage-Rep.	Medical	Legal
Panel	Nonsub	0.671*** (0.05)	0.828*** (0.06)	0.326*** (0.05)	0.020*** (0.01)
	Non-traumatic Dummy	1.720*** (0.04)	1.569*** (0.04)	2.085*** (0.07)	2.485*** (0.14)
	Non-traumatic \times Nonsub	0.654*** (0.06)	0.698*** (0.06)	0.637** (0.12)	1.136 (0.58)
All	Nonsub	0.591*** (0.04)	0.760*** (0.05)	0.315*** (0.04)	0.202*** (0.07)
	Non-traumatic Dummy	1.868*** (0.04)	1.706*** (0.03)	2.324*** (0.07)	2.344*** (0.11)
	Non-traumatic \times Nonsub	0.704*** (0.04)	0.740*** (0.04)	0.650*** (0.10)	0.380*** (0.14)

Other Model Covariates: State dummies, company dummies, quarter dummies, WCRI benchmarks, a (nonsub \times non-traumatic injury) interaction term, and a non-traumatic injury dummy.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Standard errors are clustered on facilities. Coefficients are presented as Incident Rate Ratios (IRR). Unique claims are the unit of analysis.

Model: The model is a generalized linear model, specified with the gamma family and a log link.

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 13 companies that provided transaction-level cost data (all but 6 & 7). Panel models include data from the 8 companies that not only provided transaction-level cost data, but also data from at least one year before the date of nonsubscription (2, 3, 4, 10, 11, 12, 13, 14). Legal Cost regressions exclude company 13 due to lack of data.

States Used in Analysis: The sample is restricted to the 20 states for which there are WCRI benchmarks of average costs per claim: AR, CA, CT, FL, GA, IA, IL, IN, LA, MA, MD, MI, MN, NC, NJ, PA, TN, TX, VA, & WI.

Dependent Variable: The dependent variable is costs per claim as-of 12 months from the date of injury.

Categorical Exclusions: Categorical exclusions are injuries which are likely not covered in the nonsubscription environment. Categorical exclusions are company-specific and were extracted from nonsubscription plan documents. Claims due to categorically excluded injuries are removed from the dependent variable.

Covariate Notes: WCRI benchmarks of average costs per claim for 20 states from 1997-2009 are included. Each model includes WCRI benchmarks only for the cost type of the dependent variable, with the exception of legal costs; WCRI does not include average legal costs information, so legal cost models use WCRI average total cost benchmarks instead.

Sample: The sample includes only claims with positive total costs. Claims included in sample do not necessarily have positive costs of each cost type, and therefore, for example, some claims with zero wage replacement costs are included in wage replacement models. All-company and panel models include data from 1998Q1 - 2010Q1.

Robustness Checks: I also implemented the two-stage procedure for these models as in Table 2. The non-traumatic injury \times nonsub interaction term was negative (less than one in IRR) in every model for each stage but was only significant at 1% in the first stage for wage-replacement and legal probit regressions, and in the second stage for medical and total GLM regressions. These results do not negate our hypothesis of a moral hazard effect acting on non-traumatic injury claims in the nonsubscription environment. Interaction effects that are only significant in the first stage suggest an effect at the intensive margin (costs savings). Those interaction effects that are only significant in the second stage suggest an effect only at the extensive margin (participation effects).

Table 6: Average Marginal Effect of Nonsubscription on Percent of Claims that Arise from Non-Traumatic Injuries

Companies		Total	Wage-Rep.	Medical	Legal
Panel	Nonsub	-0.074*** (0.01)	-0.176*** (0.02)	-0.080*** (0.01)	-0.137*** (0.05)
All	Nonsub	-0.082*** (0.01)	-0.180*** (0.02)	-0.086*** (0.01)	-0.180*** (0.04)

Other Model Covariates: State dummies, company dummies, quarter dummies, total hours worked and total number of injuries per facility-quarter.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Coefficients are presented as average marginal effects (AME). Standard errors are clustered on facilities. Unique facility-quarters are the unit of analysis.

Average Marginal Effects: The results presented are the average nonsubscription effect on the predicted proportion of claims per facility-quarter due to non-traumatic injuries. The unit of measurement is percentage of claims per facility-quarter.

Model: The model is a generalized linear model, specified with the Bernoulli family and a logit link (Fractional Logit).

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 15 companies that provided claims data. Panel models include the 10 companies from among this group that provided data from at least one year before the date of nonsubscription (2, 3, 4, 6, 7, 10, 11, 12, 13, 14). Legal Cost regressions exclude companies 6, 7, & 13 due to lack of data.

States Used in Analysis: All states are included.

Dependent Variable: The dependent variable is the proportion of claims due to non-traumatic injuries, with positive paid costs as of 12 months from the date of injury, for injuries sustained during a given facility-quarter.

Categorical Exclusions: Categorical exclusions are injuries which are likely not covered in the nonsubscription environment. Categorical exclusions are company-specific and were extracted from nonsubscription plan documents. Claims due to categorically excluded injuries are removed from the dependent variable.

Sample: The sample includes all facility-quarters with positive paid costs of each cost type. All-company and panel models include data from 1998Q1 - 2010Q1.

Robustness Checks: As a robustness check, I ran four different specifications of the model. The first specification includes neither total injuries nor total hours worked as covariates. The second specification only includes total hours worked, the third variation only includes total number of injuries, and the fourth specification includes both as covariates. Although only the results from the fourth specification are presented above, and the results from the other three specifications were nearly identical. See Part 5: Injury Type Analyses on the website for alternative specifications.

Table 7: Effect of Nonsubscription on *Frequency of Claims for Severe, Traumatic Injuries*

Panel Companies	Total Claims	Wage-Rep. Claims	Medical Claims	Legal Claims
Nonsub	0.527*** (0.05)	0.413*** (0.07)	0.524*** (0.05)	0.526 (0.23)
Average Predicted Frequency Per Quarter: WC	0.050	0.022	0.049	0.005
Average Predicted Frequency Per Quarter: NS	0.026	0.009	0.025	0.002
Average Predicted Decline	0.024	0.013	0.023	0.002
Average Predicted Percent Decline	47.30	58.75	47.59	47.44
All Companies	Total Claims	Wage-Rep. Claims	Medical Claims	Legal Claims
Nonsub	0.624*** (0.05)	0.479*** (0.06)	0.618*** (0.05)	0.450** (0.18)
Average Predicted Frequency Per Quarter: WC	0.038	0.016	0.037	0.003
Average Predicted Frequency Per Quarter: NS	0.024	0.008	0.023	0.002
Average Predicted Decline	0.014	0.009	0.014	0.002
Average Predicted Percent Decline	37.62	52.15	38.21	55.03
Other Model Covariates and Exposure Term: State dummies, company dummies, and quarter dummies. Hours worked is the exposure term.				

Notes: Significance Levels: *** 1%, ** 5%, * 10%. Coefficients are presented as incidence rate ratios (IRR), and standard errors are clustered on facility. Unique facility-quarters are the unit of analysis.

Models: The models are negative binomial regressions.

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 15 companies that provided claims data. Panel models include the 10 companies from among this group that provided data from at least one year before the date of nonsubscription (2, 3, 4, 6, 7, 10, 11, 12, 13, 14). Legal Cost regressions exclude companies 6, 7 & 13 due to lack of data.

States Used in Analysis: All states are included.

Dependent Variable: There are four dependent variables for each model: number of Total Claims, number of Wage-Replacement Claims, number of Medical Claims, and number of Legal Claims. Each reflects the number of claims from severe, traumatic injuries with positive paid costs in that category as of 12 months from the date of injury, for injuries sustained during a given facility-quarter. If a claim has accrued both Wage-Rep. and Medical costs, for example, it will be included in both categories. Severe, traumatic injuries include amputations, concussions, fractures, brain damage, and enucleation.

Sample: The sample includes all facility-quarters with non-negative paid costs of each cost type and positive hours. All-company and panel models include data from 1998Q1 - 2010Q1.

Predicted Statistics: Predicted Statistics are calculated in the same way as Table 3.

Table 8: Counterfactual (CF) Models of the Effects of Nonsubscription on Costs per Worker-Hour, with *Capped Benefits and Excluding Chiropractic Costs, PPD costs, and Categorical Exclusions*

Panel Companies	Total Costs (CF)	Total (Baseline)	Wage-Rep. Costs (CF)	Medical Costs (CF)	Legal Costs (CF)
Nonsub Dummy †	[0.030***/0.591***] [(0.01)/(0.04)]	[0.027***/0.518***] [(0.01)/(0.04)]	[-0.029***/0.478***] [(0.01)/(0.05)]	[0.030***/0.736***] [(0.01)/(0.05)]	[-0.025***/0.284***] [(0.01)/(0.11)]
Average Predicted Hourly Costs: WC	\$0.123	\$0.137	\$0.026	\$0.078	\$0.010
Average Predicted Hourly Costs: NS	\$0.079	\$0.076	\$0.010	\$0.062	\$0.002
Average Predicted Cost Savings	\$0.045	\$0.061	\$0.016	\$0.016	\$0.008
Average Predicted Percent Savings	35.67	44.16	62.35	19.82	83.52
All Companies	Total Costs (CF)	Total (Baseline)	Wage-Rep. Costs (CF)	Medical Costs (CF)	Legal Costs (CF)
Nonsub Dummy †	0.007/0.586*** (0.01)/(0.05)	0.004/0.527*** (0.01)/(0.05)	[-0.041***/0.319***] [(0.01)/(0.03)]	0.012/0.831** (0.01)/(0.08)	[-0.034***/0.559*] [(0.00)/(0.19)]
Average Predicted Hourly Costs: WC	\$0.136	\$0.150	\$0.041	\$0.082	\$0.008
Average Predicted Hourly Costs: NS	\$0.080	\$0.079	\$0.009	\$0.068	\$0.002
Average Predicted Cost Savings	\$0.056	\$0.071	\$0.032	\$0.014	\$0.006
Average Predicted Percent Savings	41.40	47.273	79.16	16.89	80.30
Other Model Covariates: State dummies, company dummies, quarter dummies, and WCRI benchmarks.					

† I used an algorithm described in Section 5: Research Questions and Identification Strategy to estimate the predicted hourly costs for each regime. If the first-stage probit yielded a statistically significant extensive margin at the 5% level, then I used the results of both the probit and the second-stage GLM to generate predicted statistics. I then used a bootstrapping method, described in Woolridge (2010), to obtain standard errors and significance levels for the average predicted hourly costs presented for these models. In these cases, the second-stage GLM was performed only on facility-quarters with positive costs of that cost type. However, if the first-stage probit did not yield a statistically significant extensive margin at the 5% level, then I estimated a GLM on the sample of all facility-quarters, regardless of whether or not there are positive costs of that type. In these cases, predicted statistics are generated solely from the results of the GLM. See Section 5. Research Questions and Identification Strategy for fuller explanation of the methodology. Predicted statistics presented that were calculated from both a probit and GLM are significant at the 1% level for all cost types, except the predicted statistics for legal costs were insignificant in the all-company sample.

Notes: Significance Levels: *** 1%, ** 5%, * 10%. GLM coefficients are presented as incidence rate ratios (IRR), probit Average Marginal Effects are presented, and standard errors are clustered on facility. Unique facility-quarters are the unit of analysis.

Model: For total and medical costs per worker hour, the models are generalized linear models specified with the gamma family and a log link. For wage-replacement and legal costs per worker hour models, I use probit models in the first stage and generalized linear models, specified with the gamma family and a log link in the second stage.

Companies Used in Analysis: Due to data limitations, two different groupings of companies are included in the above analyses. All-company models include data for all 13 companies that provided transaction-level cost data (all but 6 & 7) and panel models include the 8 from among this group that provided data from both before and after nonsubscription (2, 3, 4, 10, 11, 12, 13, 14). All models include data from Texas and all other states of operation. Companies 9 & 13 lack sufficient chiropractic detail, so no chiropractic costs are removed, and similarly, company 13 lacks sufficient PPD information to exclude PPD costs. These companies are still included in the sample. Legal Cost regressions exclude company 13 due to lack of data.

States Used in Analysis: The sample is restricted to 20 states with WCRI benchmarks: AR, CA, CT, FL, GA, IA, IL, IN, LA, MA, MD, MI, MN, NC, NJ, PA, TN, TX, VA, & WI.

Dependent Variable: Each dependent variable reflects costs paid per worker-hour, calculated as of 12 months from the date of injury, adjusted for inflation, for injuries sustained during a given facility-quarter. There are four dependent variables: Total Costs, Wage-Rep. (Wage-Replacement) Costs, Medical Costs, and Legal Costs. However, the four CF (Counterfactual) models additionally transform the dependent variables by capping benefits, excluding chiropractic costs, PPD costs, and categorical exclusions injuries as occurs under nonsubscription plans. All explicitly-marked PPD costs were removed and all General Lump Sum costs, which only sometimes represent PPD, were removed.

Covariate Notes: WCRI benchmarks of average costs per claim for 20 states from 1997-2009 are included. Each model includes WCRI benchmarks only for the cost type of the dependent variable, with the exception of legal costs; WCRI does not include average legal costs information, so legal cost models use WCRI average total cost benchmarks instead.

Sample: The sample includes all facility-quarters with nonzero hours worked and claims with non-negative paid costs within the first 12 months from the date of injury, and excludes quarters and injuries sustained less than one calendar year before a company's data was pulled. All-company and panel models include data from 1998Q1 - 2010Q1.

Robustness Checks: As a robustness check, I ran the above models on various samples. First, I used a sample with costs per worker hour calculated as of 36 months from the date of injury. Next, I used a sample of costs per worker hour calculated over the lifetime of all closed claims. I did not use a sample of incurred costs per worker hour with all claims, open and closed, because no data was available for incurred PPD costs. None of these tests gave me reason to believe that the results presented here are statistical artifacts.

Predicted Statistics: Predicted Statistics are calculated in the same way as Table 1.