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ABSTRACT

We examine how consumers respond to being effectively double insured under two systems: group health (GH) and workers' compensation (WC). Many GH plans have substantial consumer cost-sharing burden, while WC coverage has no cost-sharing for medical services for work-related injuries. As a result, a consumer facing a large deductible under their group health plan will have a strong financial incentive to make a claim under WC instead. We use a unique data set of claims under both GH and WC to study how "case shifting" to WC responds to GH deductibles for the most common set of injuries that are covered under both types of insurance. We identify the impact of case shifting by using interactions of deductible levels and previous spending. We find that a typical claim is about 1.4 percentage points (5.3%) more likely to be filed as a WC claim when facing an average deductible (about $630) compared to a plan with no deductible, and that total WC costs in the U.S. are more than $1.2 billion higher as a result. At the same time, we find that consumers do not appear to be forward looking, focusing on the "spot price" rather than the full "end of year price" in deciding whether to claim under WC.

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The past decade has seen a dramatic growth in the use of consumer cost-sharing as a mechanism of cost-control by health insurance plans. According to the Annual Survey of Employer Health Benefits conducted by the Kaiser Family Foundation, the share of covered workers in plans with a general annual deductible increased from 59% in 2007 to 81% in 2017, while the percentage of workers enrolled in high deductible (more than $1,000) plans quadrupled from 12% in 2007 to 51% in 2017. The average deductible amount, among those with a deductible, rose from $616 in 2007 to $1,505 in 2017.[1]

The goal of such an increase is, ideally, to deter cost-ineffective medical care. There is now a large body of evidence showing that more consumer cost-sharing does deter use of care across a wide variety of contexts—but whether that is only cost-ineffective care, and not also cost-effective care, is unclear.

But there is another margin of response to more consumer cost sharing that has not been widely explored by previous literature: shifting the claim out of the group health insurance to other sources of coverage. For a wide variety of medical claims in the U.S., consumers are effectively double covered. This includes any medical claim which arises out of workplace injuries, through the workers' compensation (WC) program, and any medical claim which arises out of auto injuries, through auto insurance. This is a non-trivial share of medical spending in the U.S. Medical spending by the WC program is $31.4 billion, while medical spending through auto insurance claims is about $2 billion.[2]

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[1] 2017 Employer Health Benefits Survey, https://www.kff.org/health-costs/report/2017-employer-health-benefits-survey/.

[2] WC data from National Academy of Social Insurance estimates based on data received from state agencies, the U.S. Department of Labor, A.M. Best, and the National Council on Compensation Insurance; auto data from http://www.naic.org/prod_serv/AUT-PB-14.pdf.

When consumers are double covered, they may face very different financial incentives to make claims through one form of insurance or another. For example, state WC programs as a rule do not have consumer cost sharing for medical care received under the program. As a result, a consumer facing a large deductible under their group health plan will have a strong incentive to make "shift" their case to WC instead.

Whether consumers can, or are willing to, do so is unclear. Technically, there is a clear distinction between which system should be used based on the nature of the injury. Practically, it may be very hard for insurers to distinguish whether a particular injury is or is not related to a workplace injury or auto accident. If consumers do actively substitute between forms of insurance in their claims, then it could have important implications for the role of consumer cost sharing, and for the benefits of integrating health care coverage across multiple sources. To illustrate the potential importance of case-shifting for workers' compensation, if just 1 percent of group health cases with soft tissue conditions (including non-specific back pain) were shifted to workers' compensation, workers' compensation costs in a state like Pennsylvania could increase by nearly $35,000,000.[3]

In this paper, we investigate whether consumers facing greater cost-sharing of their group health plans substitute between different sources of insurance coverage, by shifting cases to workers' compensation. We do so by using novel data that, for a large sample of workers, incorporates claims data under both their group health and WC coverage. We focus on a set of injuries—soft tissue injuries and traumatic injuries—which represent the majority of

[3] To obtain the cost impact estimates, we used average medical and income benefit payments per soft tissue claim and the share of soft tissue injuries among workers' compensation injuries in a particular state.

WC claims, and for which there is a significant share of claims that are filed under group health plans, so that there is a plausible substitution margin between the sources of coverage.

Importantly, there is significant variation across workers in our sample in the deductibles that they face under their health plans. Our identification comes from the interaction between enrollee spending and plan deductibles. We incorporate this in two ways: through spot prices and end of year prices. For spot prices, we measure the remaining deductible at the point in time when the enrollee files their claim. That is, two enrollees who have the same level of spending at a point in time will face different incentives to shift a claim to WC depending on their deductible; likewise, two enrollees who have the same deductible will have different incentives based on their spending at that point in time. This allows us to control for rich controls for both plan characteristics (plan fixed effects) and individual spending, identifying solely by their interaction.

Of course, if individuals are fully forward looking, it should not be the spot price which determines whether they file a WC claim—it should be the end of year price. An individual who knows with certainty that they will exceed the deductible has no incentive to shift a claim to WC even if the injury hits before they have yet exceeded the deductible. On the other hand, individuals may not be fully forward looking. A variety of studies in the health insurance context show that patients consider both the spot and end of year prices in making their health care consumption decisions; the same distinction likely applies to the decision to claim in WC or GH.[4] In addition, while the spot price is known with certainty, the end of year price must be projected with some uncertainty.

[4] See for example Finkelstein, Einav and Schrimpf (2015) or Abaluck, Gruber and Swanson (2017).

We therefore augment our models with end of year prices. This is of course difficult since the actual spending during the year will depend on whether the episode in question is filed as GH or WC. We address this potential endogeneity by creating an instrument that is a function of last year's total spending.

We find that patients are sensitive to price incentives in their decision to claim injuries under WC. In our richest specification, we find that a typical claim is about 1.35 percentage points more likely to be claimed as WC at the average remaining deductible compared to no deductible at the time of injury. Compared to a mean WC claiming rate of 26%, this implies that that typical deductible plan shifts about 5% of claims from GH to WC. At the same time, we do not find any sensitivity to end of year prices, suggesting that consumers are not forward looking in their WC filing decision.

We also explore two dimensions of heterogeneity which support our interpretation of the results. First, we show that our findings are much stronger for sprains and strains, which are easier to reclassify as work-related, then for traumatic injuries. Second, we show that our findings are much stronger in states where employees have free choice in picking their providers.

Our paper proceeds as follows. Section I describes the WC program and the relevant previous literature. Section II describes our data and empirical methods. Section III shows our results, while Section IV concludes.

Part I: Background on WC and Literature Review

The Workers' Compensation Program is the nation's oldest, and one of its largest, social insurance programs. It covers all medical expenses and a portion of lost wages of those injured on the job. The employer pays these benefits for injuries "arising out of and in the course of employment" under no fault agreement, while injured worker releases the right to sue for additional compensation. Most workers are covered for their non-work related injury through a group health insurance plan, while work-related injuries are covered through their employers' workers' compensation insurance plans.

In this work, we examine workers' incentives to classify an injury as work-related. Workers are responsible for informing their doctor about whether they believe the injury to be work-related. If the doctor agrees, she submits a bill to the individual's workers' compensation insurer. Workers are also responsible for notifying their employer and filing a WC claim. The WC payer sometimes disagrees with the provider's classification of an injury and disputes whether the injury is work-related. In this case, the worker may either ask the provider to bill the GH insurer, or file a request for an administrative hearing from the state regulatory agency. In some states, where employers control choice of medical providers, workers will have to file their claim before getting medical care. In this case, a claim adjuster will direct a worker to their choice of physician for evaluation and treatment.

For many injuries, the work-relatedness is an open question as demonstrated in the "Monday effect literature".[5] In particular, in support of the "Monday effect" hypothesis, Smith

[5] Since weekend presents more opportunities for off the job injuries, then one might expect that hard-to-diagnose injuries will be disproportionately reported on Mondays compared to other regular workdays. This hypothesis is referred to as "Monday effect".

(1990) showed that a greater proportion of sprains and strains relative to fractures and cuts were reported earlier in the work week and work shift; on the other hand, Card and McCall (1996) and Campolieti and Hyatt (2006) did not find evidence suggestive of "Monday effect". If a worker's group health plan features cost sharing, she may decide to claim injuries are work-based and get treated with no cost-sharing through WC.

At the same time, previous literature offers abundant evidence that a sizable proportion of injured workers with work-related injuries does not file a WC claim. [6] In particular, Biddle and Roberts (2003) merged Michigan WC administrative data with a sample of workers who were identified by physicians as having work-related injuries. They found that only 30% of all injured workers filed a WC claim, 55% of injured workers with time away from work filed a claim, and 72% of injured workers with more than 7 days of lost time filed a WC claim. These substantial non participation rates suggest that WC filing is not free. Among costs associated with filing are lack of information about filing and availability of WC, employer discouragement of filing for WC benefits, stigma, and loss of bonuses/overtime pay. Workers with access to health insurance with low-cost sharing burden and various other wage-replacement benefits may be unwilling to bear the filing costs. In particular, about one-third of all non-participants reported that one of the reasons of not filing was availability of other sources of health insurance coverage (Biddle and Roberts, 2003).

[6] Biddle and Roberts (2003), Fan et al. (2006), and Ruser and Pergamit (2004).

The previous literature on this topic reports mixed results for the correlation between the availability of alternative sources of health coverage and rates of WC claiming.[7] These mixed results are likely due to the fact that firms that offer insurance are different in a number of ways that might impact WC filing decisions; e.g., white collar firms with low rates of on-the-job injury will be most likely to offer group health. We therefore extend this literature in a new direction: exploring the relationship between cost-sharing in group health insurance and the decision to file a WC claim. As described below, in doing so we are able to control for fixed differences across firms while still identifying the financial incentives to file under WC. Like the previous literature, however, we will be unable to distinguish whether the claims that are, for example, promoted to WC by higher GH cost sharing are "truly" work related (and just previously underreported due to hassle costs) or not.

A related literature on financial incentives in classification of claims as work-related focuses on provider incentives, which is different from the focus of this work on financial incentives facing patients. Initial evidence in Ducatman (1986) undertook a cross-sectional examination of eight federal shipyards with varying degrees of HMO penetration, and found that WC costs were higher at the shipyard with a larger HMO penetration. Butler et al. (1997) show that higher HMO penetration across states increases the incidence of WC claims,, using data from one firm. They also find that workers' compensation claims are higher for workers enrolled in an HMO plan. Additionally, Fomenko and Gruber (2017) document that there is significant reclassification of injuries from group health plans into WC when the financial

[7] Biddle and Roberts (2003) finds that having group health coverage is associated with lower WC claiming rates, while Lakdawalla et al. (2007) found that employers offering health insurance have higher WC claiming rates.

incentives to do so are strongest. In particular, they exploited differences in financial incentives as shaped by capitated group health plans (such as HMOs) vs. non-capitated plans, as well as differences in WC reimbursement fees for medical services across states.

An important aspect of our investigation is considering whether individuals myopically focus just on spot prices, or whether they take a more forward-looking perspective in their health care claims filing decisions. Some recent studies have investigated this question in another context by modeling how health care consumption responds to spot vs. end of year prices. Brot-Goldberg et al. (2017) find that consumers substantially reduce their spending on medical services facing higher spot prices, but find no evidence of consumers' responsiveness to the true end of year price. Previous research by Einav et al. (2013a), Dalton et al. (2015) and Abaluck et al. (2015) on price responsiveness in the context of Medicare Part D prescription drug coverage also shows that consumers respond overwhelmingly to spot prices. On the other hand, Aron-Dine et al. (2012) and Finkelstein et al. (2012) find support of forward looking behavior by consumers facing non-linear insurance contract and conclude that consumers respond to both spot and true end of year prices in making health care consumption decisions.

Part II: Data and Empirical Strategy

Data

This analysis relies principally on workers' compensation and group health medical data coming from the Truven Health MarketScan Commercial Claims Database, Health and Productivity Management Database and Benefit Plan Design (BPD) Database.[8] In general the

[8] Copyright® 2015 Truven Health Analytics Inc. All rights reserved.

Truven Health MarketScan® Research Databases capture patient-level utilization of medical services, and payments associated with the medical services provided, for a wide range of services including outpatient, inpatient, prescription drug, and carve-out services. These data also include GH enrollment and plan design information, including enrollment dates for each employee and detailed cost-sharing profile of the employer-provided plan of the enrollment. The data come from a selection of large employers, health plans, and government and public organizations and are frequently used in peer-reviewed published health policy research studies (e.g., Fomenko and Gruber, 2017; Dor, Grossman, and Koroukian, 2004; Berndt et al., 2002).

The Truven databases used in this analysis are based on a large convenience sample of patients where the data was provided by health insurers and self-insured employers. The data include individuals employed by mostly large employers and insured or administered by one of approximately 100 group health plans. The data are unique in that, for a given employee, it shows whether a given medical encounter (visit) was paid for by group health or workers' compensation. This is key for the study since it provides the basis for determining which treatments were paid under which insurance policy.

The strength of these data are their size and the unique availability of both GH and WC data supplemented by wealth of information on GH plan characteristics; these are the only national data of which we are aware that provides this information. The weakness is that this is a convenience sample. There is no reason, however, to think that the particular convenience sample employed here would in any way bias our estimates of claims-shifting.

For the sampled employees, the group health section of the database, Truven Health MarketScan Commercial Claims, contains patient information including demographic

characteristics (e.g., age, gender, and geographic location), employment information (e.g., employment status and industry), and group health plan enrollment details (e.g., dates of coverage and type of private insurance plan). This database links patient information with detailed medical transaction (i.e., encounter) level data for all services reimbursed under group health plans regardless of the setting (i.e., outpatient or hospital) or provider type. The medical transaction data contains detailed information for each medical encounter, including the type of services provided during the encounter, medical diagnosis recorded, and payment amounts for each rendered service.

The Truven Productivity Management Database includes workers' compensation claim data for most of the same individuals, if they had a WC claim. Unlike group health medical encounter data, workers' compensation data do not contain detailed encounter level information for medical services paid by workers' compensation insurance; instead, workers' compensation data contains aggregated workers' compensation claim (i.e., episode) level data. For example, the diagnostic and payment information for all services provided to an injured worker and compensated by workers' compensation insurance is summarized at the claim (episode) level, with information on primary diagnosis (or injury type) and total medical payments for all services provided and paid as of the time of data collection.[9]

The Truven Health MarketScan Benefit Plan Design (BPD) Database contains a wealth of information characterizing GH health plans, including deductibles, coinsurance, copayments, and maximum out-of-pocket amount. In this analysis, we focus on the GH plan deductible

[9] That is, in the nomenclature of WC, a "claim" is equivalent to a medical episode, and includes all services associated with that episode.

amount that captures the amount the enrollee pays before the plan begins to pay for medical coverage during a plan year.

We also rely to some extent on the Detailed Benchmark/Evaluation (DBE) database collected by the Workers Compensation Research Institute (WCRI).[10] We used these data to examine descriptive statistics on the distribution of office visits per workers' compensation claim (for comparison with group health data); we use these data because unlike the workers' compensation data in the main database, these data contain detailed data on the date and type of services rendered.

Sample Definition

We select a sample of workers who had one of two types of injuries which are frequent sources of workers' compensation claims. The first type of injury includes certain soft tissue conditions, such as back pain, knee pain, and shoulder pain. The second type of injury includes injuries by trauma, including fractures, lacerations, and contusions. According to our data, these two sets of diagnoses comprise more than 70% of workers' compensation claims; the vast majority of the remaining injuries in the database are not well specified occupational or cumulative injuries.

We select a sample of workers with one of these two types of injuries that occurred over the 2008–2014 period. To identify a worker as having a particular medical condition, for

[10] The DBE data were from 26 large insurers, self-insurers, state funds, and third-party administrators in the study states. Other WCRI studies show that the DBE database is reasonably representative of the state systems studied, but not in all states. For methods used to assess the representativeness of sample data in the DBE database, please refer to *CompScope™ Benchmarks, 15th Edition* (Belton et al., 2015).

patients whose care was paid for by the group health insurers, we relied on the primary diagnosis code associated with the first and second office visits or emergency room visits (we discuss the restriction to two visits below). For workers' compensation patients, we used injury type assigned by the workers' compensation claims adjuster since the available data do not have visit-level diagnosis records. In these cases, medical condition was assigned using standard WC industry codes for type of injury when available (for about 90 percent of the injuries).[11] In other cases, it was assigned using the International Classification of Diseases, 9th Revision (ICD-9) codes in the billing data, which were available for about 70 percent of injuries. For the overwhelming majority of WC claims, both sources of identification of injury type result in consistent injury definitions.

We restrict the analysis sample to full-time workers (about 86 percent of these injuries). We exclude employees who were older than 65 since they may also be covered by Medicare. We also exclude patients who may be undergoing ongoing treatment for an existing injury, in order to focus on new injuries. To do so we exclude from the sample patients who received treatment for the same medical condition in the 24 months prior to the first claim that we observe during our study period. Doing so also ensures that we are focusing on the extensive margin of categorizing the initial WC claim, and not the intensive margin of further coding additional medical as work related. Further, to ensure that we are excluding patients who had such earlier care but were covered by another payer outside of the database or were uninsured, we exclude patients who did not have continuous medical insurance coverage with an employer captured in the database. Hence, we include workers with continuous group

[11] Standard WC industry codes for type of injury are also known as WC insurance organization codes.

health insurance coverage and without treatment for the same medical conditions for the two years prior the onset of an episode; as a result the data used in this analysis covers years between 2006 and 2015. After these exclusions, the final sample consists of 102,328 observations.

Dependent variable: did the patient file a workers' compensation claim?

We focus on the patient's decision to file a workers' compensation claim or not. Since we do not directly observe the patients' decisions, we infer the decision from whether a patient's care was paid under workers' compensation or group health. If the medical care was paid by workers' compensation, we assumed that the worker decided to claim an injury as work-related. We assume that decision to file a WC claim gets settled pretty early in the claim. For the purposes of this study, we therefore examine whether the first two visits were paid by workers' compensation or group health. Hence we excluded patients that had fewer than 2 visits with diagnoses of one of the medical conditions of interest.

The use of a 2 visit threshold confirms the diagnosis that serves as our sample selection criterion. In addition, we found only a very small share of WC cases with only one visit, so restricting to those with two or more GH visits imposes more uniformity on the samples.[12]

Table 1 shows the sample by type of injury and type of payer in our sample. In the full sample, 74% of claims are for soft tissue conditions, while 26% are for traumatic injuries,

[12] Comparing the means and medians for the number of visits by those with WC and GH, we find that they match much better when restricting to at least 2 GH visits. For example, the mean number of visits for patients with injuries by trauma under WC is 2.9, and the median is 2. Looking at all GH patients, the mean is 1.3 and the median is 1. But if we restrict to patients with a least two visits, the mean is 2.6 and the median is 2.

divided roughly equally into contusions, fractures/dislocations, and lacerations. Not surprisingly, there is a much higher share of traumatic injuries in the workers' compensation sample—about 50 percent of workers' compensation injuries versus 18 percent among group health injuries. On the other hand, soft tissue conditions are only 50% of WC paid claims, while they are 82% of the GH paid claims.

Independent Variables of Interest

The key independent variables for our analysis are two price measures relevant for WC claiming decisions: spot price and end of year price. Spot price captures the remaining deductible at the point in time when the enrollee decides whether to file their injury as a WC claim or not, so it combines information on enrollee's actual out of pocket deductible spending during this enrollment year up to the time of injury (A), and her plan deductible (D). To capture the out-of-pocket health care costs, we focus on the deductible amounts, since the consumer faces the full price of her health care consumption with some exceptions.[13] In some plans, cost-sharing remains when the deductible is reached, in the form of remaining copayments or co-insurance, but the marginal cost impacts are modest relative to deductibles.

To the extent that cost-sharing remains in place after the deductible, we bias our coefficients downwards (since we are measuring a gap in cost sharing upon meeting the deductible that is too large).[14]

[13] Most plans cover preventive services before the deductible is met, and some plans also reimburse for office visits with primary care providers and even specialty care providers when the enrollee is still under the deductible.

[14] In our sample, 39% of workers faced coinsurance requirement for at least some services with average coinsurance rate of about 22%. Also, about 20% of workers had coinsurance for office visits with average rate of 17%. About 67% of the sample had copayment requirement of cost-sharing structure of their group health plans with an average copayment amount of about $20 for primary care and about $30 for specialty care.

In our analysis, we use two measures to capture non-linearity of the spot prices. The first spot price measure (P_1^s) is a dummy variable taking on value one if this year's actual deductible spending prior to the injury is below this year's plan deductible and zero otherwise (Equation 1). The second spot price measure (P_2^s) reflects a difference between deductible amount and actual deductible spending that is capped at zero when the plan deductible is met (Equation 2).

$$P_1^s = 1 \text{ if } \mathrm{A} < \mathrm{D} \text{ or } P_1^s = 0 \text{ if } \mathrm{A} \geq \mathrm{D} \quad (1)$$

$$P_2^s = \mathrm{D} - \mathrm{A} \text{ if } \mathrm{A} < \mathrm{D} \text{ or } P_2^s = 0 \text{ if } \mathrm{A} \geq \mathrm{D} \quad (2)$$

The end of year price is a measure of where the individual expects to be relative to their deductible by the end of the year. As noted earlier, forward looking consumers should pay attention to this measure, and not the spot price, in making their WC claiming decisions. For example, if a consumer is below the plan deductible at the time of the injury, but knows with high certainty that they will have sufficient group health spending to put them above the deductible before the end of the year, then there is no financial incentive to shift the injury to workers' compensation. Once again, there may be smaller unobserved additional cost-sharing beyond the deductible. In the case of end of year price, this would lead to an upward bias to our estimate (since we are measuring an end of year price that is too low).

Similarly to the spot price measure, we define two end of year spending variables (P_1^y *and* P_2^y) that compare the end of previous year deductible eligible spending (S^y) and the current year plan deductible (D). First, we define a dummy variable (P_1^y) on whether by the end of the year plan deductible is expected to be exceeded or not (see Equation 3). Second, we compute a difference between the plan deductible and the end of previous year deductible

eligible spending measure, equated to zero when deductible is met or exceeded (see Equation 4).

$$P_1^y = 1 \text{ if } S^y < \text{D or } P_1^y = 0 \text{ if } S^y \geq \text{D} \quad (3)$$

$$P_2^y = \text{D} - S^y \text{ if } S^y < \text{D or } P_2^y = 0 \text{ if } S^y \geq \text{D} \quad (4)$$

Empirical Strategy

The goal of our empirical strategy is to assess whether the worker facing greater financial burden of cost sharing under his GH plan is more likely to shift the claim out of the group health insurance and file a workers' compensation claim.

To estimate the effect of greater deductible on the likelihood of the worker to file a WC claim, we run regressions of the form:

(1) $WC_{ep} = \alpha + \beta P^S_{ep} + \lambda P^y_{ep} + \mu S^s_{ep} + \nu S^y_{ep} + \delta X_e + \pi_p + \varepsilon_{ep}$

Where e indexes episode, and p indexes GH plans. WC is a dummy for whether episode e for an individual enrolled in GH plan p is categorized as a workers' compensation claim. P^S_{ep} is the spot dummy/price, while P^y_{ep} is the end of year dummy/price. We also include a rich set of control variables for each patient's episode (X). This includes age (dummies for ages 18-34, 35-44, 45-54 and 55-64), gender, medical condition treated, injured body part, dummies for each state of residence, and dummies for injury month.

As noted above, we consider two different measures of spot and end of year prices. The first is the amount of deductible remaining, either at the point of the claim or at the end of the year. The second is a dummy which measures whether the employee has not yet exceeded the deductible, either at the point of the injury or by the end of year. In both cases, larger values (or

a positive dummy variable) indicate a larger financial incentive to file a claim as WC rather than GH. So if claims shifting responds to financial incentives, we expect positive coefficients on the incentive measures.

There are two major concerns with this empirical framework. The first is selection bias, on both the employer and employee side. Employers offering high deductible plans may also be associated with different propensity for claiming WC. For example, the firms that have the highest deductible plans may also have more dangerous workplaces where the marginal claim is more likely to be due to a work-related injury; alternatively, the firms offering high deductible health plans may also be discouraging their injured workers from filing workers' compensation claims. These considerations emphasize importance of workplace characteristics in shaping propensity of claiming WC. To address this concern, we include health care plan fixed effects (π_p), so that we fully absorb any differences across workers in not just deductibles, but any other health care plan or firm characteristics correlated with that deductible.

In addition, workers who have low medical spending and therefore are unlikely to exceed their deductible may be different in their propensity to have a work-related injury. For example, employees in good overall health that is reflected in low medical spending may be the ones for whom a given injury is more likely to be work related and less likely due to overall poor health. We address this identification concern by controlling for spending levels. We control for differences in spending levels in a rich way, by including deductible eligible medical spending at the time of the injury (S^s_{ep}) and over the entire previous year (S^y_{ep}). In particular, for both variables, we define categories with \$250 step for spending between \$0 and \$5,000, \$500

interval for spending between $5,000 and $8,000, $1,000 between $8,000 and $15,000, and the remaining category includes spending amounts of $15,000 or more.

By including both of these controls, we address concerns about identification from plan differences or worker spending differences. Our identification comes instead from the interaction of the two—that is, by comparing high and low spending employees within the same plan deductible, while controlling in general for how being a high or low spending employee might change your propensity to make a WC claim.

The second major concern with this framework is the endogeneity of the forward-looking measure of end of year price to the current decision on whether or not to claim an injury as GH or WC. If a worker files the current claim as WC, for example, that reduces the odds that they actually exceed their deductible. Therefore, higher rates of WC claiming are associated with a larger remaining end of year deductible, raising the risk of reverse causality for our end of the year measures.

To address this endogeneity, we instrument the end of year price measures by the same measure computed based on last year's expenditures. So long as last year's spending is a good predictor of this year's spending (which it is), then this allows us to avoid the endogeneity that arises due to current claiming effects on end of year prices. As noted earlier, we control richly for last year's spending in the regression framework as well.

Descriptive Statistics

Table 2 shows the descriptive statistics for our sample, separately for those claims under WC and those under GH. Roughly three-quarters of the claims are classified as Group Health.

WC patients are slightly younger and more likely to be male than GH patients. There are also some differences in prevalence of body parts impacted and medical conditions between two groups. Injuries to spine are more frequent among GH patients, while upper extremity injuries are more common among WC patients. WC patients are also slightly more likely to be under deductible at the time of the injury as well as at the end of the year based on spending over the entire previous year. Additionally, GH patients have somewhat higher year to date deductible eligible spending and total end of year deductible eligible spending.

Part III: Results

Basic Results

Table 3 presents our basic results. We begin in column 1 by showing results for the specification that includes only the remaining current deductible, expressed in $100. We estimate a significant positive coefficient of 0.0016, which means that for every $100 of remaining deductible, individuals are 0.16 percentage points more likely to claim workers' compensation as the payer (rather than group health). The second panel of the table interprets our findings. Since 26% of injuries are paid by WC at baseline, this suggests that each $100 of remaining deductible leads to 0.6% more injuries being shifted to WC. At the mean of $555 remaining deductible, the spot price effect amounts to the 3.48% of the WC claim volume.

In the second column, we replace the remaining deductible amount with a dummy variable for whether you are currently below the deductible. As expected, this is also positive: individuals who are below the deductible are more likely to claim workers' compensation for

their injury. The estimate implies that being below the deductible at the time of your injury raises the odds of claiming WC by roughly 1%, or about 3.5% of the mean.

In the third column, we combine the two coefficients. In this case, the coefficient on the dummy variable captures whether being below the deductible in general impacts WC claiming, while the remaining deductible captures the marginal impact of having additional dollars below the deductible. The coefficients are largely unchanged when the variables are included together, although the coefficient on the dummy variable becomes only marginally significant.

In our sample, 74% of individuals face a non-zero deductible at the time of their injury, and among those individuals the mean deductible is $555. This implies that at the mean there is an effect of spot price of 0.78*0.74 + 0.0014*555 = 1.35%. That is, on average, individuals being injured are shifting 1.35% of their claims to WC, which amounts to about 5% of all WC claims.

These effects are fairly small in percentage point terms, but amount to large dollars. As noted earlier, total medical costs of WC amounted to $31 billion. So given that 80 percent of workers in 18-64 age category have private health insurance, we conclude that over $1.2 billion in claims each year are shifted to WC due to financial incentives facing patients.[15]

From these regressions we conclude that individuals who are facing financial exposure to the costs of their claims in their group health plan are more likely to shift that claim onto workers' compensation. The next three columns then consider whether individuals are forward looking in these claiming decisions by using end of the year values of our key financial incentive measures (instrumented by last year's values). As with columns 1-3, we first consider the

[15] The estimate of working-age employed adults by health insurance type are published by US Census Bureau (https://www2.census.gov/programs-surveys/demo/tables/p60/264/tablea_2.pdf).

amount remaining below the deductible, then a dummy for being below the deductible, and then finally both combined.

The coefficients here are uniformly insignificant—and for the dummy variable even wrong signed. This is inconsistent with the notion of individuals being forward looking; rather, individual decisions to claim through WC appear focused on the spot price. This conclusion is somewhat tempered by the larger standard errors on the end of year price, however.

Heterogeneity

To confirm our findings, we explore two sources of heterogeneity. The first is variation by injury type. There are strong incentives to shift claims regardless of injury type, but it may be easier to do so for sprains and strains. For example, determining if a condition is work-related is relatively straightforward for a patient who presents with a fractured tibia—the cause of the fracture is usually identified with a specific event, and determining whether or not that event was work-related is also relatively straightforward. By contrast, the cause may be less certain for a patient presenting with a soft tissue condition (e.g., non-specific back pain or strain/sprain of knees or shoulders). For example, the medical literature shows that there is often little consensus about identifying the precise cause of back pain in a specific individual. Some cases of back pain are said to be caused by a specific event (e.g., lifting a heavy object); others are said to be caused by repetitive motion that wears down parts of the back architecture; still other cases are believed to be caused by the wear and tear of the aging process; and others are thought to result from latent congenital defects in the architecture of the back that emerge at some point in time. Overall, about half of acute injuries (i.e., fractures, laceration, and contusions) are coded as WC, while fewer than 20% of sprains and strains are coded as WC.

In Table 4, we show the spot price and end of year price effects separately by injury type. The coefficient for remaining deductible at the time of injury is larger for sprains and strains (and statistically significant) than for acute injuries, while the coefficient on the dummy for having a remaining deductible is similar across two types of injuries (and only marginally significant for sprains and strains). Combining the coefficients at the typical likelihood of being below the deductible and amount of deductible remaining at the time of injury, we find that there is a 1.8 percentage point impact on shifting sprains and strains to WC that is equivalent to the almost 10 percent increase in the volume of the WC soft tissue conditions. The effect is statistically significant at 1% significance level. For acute injuries, the impact is smaller at 1.4 percentage points and not statistically significant, or only 2.8% of the increase in the baseline number of the WC claims for acute injuries. Therefore, as we hypothesized, the impact of case-shifting is much larger for soft tissue conditions than acute injuries. In other words, the effect is large where it may be easier to substitute between two programs or reclassify claims as work related or not.

We also investigate whether the effect of higher deductibles on the decision to file an injury as work-related is intensified in states where workers control the choice of initial medical provider. Our hypothesis for this analysis is that flexibility of staying with the worker's own doctor when getting treatment for work-related injury lowers the cost of filing for workers' compensation coverage and, therefore, may have a positive effect on propensity to file for WC in states where workers control the choice of initial provider. Also, the process of filing for WC coverage is different depending on the provider choice policy. In the states where regulation allows workers to choose their provider, workers are responsible for informing their doctor

about whether they believe the injury to be work-related. If the doctor agrees, he/she submits a bill to the individual's workers' compensation insurer. In other states, where employers control choice of medical providers, workers will have to file their claim before getting medical care. In this case, a claim adjuster will direct a worker to their choice of physician for evaluation and treatment.

Provider choice policies vary across states, defining not only initial choice of medical provider but also circumstances under which workers can change their provider. We focus on initial provider choice policies to examine potential differences in filing WC injuries when workers have greater flexibility of choosing their initial provider versus when employers have control over the choice of initial provider. We classified states into two categories: (1) workers' choice of provider states, where workers have control over their choice of initial provider, or their choice of initial provider is limited to providers within a network; and (2) employers' choice of provider states, where employers control the choice of initial provider or the choice is limited to a panel of providers.[16] For this analysis, we estimate the same model described earlier separately for each group of states. Also, as part of our sensitivity analysis to make sure that our results are not sensitive to our definition of workers' choice of provider policies, we excluded states from the workers' choice group where the initial choice of medical provider is limited to providers within managed care networks. Our results are robust to such changes in the classification definition.

[16] These classification decisions are informed by state statutes, WCRI and IAIABC (2009), and Tanabe (2010, 2011, 2012, 2013).

It is important to recognize that both categories of provider choice policies have substantial variation in policy formulation. In some states, the regulations are more straightforward regarding the choice of initial provider (e.g., Indiana and Iowa are employer choice states), while in other states, provider choice policies discuss various circumstances shaping control over the initial provider. In particular, in California, the choice of the initial physician is limited to medical treatment networks that were introduced by Senate Bill (SB) 899 effective January 1, 2005, allowing employers to establish medical treatment networks. However, the employer arranges the initial medical evaluation, after which the worker can choose a new provider from the network. Since initial evaluation of the injury is the focus of this study, we classified California as one of the employer choice states.

Table 5 shows that workers are even more responsive to out-of-pocket costs of health care in states where they can choose their initial provider, and workers are non-responsive to cost-sharing in states where employers control the choice of initial provider. In Columns 1, 2 and 3, we show the spot price and end of year price effects for states with workers' choice of initial provider, where Column 1 presents results for all injuries and Columns 2 and 3 present results for soft tissue conditions and injuries by trauma, respectively. Columns 4, 5, and 6 summarize results for states where employers control the choice of initial provider.

Comparing results between the two groups of the states, the effect is concentrated in the states where workers have more control over the choice of the initial provider. The overall effect of the spot price, combining the coefficients on remaining deductible and on the indicator for having a remaining deductible at the average deductible level observed in the sample, is a 3.6 percentage point increase in case-shifting to WC that is equivalent to the 14

percent increase in the volume of WC cases. For soft tissue conditions, the spot price effect is even larger—about 4 percentage points at the average, or an almost 21 percent increase in the volume of WC soft tissue conditions. On the other hand, the impact is smaller for injuries by trauma, amounting to an 11 percent increase in the baseline number of WC claims for injuries by trauma. The estimated spot price effects are not only sizable but also statistically significant. Also, across all specifications, the end of year price effect remains insignificant.

In contrast, for the states where the employer controls the choice of initial provider, the coefficient on the remaining deductible at the time of injury becomes immaterial and statistically insignificant, while the coefficient on the dummy for having a remaining deductible is also small and becomes negative. Additionally, the spot price effect becomes small and statistically insignificant, and the end of year price effect remains statistically insignificant. Therefore, the impact of case-shifting is larger and statistically significant in states, where workers have more control over the choice of initial medical provider.

Part IV: Conclusions

While much attention is rightfully focused on the $1 trillion private health insurance market,[17] another important component of the U.S. health care system is workers' compensation insurance, which featured $31 billion in health claims in 2017. Importantly, there

[17] The estimate for private health insurance market is based on personal health care expenditures comprising of health care goods and services purchased directly by or for individuals, excluding health expenditures for government administration and net cost of health insurance, government public health activities, research, and structures and equipment. Data retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html (accessed April 16, 2019).

is often not a cleanly identified distinction between whether injuries occur on the job or not. And individuals in high deductible plans have a strong financial incentive to claim these costs as work-related, shifting their costs from financially burdensome group health plans to cost-free workers' compensation coverage.

Indeed, we demonstrate in this paper that such substitution between insurance systems exists: when workers face higher financial burdens under group health, they are more likely to file their claims as WC claims. At the same time, workers do not appear to be forward looking, focusing on the spot price facing them under group health plans rather than the end of year price. We also find that workers with soft tissue conditions are substantially more responsive to cost-sharing burden of their group health plans than those with acute injuries, and that these responses are stronger when individuals can choose the doctor for their initial (evaluative) visit.

As individuals increasingly become responsible for greater share of their health care costs under group health coverage, our findings indicate that workers' compensation will see a greater number of injuries shifting from group health. In particular, the share of covered workers in plans with a general annual deductible increased from 59 percent in 2008 to 81 percent in 2017, while the average deductible amount, among those with a deductible, rose from $735 in 2008 to $1,505 in 2017. In addition to estimating the spot price effect at the mean of our analysis sample, we also computed the effect of spot prices for the deductible levels observed in 2008 and 2017. Table 6 summarizes the percentage increase in the volume of WC claims filed in response to the deductible levels observed in 2008 and 2017 (or spot price effect). For example, to compute 2017 numbers, we use the 2017 enrollment percentage in plans with an annual deductible and the average deductible level as reported by KFF and

individual medical spending observed in our analysis data; we estimate that 78 percent of individuals would still be under the deductible at the time of the injury with an average remaining deductible of about $1,380. This level of GH cost-sharing would result in a 6.5 percent increase in the likelihood of filing an injury under workers' compensation, compared with workers with no deductible at the time of the injury. Since 26 percent of these injuries are filed as WC claims, this effect amounts to about a 13 percent increase in WC volume. Similar computations conducted for 2008 show that WC volume is estimated to have increased by 6 percentage points due to cost-sharing growth observed between 2008 and 2017.

The increase in the propensity to file for WC coverage for patients with soft tissue conditions is even more sizable, resulting in about 14 percentage points growth from about 13.7 percent of WC volume of soft tissue conditions in 2008 to 27.6 percent in 2017. The increase in filing for patients with injuries by trauma in response to growing deductibles is smaller and not statistically significant, yielding a 1.2 percentage point increase in the number of WC injuries by trauma between 2008 and 2017. These examples illustrate the size of the impact of increasing cost-sharing on the propensity to file an injury for WC coverage rather than group health. It shows that facing substantial financial burden of the GH plan deductibles, injured workers are more likely to turn to WC coverage in attempt to avoid greater out-of-pocket payments for medical care associated with their GH plans.

Our analysis leaves a number of questions unanswered. In particular, we have assumed that it is workers who are shifting their cases from GH to WC, but providers could actually be doing the reclassification. As we showed in our earlier work (Fomenko and Gruber, 2017), providers do undertake such reclassification in response to their own financial incentives. Our

results are not biased by the response to provider financial incentives, since we are considering individuals in the same plan who simply have different levels of spending. But it is possible that altruistic providers could be encouraging patients to shift their cases when the patients' GH cost sharing is high.

In addition, as we noted earlier, there is evidence of under-claiming of work-related injuries due to the hassle costs of the WC program. We cannot tell from our results whether the financial incentives we study are reducing under-claiming by those injured at work, or whether they are inducing a shift to WC among those not truly injured at work who have what might be considered work-related injuries. Welfare analysis of this topic would likely require an assessment of which types of claims are impacted by consumer cost-sharing.

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Table 1: Sample Size and Composition, by Type of Injury and Type of Payer

Medical Conditions	Group Health Paid		Workers' Compensation Paid		Full Sample	
	Number of Patients	Percentage	Number of Patients	Percentage	Number of Patients	Percentage
Contusion	1,863	2%	4,598	21%	6,461	6%
Fracture/dislocation	8,905	12%	2,574	7%	11,479	11%
Laceration	3,309	4%	5,365	23%	8,674	8%
Soft tissue conditions	62,052	82%	13,662	49%	75,714	74%
Grand total	**76,129**	**100%**	**26,199**	**100%**	**102,328**	**100%**

Notes: This summary of group health and workers' compensation patients is based on the analysis sample, which includes cases of care arising between 2008 and 2014. Also, cases with other medical diagnoses are excluded from the sample. For more information on the construction of the analysis sample, refer to the “Data” section.

Table 2: Descriptive Summary of the Analysis Variables

Variable	GH		WC	
	Mean	**St. dev**	**Mean**	**St. dev**
Remaining year to date deductible (in 100s)	5.68	6.67	5.16	5.59
Remaining end of year deductible (in 100s)	5.64	6.63	5.03	5.57
Dummy for whether year to date spending below deductible	0.47	0.50	0.52	0.50
Dummy for whether end of year spending below deductible	0.33	0.47	0.35	0.48
Year to date spending	4.55	9.01	3.30	7.23
Previous year total spending	7.45	11.17	6.63	10.68
Demographics				
Age: 18–34	0.15	0.35	0.18	0.38
Age: 35–44	0.26	0.44	0.26	0.44
Age: 45–54	0.38	0.48	0.36	0.48
Age: 55–64	0.22	0.41	0.19	0.39
Male	0.63	0.48	0.70	0.46
Female	0.37	0.48	0.30	0.46
Medical condition				
Contusion	0.02	0.15	0.18	0.38
Fracture/dislocation	0.12	0.32	0.10	0.30
Laceration	0.04	0.20	0.20	0.40
Sprain and strain	0.82	0.39	0.52	0.50
Body part				
Spine	0.39	0.49	0.22	0.41
Upper extremity	0.20	0.40	0.27	0.45
Lower extremity	0.27	0.44	0.26	0.44
Head & face	0.01	0.11	0.06	0.23
Multiple and other	0.03	0.16	0.06	0.24
Unspecified body part	0.10	0.30	0.12	0.33

Table 3. Estimated Spot Price and End of Year Price Effects on Workers' Compensation Filing for Multiple Specifications

	(1)	(2)	(3)	(4)	(5)	(6)
Remaining deductible amount (in $100s)	0.0016**		0.0014**	0.0014		0.0018
	(0.0006)		(0.0006)	(0.0009)		(0.0012)
Dummy for whether year to date spending below plan deductible		0.0103*	0.0078		0.0103*	0.0095
		(0.0057)	(0.0057)		(0.0056)	(0.0061)
Remaining end of year deductible (in $100s)				0.0006		0.0039
				(0.0019)		(0.0027)
Dummy for whether end of year spending below plan deductible					-0.0003	-0.0660
					(0.0268)	(0.0489)
% of cases paid by WC (vs. group health)	26%	26%	26%	26%	26%	26%
Spot price effect on the % of WC cases	3.48%**	2.92%*	5.31%**	3.03%	2.92%*	6.58%**
End of year price effect on the % of WC cases				0.01%	-0.00%	0.02%
Demographics						
Age: 35–44	-0.0114**	-0.0114**	-0.0114**	-0.0114**	-0.0114**	-0.0120**
	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)
Age: 45–54	-0.0171**	-0.0171**	-0.0171**	-0.0170**	-0.0171**	-0.0182**
	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0038)	(0.0039)
Age: 55–64	-0.0226**	-0.0227**	-0.0227**	-0.0225**	-0.0227**	-0.0243**
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0042)	(0.0044)
Male	0.0175**	0.0175**	0.0175**	0.0174**	0.0175**	0.0185**
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0027)	(0.0027)
Body part						
Upper extremity	0.0435**	0.0435**	0.0435**	0.0436**	0.0435**	0.0433**
	(0.0035)	(0.0035)	(0.0035)	(0.0035)	(0.0035)	(0.0035)
Lower extremity	0.0220**	0.0219**	0.0219**	0.0220**	0.0219**	0.0217**
	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0031)
Head and face	0.0698**	0.0697**	0.0698**	0.0699**	0.0697**	0.0694**
	(0.0092)	(0.0092)	(0.0092)	(0.0092)	(0.0092)	(0.0093)
Skin	0.3642**	0.3651**	0.3644**	0.3640**	0.3651**	0.3733**
	(0.0768)	(0.0766)	(0.0767)	(0.0766)	(0.0766)	(0.0774)

Table 3. Estimated Spot Price and End of Year Price Effects on Workers' Compensation Filing for Multiple Specifications (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Multiple and other	0.0892**	0.0891**	0.0892**	0.0891**	0.0891**	0.0898**
	(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0081)	(0.0082)
Unspecified body part	0.0760**	0.0759**	0.0759**	0.0760**	0.0759**	0.0765**
	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)
Medical condition						
Fracture/dislocation	-0.4062**	-0.4062**	-0.4062**	-0.4059**	-0.4062**	-0.4093**
	(0.0065)	(0.0065)	(0.0065)	(0.0066)	(0.0068)	(0.0072)
Laceration	-0.0918**	-0.0918**	-0.0918**	-0.0918**	-0.0918**	-0.0927**
	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0072)
Soft tissue conditions	-0.4509**	-0.4510**	-0.4509**	-0.4510**	-0.4510**	-0.4514**
	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0058)
Constant	0.6153	0.6161	0.6103	0.5683**	0.5969**	0.5591**
	(0.0254)**	(0.0256)**	(0.0257)**	(0.0415)	(0.0437)	(0.0418)
Plan fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Injury month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year to date spending	Yes	Yes	Yes	Yes	Yes	Yes
Previous year total spending	Yes	Yes	Yes	Yes	Yes	Yes
Observations	102,328	102,328	102,328	102,328	102,328	102,328
R-squared	0.278	0.278	0.278	0.278	0.278	0.278

Notes: Robust standard errors in parentheses; * statistically significant at the 10% level, ** statistically significant at the 5% level.

Table 4. Estimated Spot Price and End of Year Price Effects on WC Filing for Multiple Specifications, by Injury Type

	Soft tissue conditions	**Injury by trauma**	**Soft tissue conditions**	**Injury by trauma**
Remaining deductible amount (in $100s)	0.0020**	0.0009	0.0030**	0.0006
	(0.0006)	(0.0014)	(0.0013)	(0.0025)
Dummy for whether year to date spending below plan deductible	0.0084	0.0115	0.0101	0.0083
	(0.0062)	(0.0122)	(0.0066)	(0.0129)
Remaining end of year deductible (in $100s)			0.0049*	-0.0085
			(0.0028)	(0.0068)
Dummy for whether end of year spending below plan deductible			-0.1012*	0.1182
			(0.0527)	(0.1078)
% of cases paid by WC (vs. group health)	18%	48%	18%	48%
Spot price effect on the % of WC cases	9.74%**	0.028%	13.41%**	0.02%
End of year price effect on the % of WC cases			-0.01%	-0.04%
Demographics				
Age: 35–44	-0.0208**	0.0124	-0.0220**	0.0128*
	(0.0043)	(0.0076)	(0.0045)	(0.0074)
Age: 45–54	-0.0371**	0.0363**	-0.0393**	0.0370**
	(0.0041)	(0.0073)	(0.0044)	(0.0072)
Age: 55–64	-0.0454**	0.0385**	-0.0485**	0.0400**
	(0.0046)	(0.0081)	(0.0050)	(0.0082)
Male	0.0153**	0.0099*	0.0169**	0.0083
	(0.0028)	(0.0055)	(0.0030)	(0.0057)
Body part				
Upper extremity	0.1113**	-0.3144**	0.1119**	-0.3094**
	(0.0039)	(0.0093)	(0.0040)	(0.0118)
Lower extremity	0.0712**	-0.3364**	0.0712**	-0.3319**
	(0.0032)	(0.0092)	(0.0033)	(0.0112)
Head and face	0.5788**	-0.2464**	0.5919**	-0.2418**
	(0.0490)	(0.0120)	(0.0484)	(0.0139)

Table 4. Estimated Spot Price and End of Year Price Effects on WC Filing for Multiple Specifications, by Injury Type (continued)

	Soft tissue conditions	**Injury by trauma**	**Soft tissue conditions**	**Injury by trauma**
Skin	0.5517**	0.0307	0.5669**	0.0212
	(0.0761)	(0.0597)	(0.0963)	(0.0737)
Multiple and other	0.3172**	-0.3793**	0.3214**	-0.3738**
	(0.0115)	(0.0124)	(0.0119)	(0.0145)
Unspecified body part	0.0545**	0.1637**	0.0554**	0.1638**
	(0.0038)	(0.0133)	(0.0039)	(0.0132)
Medical condition				
Fracture/dislocation		-0.4473**		-0.4414**
		(0.0068)		(0.0102)
Laceration		-0.1032**		-0.1017**
		(0.0069)		(0.0069)
Soft tissue conditions				
Constant	0.1351**	0.9185**	0.0864*	0.8679**
	(0.0266)	(0.0449)	(0.0448)	(0.0845)
Plan fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Injury month fixed effects	Yes	Yes	Yes	Yes
Year to date spending	Yes	Yes	Yes	Yes
Previous year total spending	Yes	Yes	Yes	Yes
Observations	75,714	26,614	75,714	26,614
R-squared	0.174	0.426	0.150	0.435

Notes: Robust standard errors in parentheses; * statistically significant at the 10% level, ** statistically significant at the 5% level.

Table 5. Estimated Spot Price and End of Year Price Effects on Workers' Compensation Filing for Multiple Specifications, by Provider Choice Policy Type

Initial Provider Choice Policy	Worker Choice of Medical Provider			Employer Choice of Medical Provider		
	All Injuries	Soft Tissue Conditions	Injury by Trauma	All Injuries	Soft Tissue Conditions	Injury by Trauma
Remaining deductible amount (in $100s)	0.0026	0.0028	0.0044	0.0008	0.0026	-0.0012
	(0.0017)	(0.0018)	(0.0044)	(0.0016)	(0.0018)	(0.0031)
Dummy for whether year to date spending below plan deductible	0.0282**	0.0295**	0.0353**	-0.0182*	-0.0196*	-0.0276
	(0.0079)	(0.0085)	(0.0178)	(0.0097)	(0.0107)	(0.0194)
Remaining end of year deductible (in $100s)	0.0061	0.0071*	-0.0092	0.0000	0.0014	-0.0112
	(0.0039)	(0.0040)	(0.0102)	(0.0040)	(0.0041)	(0.0100)
Dummy for whether end of year spending below plan deductible	-0.0645	-0.0599	-0.0054	-0.0295	-0.0935	0.2020
	(0.0720)	(0.0766)	(0.1681)	(0.0681)	(0.0724)	(0.1575)
% of cases paid by WC (vs. group health)	26%	18%	48%	26%	18%	48%
Spot price effect on the % of WC cases	13.65%**	20.74%**	10.49%**	-0.03%	0.00%	-0.06%
End of year price effect on the % of WC cases	0.07%	14.76%	-0.13%	-0.04%	-0.12%	-0.02%
Demographics						
Age: 35–44	-0.0144**	-0.0237**	0.0133	-0.0061	-0.0157**	0.0150
	(0.0053)	(0.0060)	(0.0105)	(0.0060)	(0.0068)	(0.0110)
Age: 45–54	-0.0224**	-0.0395**	0.0229**	-0.0103*	-0.0360**	0.0536**
	(0.0052)	(0.0059)	(0.0101)	(0.0059)	(0.0068)	(0.0107)
Age: 55–64	-0.0263**	-0.0465**	0.0331**	-0.0181**	-0.0466**	0.0496**
	(0.0059)	(0.0067)	(0.0114)	(0.0066)	(0.0076)	(0.0122)
Male	0.0238**	0.0190**	0.0233**	0.0122**	0.0133**	-0.0042
	(0.0038)	(0.0040)	(0.0081)	(0.0041)	(0.0045)	(0.0082)
Body part						
Upper extremity	0.0365**	0.0970**	-0.2873**	0.0506**	0.1244**	-0.3378**
	(0.0048)	(0.0055)	(0.0175)	(0.0052)	(0.0059)	(0.0171)
Lower extremity	0.0136**	0.0609**	-0.3196**	0.0309**	0.0826**	-0.3495**
	(0.0042)	(0.0044)	(0.0158)	(0.0046)	(0.0049)	(0.0171)
Head and face	0.0774**	1.0181**	-0.2128**	0.0620**	0.5649**	-0.2798**
	(0.0133)	(0.0370)	(0.0201)	(0.0132)	(0.0309)	(0.0205)
Skin	0.6068**	0.8372**	0.1161**	0.3242**	0.4665**	-0.0233
	(0.1331)	(0.0737)	(0.0477)	(0.0753)	(0.0303)	(0.1279)
Multiple and other	0.0718**	0.2810**	-0.3565**	0.1061**	0.3585**	-0.4049**
	(0.0114)	(0.0163)	(0.0214)	(0.0121)	(0.0175)	(0.0203)

Table 5. Estimated Spot Price and End of Year Price Effects on Workers' Compensation Filing for Multiple Specifications, by Provider Choice Policy Type (continued)

	Worker Choice of Medical Provider			Employer Choice of Medical Provider		
	All Injuries	**Soft Tissue Conditions**	**Injury by Trauma**	**All Injuries**	**Soft Tissue Conditions**	**Injury by Trauma**
Unspecified body part	0.0679**	0.0440**	0.2697**	0.0848**	0.0658**	0.0697**
	(0.0053)	(0.0052)	(0.0191)	(0.0059)	(0.0060)	(0.0191)
Medical condition						
Fracture/dislocation	-0.4114**		-0.4381**	-0.4005**		-0.4503**
	(0.0102)		(0.0153)	(0.0104)		(0.0143)
Laceration	-0.1250**		-0.1373**	-0.0631**		-0.0689**
	(0.0104)		(0.0103)	(0.0100)		(0.0097)
Soft tissue conditions	-0.4440**			-0.4610**		
	(0.0084)			(0.0081)		
Constant	0.5293**	0.065	0.8199**	0.7129**	0.2316**	1.1746**
	(0.0592)	(0.0667)	(0.1167)	(0.0616)	(0.0678)	(0.1277)
Plan fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Injury month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year to date spending	Yes	Yes	Yes	Yes	Yes	Yes
Previous year total spending	Yes	Yes	Yes	Yes	Yes	Yes
Observations	53,855	40,090	13,765	46,193	33,906	12,287
R-squared	0.239	0.136	0.400	0.307	0.184	0.460

Notes: Robust standard errors in parentheses; * statistically significant at the 10% level, ** statistically significant at the 5% level. Reported effects were estimated using the linear probability model of the likelihood of an injury being classified as work-related. See the section “Evaluation of the Estimates’ Sensitivity to the Choice of Explanatory Variables” for definitions of the specifications.

Table 6. Trend in Propensity of Filing for Workers' Compensation as Cost-Sharing Continues to Grow: 2008 and 2017

Increase in Workers' Compensation Volume	**2008[a]**	**2017[b]**
All injuries	6.4889**	12.5931**
	(2.7664)	(4.1092)
Soft tissue conditions	13.7434**	27.5932**
	(4.3501)	(9.3569)
Injury by trauma	1.7096	2.9504*
	(3.1107)	(6.7864)

Notes: * statistically significant at the 10% level, ** statistically significant at the 5% level.

These numbers were obtained using estimates reported in Table 3.1 and cost-sharing statistics presented in the Annual Survey of Employer Health Benefits by the Kaiser Family Foundation (KFF). In particular, the share of covered workers in plans with a general annual deductible increased from 59 percent in 2008 to 81 percent in 2017, while the average deductible amount, among those with a deductible, rose from $735 in 2008 to $1,505 in 2017.

[a] Under the 2008 deductible levels as reported by KFF, we estimated that 57 percent of individuals were still under the deductible at the time of the injury, with an average remaining deductible of about $632.

[b] Under the 2017 deductible levels as reported by KFF, 78 percent of individuals were still under the deductible at the time of the injury, with an average remaining deductible of about $1,390.