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ABSTRACT

We study over 20 million emergency room (ER) discharges in Massachusetts and three comparison states to estimate the impact of Massachusetts health care reform on claims for Workers' Compensation (WC). Prior evidence on the relationship between health insurance and WC claiming behavior is mixed. We find that the reform caused a significant decrease in the number of per-capita ER discharges billed to WC. This result is driven by larger decreases in WC discharges for conditions for which there is greater scope to change the payer or the location of care. Conversely, we estimate smaller impacts for weekend versus weekday admissions and for wounds compared to musculoskeletal injuries. Our findings are consistent with the reform lowering WC medical costs for employers/insurers, primarily by inducing injured workers to seek care at less costly sites. The results suggest much smaller impacts on the propensity to bill WC for a given injury.

JEL Classification Codes: I11, I13, J32

Key Words: Workers' compensation, health insurance, claiming behavior

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The extent to which changes in public health insurance affect participation and program costs for other forms of social insurance is an important and timely policy question. State workers' compensation (WC) programs, which provide near universal insurance for workers who become injured or ill on the job, may be especially impacted by changes in access to health insurance. In particular, because WC covers all medical and rehabilitation costs of a work-related injury (or illness), workers who are uninsured or who are covered by plans that involve high cost sharing have an increased incentive to report injuries that happened outside of work as work related (Card and McCall 1996; Hansen 2014; Smith 1990).[1] For injuries that *are* work related, increased access to health insurance may reduce the likelihood of reporting the injury and filing for WC if workers face some cost of claiming WC, such as stigma, fear of repercussions from their employers, or uncertainty about their ability to prove an injury is work related (Lakdawalla, Reville, and Seabury 2005). Likewise, if medical providers incur additional administrative costs when billing to WC rather than to health insurance, they may discourage patients who have insurance coverage from claiming WC (Leigh and Ward 1997). Existing empirical evidence on this topic is mixed: some studies find no evidence that WC claiming propensity is related to insurance status (Card and McCall 1996; Lakdawalla, Reville, and Seabury 2005), and others find a negative relationship between insurance coverage and WC claims (Dillender 2015; Heaton 2012).

This paper studies the impact of a major expansion in public health insurance—the 2006 Massachusetts health care reform—on WC claims. By now, the key features of the reform are well known. Like the Patient Protection and Affordable Care Act (PPACA), the Massachusetts reform included an individual mandate, requiring individuals to purchase health insurance or face a tax penalty; an employer mandate, requiring all but the smallest firms to offer insurance plans to their

[1] Workers' compensation also provides partial wage loss reimbursement when a worker is unable to work because of the injury.

employees; a state-run health insurance exchange; a state-subsidized low-cost insurance plan (for those with incomes too high to qualify for Medicaid); and an expansion of Medicaid through increases in the income thresholds that determine eligibility.

The effects of the Massachusetts reform on insurance coverage were dramatic—in the years immediately following the reform, the rate of uninsurance in Massachusetts fell by approximately 50 percent, while the uninsurance rate in other states remained flat (see Figure 1). Coinciding with this increase in insurance coverage was a reduction in WC medical costs in Massachusetts (see Figure 2), relative to other states. Whereas WC medical benefit payouts were rising at the national level, WC medical benefits in Massachusetts fell from 10.6 cents per covered worker in 2005 to 9.3 cents per covered worker in 2008 (a decrease of 12 percent). Moreover, this decrease in WC medical payments in Massachusetts relative to other states occurred despite the fact that injury rates were falling *less* quickly in Massachusetts than in other states (see Figure 3). While these trends do not necessarily reflect causal relationships, they could be consistent with the expansion in health insurance coverage causing a decrease in the number of WC claims, or a decrease in the average medical cost of a claim.

To investigate the causal impact of Massachusetts health care reform on WC claims, we use data on over 20 million emergency department discharges from the Healthcare Cost and Utilization Project (HCUP). While the HCUP emergency room (ER) discharge data do not allow us to capture all potential WC cases, at least 40 percent of WC cases involve ER care. We estimate the reform's impact on the total number of discharges billed to WC (per capita at the county level), and the share of discharges billed to WC, using a differences-in-differences (DD) approach, which compares these outcomes in Massachusetts counties to those in a set of control counties in New Jersey, Maryland, and Vermont before and after the reform.

Our results indicate that the increase in access to health insurance brought on by Massachusetts health care reform caused a meaningful decline in ER discharges billed to WC. Estimating the impact of the reform on the county-level per-capita number of discharges billed to WC, we find that the 2006 reform decreased WC discharges in Massachusetts relative to comparison states, by 6.4 percent in the implementation period (Q3 2006 through Q4 2007) and by 8.4 percent in the post period (2008).

Of course, increases in insurance coverage may have affected the number of ER discharges billed to WC not only by impacting incentives for workers to bill WC for a given injury or illness, but also by impacting the choice of *where* to seek medical care (ER versus other locations). For those gaining insurance, the reform lowered the price of a physician's visit while either leaving unchanged, or marginally raising, the price of an ER visit. Miller (2012) demonstrates that ER discharges, overall, declined in Massachusetts because of health care reform. If newly insured workers who were injured on the job responded to changes in the relative price of ER treatment, they may have increasingly sought care for work-related injuries at urgent care clinics or physicians' offices rather than the ER.[2] Indeed, we find that the reductions in WC discharges per capita are very similar to the proportional reductions in overall ER usage, with total ER discharges per capita falling by 6.7 percent and 8.5 percent in the implementation and post periods, respectively. While this result does not rule out that the reform may have decreased the propensity to bill WC for a given injury, it raises the possibility that most, or all, of the decrease in per-capita WC discharges was driven by a shifting of care away from ERs.

Using detailed information about each admission and discharge, we test for heterogeneous effects of the reform among injuries/illnesses for which there is more versus less scope for

[2] On the other hand, because WC involves no patient cost sharing, we expect no greater shifting away from the ER for work-related injuries/illnesses than for other, non-work-related conditions.

changing payers or shifting care to a non-ER setting. Consistent with the incentives described above, we find significant decreases in WC claiming for weekday discharges and for conditions diagnosed as musculoskeletal injuries. In contrast, we estimate smaller responses among subsamples of weekend admissions and burn/trauma/wound diagnoses.

Taken together, these findings provide evidence that the increase in access to health insurance brought on by health care reform caused a decrease in costs for the WC program. The magnitudes of our estimates suggest the primary effect of increased access to health insurance was to induce injured workers to seek care at less costly, non-ER sites. Our evidence indicates much smaller impacts on the propensity to bill WC for a given injury that is treated in the ER. Back-of-the-envelope calculations based on our estimates for musculoskeletal injuries suggest that even among these harder-to-verify conditions, changes in the propensity to bill WC are likely to account for no more than half of the overall decline in discharges billed to WC.

The paper proceeds as follows. The following section provides institutional background on the WC program and changes to public health insurance in Massachusetts and the three comparison states. The third section describes our data and empirical methods and considers prereform trends in overall ER discharges and ER discharges billed to WC in Massachusetts and the comparison states. The fourth section presents results, and the fifth section concludes and discusses directions for future research.

BACKGROUND

Our empirical analysis uses Massachusetts health care reform to identify the effect of increased access to health insurance on WC claims, comparing changes in ER discharges billed to WC in Massachusetts to those in New Jersey, Vermont, and Maryland. Expansions in access to

health insurance may cause a decrease in WC claiming if WC picks up medical costs of uninsured workers who experience non-work-related injuries (as in Smith, 1990); if workers who are injured on the job prefer to bill their costs to health insurance when it is available (perhaps due to stigma or fear of repercussions from their employers); or if Medical providers prefer to bill patient costs to health insurance over WC (perhaps because of high administrative costs and low reimbursement rates in WC). At the same time, gaining health insurance may also cause a decrease in the number of ER discharges billed to WC if it increases the likelihood that patients seek care outside of ERs; for example, in physician's offices or urgent care centers (Miller 2012).

Our DD approach depends on the assumption that ER discharges in these three states comprise a reasonable comparison group for Massachusetts. To that end, here we describe important features of both WC and public health insurance in Massachusetts and the comparison states.

Workers' Compensation in Massachusetts and Comparison States

In all states except Texas and Oklahoma, firms are required by law to obtain WC insurance to provide immediate coverage of medical and rehabilitation costs to workers who are injured or become ill on the job.[3] Workers may also file for WC indemnity benefits, which begin after a waiting period and are paid according to a state-mandated benefit schedule.[4] At the national level, medical costs have comprised an increasing share of the benefits paid out through state WC programs since the late 1980s. WC medical payments to providers amounted to $30.8 billion in

[3] All but the smallest firms face experience-rated premiums, whereby their insurance premiums increase with their past losses. Since employers pay higher WC premiums when workers receive medical or cash benefits, experience-rated employers may discourage injured workers from filing WC claims or dispute their claims, giving injured workers added incentive to use health insurance to pay for the medical costs of an injury.

[4] The waiting period is five days in Massachusetts, three days in Vermont and Maryland, and seven days in New Jersey. This difference is less important for our analysis because we focus on coverage of medical costs rather than indemnity payments.

2012 and now account for approximately half of all WC benefits paid out (Sengupta, Baldwin, and Reno 2014). If increased access to health insurance negatively impacts WC claiming, large-scale health insurance expansions may impact WC programs, lowering program costs. Indeed, WC medical benefit payments per covered worker decreased in Massachusetts after the 2006 reform, despite the fact that they were rising at the national level (Figure 2), and injury rates were falling less slowly in Massachusetts than in other states (Figure 3).

Provider incentives to bill health insurance versus WC may be impacted by the reimbursement the provider receives from WC. Compared to many states, Massachusetts WC provides a lower rate of reimbursement to providers for medical services (Coomer and Liu 2010). Massachusetts sets its fee schedule according to its Medicare reimbursement schedule, with some modifications, as does Maryland. Vermont bases its WC provider fee schedule on various Blue Cross/Blue Shield plans, and New Jersey does not have a provider fee schedule for WC. To assess the relative generosity of WC reimbursements in different states, Fomenko and Liu (2012) compare WC provider reimbursement amounts to Medicare provider reimbursements in the 43 states that have fee schedules. For ER services, the authors find that Massachusetts is the least generous state, Maryland is among the bottom four states, and Vermont is more generous but also falls below the median state. We later check the sensitivity of our results to the inclusion of any particular state and find the main results to be robust to separately dropping each state from the analysis.

Finally, injured workers in Massachusetts are, in principle, free to choose their own doctors (seeking initial treatment within a preferred provider network if their employers have such an arrangement), but some doctors refuse to accept the WC rate of reimbursement. Injured workers in Vermont and Maryland are also free to choose their physicians, while under New Jersey WC

law, the employer and/or the insurance carrier can select the physician(s) to treat injured workers for work-related injuries. In principle, the extent of physician choice may impact insured workers' incentives to use health insurance rather than WC to pay for medical costs; however, this difference between states is of less concern for our study because we observe injuries/illnesses treated in emergency rooms.

Massachusetts Health Care Reform

In April 2006, Massachusetts enacted major legislation designed to provide universal health insurance, expanding coverage to nearly all state residents. A model for the national reform legislation (PPACA) several years later, the Massachusetts reform combined an individual mandate to obtain health insurance coverage (or pay a tax penalty) with a substantial expansion of the state's Medicaid program (MassHealth), a state-run online health insurance exchange (the Connector), and subsidies for individuals in households with incomes up to 300 percent of the poverty line to purchase insurance. Gruber (2008) provides a detailed account of the reform's features, while the details on the implementation of the reform are documented elsewhere (see Lischko, Bachman, and Vangeli 2009).

The expansion of Massachusetts' Medicaid program, MassHealth, raised income eligibility cutoffs for children, restored coverage to groups who had lost it during the 2002–2003 fiscal crisis, including the long-term unemployed, and removed caseload caps for low-income people with disabilities (Kolstad and Kowalski 2012; Miller 2012). The Medicaid changes were among the first reform efforts to take hold, while other parts of the reform were implemented more slowly. We document a large and immediate uptick in the share of ER discharges being billed to Medicaid, beginning in the third quarter of 2006, when implementation of the reform first began.

To extend coverage to individuals who would not qualify for Medicaid, the reform initiated a new program called Commonwealth Care (CommCare). These plans were sold through the new, state-run health insurance exchange and offered free coverage to those below 150 percent of the poverty line and subsidized coverage to individuals up to 300 percent of the poverty line. Individuals above 300 percent of the poverty line could purchase health insurance coverage at regulated levels (i.e., bronze, silver, gold, platinum, and catastrophic plans for young adults) through an online marketplace, the Connector. And of course, individuals could continue purchasing employer-provided health insurance if it was available to them, or could continue purchasing plans directly from insurers through the nongroup market.

For uninsured individuals below 100 percent of the federal poverty line, the reform did not meaningfully change the price of an emergency room visit. Prior to the reform, care for these individuals would have been financed through the Uncompensated Care Pool, whereas after the reform, they were eligible for either fully subsidized Commonwealth Care plans or MassHealth (Raymond 2007); both require ER copays of just $3. Those between 100 and 200 percent of the poverty line, if ineligible for MassHealth, would face a higher ER copay of $50 after the reform, through partially subsidized Commonwealth Care plans (Miller 2012). On the other hand, the reform unambiguously lowered the price of a visit in a physician's office for all individuals below 200 percent of the poverty line.

Changes in Public Health Insurance in Comparison States

While none of the comparison states experienced the discrete drop in uninsurance brought about in Massachusetts by the 2006 reform (see Figure 1), all three states expanded access to health insurance for adults to some degree during our study period. However, we note that using these three states as a control group would, if anything, bias us toward underestimating the impacts of

Massachusetts health care reform, as expansions in access to insurance in the comparison group will mute the treatment contrast between Massachusetts and the comparison states.

Although Maryland did not enact comprehensive health care reform during our study period, in July 2008 the state expanded Medicaid to parents and childless adults with family incomes up to 116 percent of the federal poverty level (FPL) through the Primary Adult Care (PAC) Program (under a Section 1115 waiver).[5] At the same time, the state also began subsidizing health insurance premiums for employees working in small businesses. Although this popular public insurance expansion began enrolling adults during Massachusetts's postreform period, it only affects the last two quarters of our study period.

New Jersey's large public insurance expansions preceded our study period of 2004–2008. After the introduction of the Children's Health Insurance Program (CHIP) in 1998 (NJ KidCare), New Jersey expanded CHIP to parents (up to 200 percent FPL) and childless adults (up to 100 percent FPL) through the NJ FamilyCare program in 2001. Response to the program was overwhelming, and when combined with a large state budget shortfall, enrollment closed in September 2001 (Silow-Carroll et al. 2002). During our study period of 2004–2008, enrollment reopened for parents. In 2005, parents with incomes up to 100 percent FPL were eligible for coverage, and this income threshold for parents increased gradually to 133 FPL during the implementation and post periods (2006–2008).[6]

Most notably, comprehensive health care legislation was signed into law in Vermont in May 2006.[7] Prior to the legislation, Vermont had generous eligibility criteria for Medicaid (i.e.,

[5] http://www.commonwealthfund.org/publications/newsletters/states-in-action/2009/august/august-september-2009/snapshots/maryland-increasing-adult-eligibility-while-cutting-the-budget (accessed May 31, 2016).

[6] http://kff.org/medicaid/state-indicator/medicaid-income-eligibility-limits-for-parents/ (accessed May 31, 2016); http://www.state.nj.us/humanservices/dmahs/info/resources/medicaid/2005/05-08_NJ_FamilyCare_Expansion.pdf (accessed May 31, 2016).

[7] https://kaiserfamilyfoundation.files.wordpress.com/2013/01/7723.pdf (accessed May 27, 2016).

childless adults with incomes up to 150 percent FPL were eligible, and parents with incomes up to 192 percent FPL were eligible throughout the entire study period of 2004–2008). But the reform in Vermont also introduced the Catamount Health Plan, with subsidized premiums for individuals up to 300 percent FPL. Similar to Massachusetts, Vermont introduced a penalty to employers who do not offer affordable health care coverage. We include Vermont in our main analysis because it is a neighboring state with comparable information in the HCUP database; however, we recognize that including Vermont poses an especially stringent test on our estimates of the impacts of Massachusetts reform because of the concurrent reform.

DATA AND EMPIRICAL METHODS

Data: HCUP State Emergency Department Databases

Our analysis relies on data from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD), from 2004–2008. The SEDD are composed of data from hospital-based emergency departments and include all patients, regardless of payer (e.g., Medicare, Medicaid, private insurance, the uninsured, and other government programs, such as CHAMPUS). They include discharge information for emergency department visits that do not result in admission to the inpatient hospital or an outpatient observation stay. While not every hospital in Massachusetts contributes data, 99 percent of patient charges in the state (coming from 65 of the state's 68 hospitals) are included during this time period. In all cases, we restrict our samples to discharges for working-age adults, aged 20–64. A limitation of the current analysis is that, by focusing on ER discharges, we cannot capture the entire universe of care provided to workers who incur work-related injuries

or illnesses. However, nearly 40 percent of WC claims involve some ER care, suggesting that it is an important contributor to WC medical costs.

We first classify discharges according to the primary payer listed; if WC is listed as the first payer, we treat that discharge as billed to WC. In cases where the patient is listed as the primary payer ("self-pay"), we code those discharges as uninsured. Discharges billed to Medicaid and Medicare are clearly delineated in the SEDD data. We include as privately insured those for whom the primary payer is a private insurance plan.

We then aggregate total discharges (overall and by payer) to the county-quarter level. As our primary dependent variables, we construct per-capita measures of total ER discharges (per 100 residents) and discharges billed to WC and other payers, using county population estimates for 20- to 64-year-olds from the Small Area Health Insurance Estimates files from the Census Bureau.

The SEDD also provide some information on the nature of the discharge, including the day and time of admission and the ICD-9 diagnosis code.[8] We use this information to examine heterogeneity in the impacts of health insurance on WC discharges for admissions occurring during weekday business hours versus weekend and weekday overnight hours, as well as to compare WC discharges for musculoskeletal injuries versus more easily verifiable burns, traumas, and wounds. In these regressions, we use county totals for the different categories of discharges as the dependent variable.

We control for county-level traits that may affect the number of discharges billed to WC, including the share of total discharges that arise from different types of injuries (cuts, falls,

[8] The day of admission is reported in all states; however, the time of the admission is only available in Massachusetts and New Jersey. In our analysis of heterogeneous treatment effects, we use day of admission to compare weekday versus weekend discharges. In a separate comparison of only Massachusetts and New Jersey, we incorporate the time of admission to compare weekday business-hour admissions to weekend and weekday overnight admissions.

drowning, fires, firearm accidents, machinery, motor vehicle accidents, environmental causes, poisonings, being struck, suffocations, and overexertion), and the county-quarter unemployment rate, median income, and percent black in the individual's county, similar to Miller (2012).

In the pre period, there are on average 8.7 quarterly ER discharges per 100 residents in Massachusetts, and approximately one ER discharge is billed to WC for every 200 residents. Relative to the comparison states, there are more ER discharges in Massachusetts, fewer uninsured discharges, and more discharges covered by Medicaid. Although there are differences in the levels of the discharges between Massachusetts and the comparison states, we later demonstrate that the pre period trends in the outcome of interest—WC discharges—are quite similar for the two groups.

Methods

To estimate the causal impact of Massachusetts 2006 health care reform on WC claims, we use a DD approach, comparing changes in ER discharges billed to WC for counties in Massachusetts to changes in counties in three comparison states (Maryland, New Jersey, and Vermont) over the years from 2004 through 2008. This approach controls for confounding factors that may also have been changing over this time period. For instance, the economic downturn that began in the fall of 2007 may have impacted the number and composition of WC bills, as well as the health of the working-age population, insurance coverage, and ER usage. The internal validity of our DD estimator depends on the assumption that ER discharges in Massachusetts would have evolved similarly to discharges in the group of comparison states in the absence of health care reform (*parallel trends*). We consider the plausibility of this assumption in the following section.

We examine the impacts of the reform on the overall number of ER discharges per capita (per 100 residents), and the number of discharges billed to WC and other payers per capita. Our regression models take the following form:

$$D_{ct} = \beta_0 + \beta_1 MA_c + \beta_2 imp_t + \beta_3 post_t + \beta_4 MA_c \times imp_t + \beta_5 MA_c \times post_t + \beta_6 X_{ct} + \gamma_c + \delta_t + \varepsilon_{ct} \quad (1)$$

where the unit of observation is the county-quarter, D_{ct} is the per-capita number of discharges, MA_c is an indicator for a county in Massachusetts, imp_t equals one for the quarters in the implementation period (from July 2006 through December 2007), $post_t$ indicates post reform quarters in 2008, X_c is a vector of county characteristics (the unemployment rate, the share of the population that is black, and the median income), γ_c is a set of county fixed effects, and δ_t is a set of quarter fixed effects to capture seasonality of injuries. The key DD estimators are β_4 and β_5.

We estimate this model for the overall (per-capita) number of discharges from the ER, as well as for the per-capita number of discharges billed to WC, private insurers, and Medicaid, and the number uninsured. We also include a regression for discharges billed to Medicare, as a check on our results for the 20–64 population. We note that these four payer types are not exhaustive, because a fraction of discharges is billed to "other" payers not included here.[9]

We expect the regressions described by Equation (1) to confirm that Massachusetts health care reform caused a decrease in the overall number of (per-capita) ER discharges. This decline in discharges is likely to reflect a shifting of treatment away from emergency rooms to other settings, as in Miller (2012). Such an effect is consistent with the reform decreasing the price of a physician's visit relative to an ER visit for individuals in Massachusetts who gained insurance.

If we also find that the reform caused a decrease in per-capita discharges billed to WC, this effect could be driven by a shifting of the site of care for many injuries and illnesses away from the ER, and/or by a decrease in the propensity to bill WC for a particular ER visit. The relative magnitude of the reform's effect on WC discharges, compared to total ER discharges, can shed

[9] Importantly, in Massachusetts, discharges billed to one of the CommCare insurance plans purchased on the exchange are coded as "other." This is not problematic for our key dependent variable of interest (WC discharges).

some light on the importance of these two mechanisms. Because WC involves no patient cost sharing, we do not expect work-related injuries and illnesses to exhibit greater shifting of care away from ERs than other non-work-related conditions. Thus, if the per-capita decrease in WC discharges is larger, in percentage terms, than the decrease in all ER discharges, this would indicate that increased access to health insurance also decreases the propensity to bill WC for a given condition.

Estimated effects should be larger for conditions for which there is more scope for changing payers or seeking care outside of the emergency room. We first test for heterogeneous treatment effects by separately examining discharges by day of admission, expecting less potential for the site of care to shift for weekend admissions. Second, we split the sample by whether the diagnosis was for a musculoskeletal injury/illness or a "wound" (here we include ICD-9 codes for head wounds, open wounds, contusions, burns, spinal cord injuries, and poisoning or reaction to a toxic substance).[10]

In all cases, we report robust standard errors, which were larger than those derived when we clustered at either the county or state level.[11] While the policy variation occurs at the state level, clustering on state, with too few clusters, could lead us to over-reject the null hypothesis (Bertrand, Duflo, and Mullainathan 2004). Bootstrapping methods for addressing this problem, as proposed in Cameron, Gelbach, and Miller (2008), require at least six clusters, whereas we study just four states. Because robust standard errors resulted in the most conservative test statistics, we use these throughout.

[10] We classify musculoskeletal injuries as those with 3-digit ICD-9 codes between 710 and 739 ("Diseases of the Musculoskeletal System and Connective Tissue") or between 840 and 858 ("Sprains and Strains of Joints and Adjacent Muscles"). We classify wounds as any discharge with a 3-digit ICD-9 code between 850 and 989.

[11] These results are available in the Appendix for comparison.

ER Discharges in Massachusetts and Comparison States in the Prereform Period

Table 1 presents differences between Massachusetts and the comparison states in the total number of per-capita ER discharges, as well as the numbers of discharges billed to different payers. Massachusetts counties have a somewhat higher number of quarterly ER discharges overall in the prereform period (8.65 ER discharges per 100 residents versus 7.26 ER discharges in comparison states), and a larger per-capita number of discharges billed to WC (0.49 versus 0.26). Massachusetts also entered the reform period with a much lower uninsurance rate than other states, which is reflected in the lower number of uninsured discharges and the higher number of discharges billed to private and public insurance in Massachusetts, relative to comparison states.

While it is worth noting these treatment-control differences in the levels of mean outcomes during the prereform period, our DD estimates will be biased if WC discharges were *trending* differently in Massachusetts and the comparison states prior to the reform. Said differently, the identifying assumption that allows us to draw a causal link between increased insurance coverage resulting from Massachusetts health care reform and any change in WC claiming behavior is that no other trend differentially impacted WC discharges in Massachusetts relative to comparison states.

Figure 4 documents that the trend in the number of ER discharges billed to WC per capita is similar during the pre period for Massachusetts and the comparison states. In the pre period, WC discharges per capita are decreasing slightly in both Massachusetts and the comparison group. We also note that the series appear to converge slightly in the implementation and post periods, with WC discharges in Massachusetts decreasing somewhat more rapidly than those in the other states. In Figure 5 we repeat this exercise for the county-level *share* of ER discharges billed to WC in Massachusetts and the group of comparison states. While the share of discharges

billed to WC is consistently higher in Massachusetts than in the comparison states, the trend lines track in a parallel fashion through the pre period.

RESULTS

Effects of Health Care Reform on ER Discharges Billed to WC

The results in the first panel of Table 2 (column 1) document significant decreases in the number of injuries discharged from ERs in Massachusetts during the implementation and post periods relative to comparison states. Discharges from the ER decrease by 6.7 percent in the implementation period and 8.5 percent in the post period (relative to a preperiod mean of 8.7 quarterly discharges per 100 residents).[12] These reductions are consistent with increased access to health insurance lowering the relative price of care outside the emergency room.

The primary outcome of interest, however, is the number of per-capita discharges billed to WC (in column 2). The DD estimates indicate that Massachusetts health care reform caused a significant reduction in the number of WC discharges in both the implementation and post periods. Of course, the negative sign on these coefficients is unsurprising, given that overall ER usage declined as a result of the reform. Comparing the magnitudes of these coefficients to the DD estimates for total ER discharges, we note that the reductions in WC discharges (6.4 percent and 8.4 percent in the implementation and post periods, respectively) are very similar in magnitude to the reductions in ER discharges overall. Because these effect sizes are so similar for WC discharges and total ER discharges, we estimate no change in the *share* of discharges billed to WC (panel B of Table 2).

[12] Our estimates are similar in magnitude to those of Miller (2012), who finds a reduction in ER discharges of approximately 5 percent. However, she included discharges for patients of all ages, and her data set was not limited to outpatient-only ER discharges.

In Table 3, we examine the robustness of our main results (repeated in column 1 for comparison) to several specification checks. First, in column (2), we probe the parallel trends assumption by including interaction terms between Massachusetts and each of the two preperiod years, 2004 and 2005. If our main interaction terms of interest were merely capturing a preexisting trend that differed between Massachusetts and comparison states, then including these lead terms may reduce our estimated impacts in the implementation and post. Our DD results are robust to this change; we continue to estimate significant decreases in WC discharges per capita for both the implementation and post periods, and the estimates are of similar magnitude to those in column (1). We also confirm that the coefficient estimates on the two preperiod interaction terms are close to zero and not statistically significant, suggesting that WC discharges were not changing differently in MA relative to the comparison states in the pre period.[13]

In the next several columns we test the appropriateness of our comparison group in several ways. In columns (3) - (5), we demonstrate the robustness of our estimates to dropping each comparison state individually. The magnitudes of the effects drop somewhat when we eliminate New Jersey from the comparison sample, perhaps because Maryland and Vermont enacted more substantial expansions to public health insurance during this time period. Finally, in columns (6) and (7) we estimate our DD model at the state level instead of the county level, and then create a synthetic control group that weights each comparison state according to the extent to which it matches Massachusetts on prereform characteristics (Abadie, Diamond, and Hainmueller 2010; see Hansen [2014] for a similar application).[14] In both cases, we estimate significant decreases in

[13] The coefficient estimate on *MA*2004* is 0.002 (standard error 0.010), and the coefficient estimate on *MA*2005* is 0.004 (standard error 0.009).

[14] We construct the synthetic control group using the following covariates: state population age 20–64, share of population residing in a metro area, mean household income, share black, share uninsured, state unemployment rate, distribution of employment by 1-digit industry, distribution of population age 18–64 by age

per-capita ER discharges billed to WC, which are similar in magnitude (or perhaps slightly larger than) our primary results. Again, we find the *percentage* reduction in per-capita discharges billed to WC to be similar to the percentage reduction in total ER discharges.

Unfortunately, these estimates alone do not allow us to draw neat conclusions about whether Massachusetts health care reform caused a change in the propensity for conditions treated in the ER to be billed to WC (i.e., a change in claiming behavior). Rather, the decrease in WC discharges per capita could be accounted for entirely by a shifting in the location of care for work-related injuries and illnesses that was equal in degree to the shifting of site of care for *all* injuries and illnesses, or could reflect a lesser degree of shifting of site of care for work-related injuries/illnesses, combined with a change in the propensity to bill WC for a particular condition.[15] In what follows, we provide evidence on which of these explanations is most likely.

Heterogeneous Effects of Health Care Reform on WC Discharges

Table 4 (columns 2 and 3) presents estimated effects of increased access to insurance on per-capita ER discharges billed to WC separately for admissions on weekdays versus admissions occurring over the weekend. Injuries occurring during the weekend are less likely to be treated outside of the ER because most physicians' offices and some urgent care centers are closed. The results consistently indicate larger impacts for weekday admissions, for which treatment can more easily be shifted away from the ER.[16] For example, the number of per-capita weekday discharges billed to WC declines by 7–9 percent in Massachusetts relative to comparison states, while the number of weekend discharges billed to WC declines between 0 and 5 percent. For weekday

category, distribution of educational attainment, and WC discharges per capita in 2004 Q1 and 2004 Q2 (or share of discharges billed to WC in 2004 Q1 and 2004 Q2 in Panel C of Table 3).

[15] Recall that WC involves no patient cost sharing, and therefore, we expect no greater shifting away from the ER for work-related injuries/illnesses than for other, non-work-related conditions.

[16] Note that injuries that occur during these hours are also less likely to be work related and therefore may involve, on average, less scope for shifting medical costs between health insurance and WC.

admissions, again we find that the percentage decreases in discharges billed to WC are extremely close in magnitude to the percentage decreases in overall ER discharges, while for weekend work-related admissions, there appears to be less shifting away from the ER than for non-work-related weekend admissions. For both subsamples, these results are consistent with the possibility that the primary driver of the decline in per-capita WC discharges is workers seeking care outside of the emergency room.

The results in Table 5 compare the effects of the reform on WC discharges for injuries that are more or less easily verifiable. We isolate the admissions within the sample that were diagnosed as either wounds or musculoskeletal injuries (column 2) and then look for differential impacts across these two categories (columns 3 and 4). Here we expect that the scope for fraudulent reporting or substitution between health insurance and WC will be greater for musculoskeletal injuries, which are less verifiable than wounds. At the same time, musculoskeletal injuries may also involve more scope to shift to a non-ER setting (e.g., to wait for one's physician's office to open) than a wound. In either case, we would estimate larger impacts on WC discharges for musculoskeletal injuries.

The estimates in columns (3) and (4) reveal larger *percentage* reductions in WC discharges for musculoskeletal injuries and smaller reductions for admissions diagnosed as wounds. (Note that one should not directly compare the coefficient estimates because the prereform means are quite different.) Indeed, in the bottom panel of Table 5, we estimate a significant negative impact of health care reform on the share of musculoskeletal injuries billed to WC but no decrease in the share of wounds billed to WC.

In thinking about how to interpret these results, comparing the effect sizes for WC discharges and all ER discharges can be helpful. Suppose that following a health insurance

expansion, patients with work-related injuries are equally likely as those with non-work-related injuries to seek care in settings other than the ER. Then a back-of-the-envelope calculation can yield a rough upper bound on the extent to which substitution between health insurance and WC (which could occur because of fraudulent reporting of nonwork injuries but could also be explained by other provider/patient incentives) can explain the reform-induced decrease in WC discharges per capita. Here we find that even for musculoskeletal injuries, which are harder to verify, a decreased propensity to bill WC following a health insurance expansion is likely to explain less than half of the decline in per-capita WC discharges.[17] Not surprisingly, our estimates for wounds indicate that the role for changing propensity to bill WC is much smaller for these easier-to-verify injuries.

CONCLUSIONS

The interaction of public health insurance with other social insurance programs, like WC, is of crucial importance for policy making, yet these programs are often studied in isolation. The literature has only recently begun to assess the impacts of expansions in health insurance coverage on participation in WC, or on program costs (Dillender 2015; Heaton 2012). Our study expands on existing research in Dillender (2015) by analyzing the impacts of Massachusetts 2006 health care reform on WC claims among working-age adults (as opposed to young adults right around age 26, the ACA's cut-off for dependent coverage) and by studying a sample of injuries and illnesses that may have occurred at work without conditioning on WC receipt. Unlike the approach

[17] We calculate this by assuming that the estimated percentage decline in *all* ER discharges is a good proxy for the amount of the decline in WC discharges that is due to shifting site of care, while the rest could be due to substitution between payers. For musculoskeletal injuries in the implementation period, shifting between payers would explain 7.7 − 4.9 = 2.8 percentage points (or 36 percent) of the 7.7 percent decline of in WC discharges.

in Heaton (2012), who also studies Massachusetts health care reform, our DD methodology uses three comparison states to disentangle the impact of health care reform from any concurrent effect of the Great Recession on WC claims.

Our primary results indicate that the increase in access to insurance associated with the 2006 reform reduced the per-capita number of ER discharges billed to WC by 6–8 percent. This finding is robust to a number of robustness and specification checks, including adding leads of the treatment, reestimating the model dropping each comparison state individually, estimating the DD model at the state (rather than county) level, and a synthetic control group approach. Without a more comprehensive view of all places of care, we cannot precisely disentangle to what extent the reduction in ER discharges billed to WC is explained by patients seeking care outside of ERs versus injured workers responding to incentives to bill health insurance rather than WC.

However, we provide substantial evidence that shifts in the site of care matter more than substitution between payers. We examine ER events that occur when physician offices and urgent care facilities are typically closed (i.e., weekend admissions versus weekday), and ER events for diagnoses that were musculoskeletal versus wounds, traumas, and burns. We consistently estimate statistically significant reductions in WC discharges per capita among weekday admissions, as well as for musculoskeletal diagnoses, effects that are larger than the impacts of the reform on weekend admissions and wounds. We conclude that health care reform's negative impact on per-capita ER discharges billed to WC was driven primarily by injured workers shifting their care to non-ER sites, whereas any reform-induced change in the propensity to bill WC for a given injury was much smaller.

Importantly, however, even if the *entire* decrease in WC discharges is accounted for by a shifting of care away from ERs (and there is *no* decrease in the propensity to claim WC for a given

injury or illness), this would likely lead to decreased WC medical costs for employers and insurers (see Figure 2). If, as our results indicate, health care reform caused more work-related injuries and illnesses to be treated in urgent care facilities or physicians' offices, where the cost of a given procedure is generally lower than in the ER, cost savings in WC may be counted as an additional benefit of the reform.

REFERENCES

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller (2010). "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105(490): 493–505.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics* 119(1): 249–275.

Cameron, Colin, Jonah B. Gelbach, and Douglas L. Miller. 2008. "Bootstrap-Based Improvements for Inference with Clustered Errors." *Review of Economics and Statistics* 90(3): 414–427.

Card, David, and Brian P. McCall. 1996. "Is Workers' Compensation Covering Uninsured Medical Costs? Evidence from the 'Monday Effect.'" *Industrial and Labor Relations Review* 49(4): 690–706.

Coomer, Nicole, and Te-Chun Liu. 2010. "Benchmarks for Designing Workers' Compensation Medical Fee Schedules: 2009." *Workers Compensation Research Institute Report WC-10-32.* Cambridge, MA: Workers Compensation Research Institute.

Dillender, Marcus. 2015. "The Effect of Health Insurance on Workers' Compensation Filing: Evidence from the Affordable Care Act's Age-Based Threshold for Dependent Coverage." *Journal of Health Economics* 43: 204–228.

Fomenko, Olesya, and Te-Chun Liu. 2012. "Designing Workers' Compensation Medical Fee Schedules." *Workers Compensation Research Institute Report WC-12-19.* Cambridge, MA: Workers Compensation Research Institute.

Gruber, Jonathan. 2008. "Massachusetts Health Care Reform: The View from One Year Out." *Risk Management and Insurance Review* 11(1): 51–63.

Hansen, Benjamin. 2014. "California's 2004 Workers' Compensation Reform: Costs, Claims, and Contingent Workers." *Industrial and Labor Relations Review* 69(1): 173–198.

Hansen, Benjamin, and Gregory J. DeAngelo. 2014. "Life and Death in the Fast Lane: Police Enforcement and Traffic Fatalities." *American Economic Journal: Economic Policy* 6(2): 231–257.

Heaton, Paul. 2012. *The Impact of Health Care Reform on Workers' Compensation Medical Care Evidence from Massachusetts*. RAND Technical Report. Santa Monica, CA: RAND.

Kolstad, Jonathan T., and Amanda E. Kowalski. 2012. "The Impact of Health Care Reform on Hospital and Preventive Care: Evidence from Massachusetts." *Journal of Public Economics* 96: 909–929.

Lakdawalla, Darius N., Robert T. Reville, and Seth A. Seabury. 2005. "How Does Health Insurance Affect Workers' Compensation Filing?" RAND Working Paper WR-205-1-ICJ. Santa Monica, CA: RAND.

Leigh, J. Paul, and Michael M. Ward. 1997. "Medical Costs in Workers' Compensation Insurance: Comment." *Health Economics* 16(5): 619–622.

Lischko, Amy M., Sara S. Bachman, and Alyssa Vangeli. 2009. "The Massachusetts Commonwealth Health Insurance Connector: Structure and Functions." The Commonwealth Fund Issue Brief. Washington, DC: Commonwealth Fund.

Miller, Sarah. 2012. "The Effect of Insurance on Emergency Room Visits: An Analysis of the 2006 Massachusetts Health Reform." *Journal of Public Economics* 96(11): 893–908.

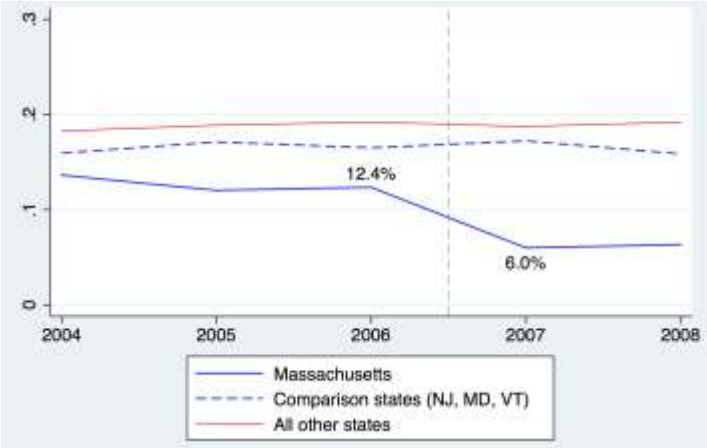
Raymond, Alan G. 2007. "The 2006 Massachusetts Health Care Reform Law: Progress and Challenges after One Year of Implementation." Waltham, MA: Massachusetts Health Policy Forum.

Sengupta, Ishita, Marjorie Baldwin, and Virginia Reno. 2014. *Workers' Compensation: Benefits, Coverage, and Costs, 2012*. National Academy of Social Insurance Report. Washington, DC: National Academy of Social Insurance.

Silow-Carroll, Sharon, Emily K. Waldman, Jack A. Meyer, Claudia Williams, Kimberley Fox, and Joel C. Cantor. 2002. *Assessing State Strategies for Health Coverage Expansion: Case Studies of Oregon, Rhode Island, New Jersey, and Georgia*. Washington, DC: Commonwealth Fund.

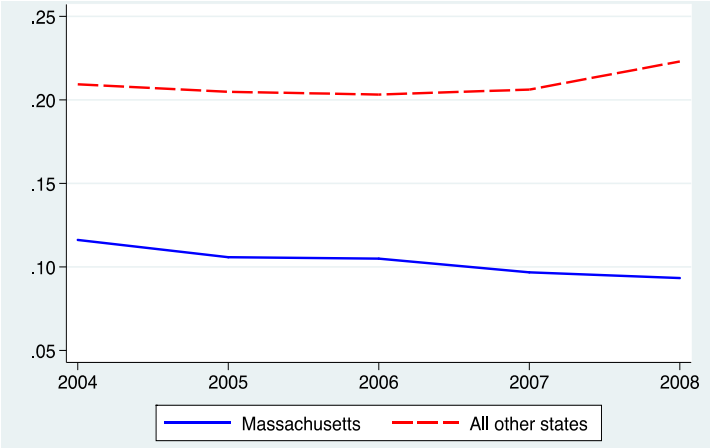
Smith, Robert S. 1990. "Mostly on Monday: Is Workers' Compensation Covering Off-the-Job Injuries?" In *Benefits, Costs, and Cycles in Workers' Compensation*, Phillip Borba and David Appel, eds. Boston: Kluwer Academic, pp. 115–127.

Figure 1 Percent Uninsured in Massachusetts and Other States, 2004–2008



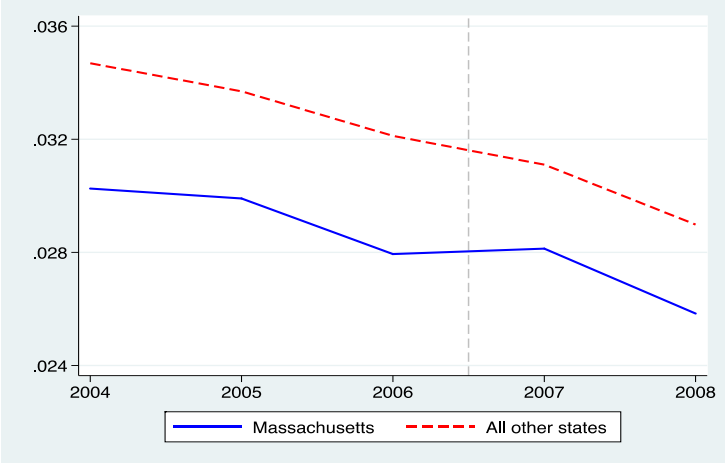
SOURCE: Authors' calculations from March Current Population Survey.

Figure 2 WC Medical Benefits Paid Per Covered Worker, 2004–2008



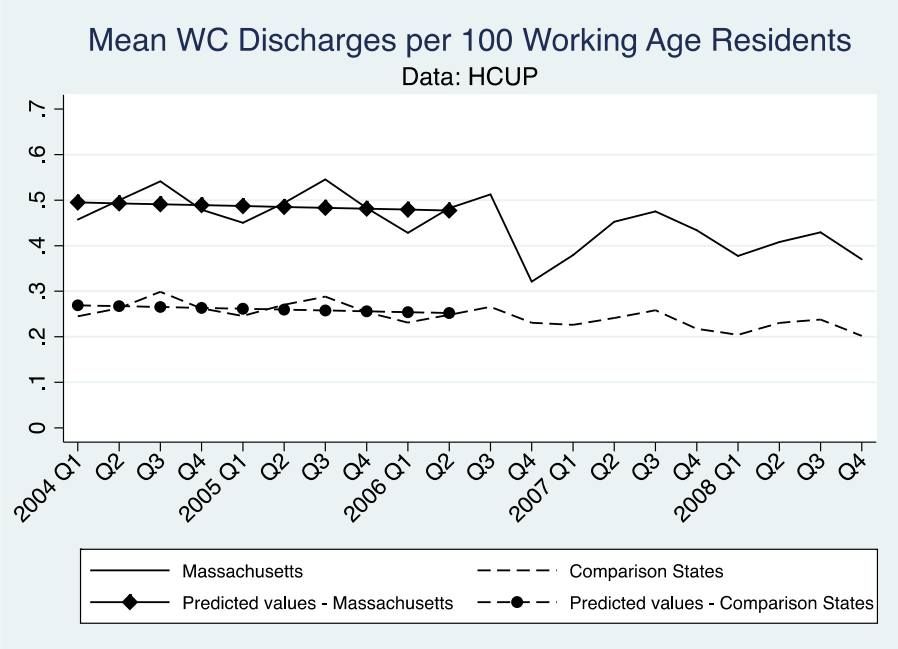
SOURCE: National Academy of Social Insurance.

Figure 3 Rate of Private Industry Injury or Illness, 2004–2008



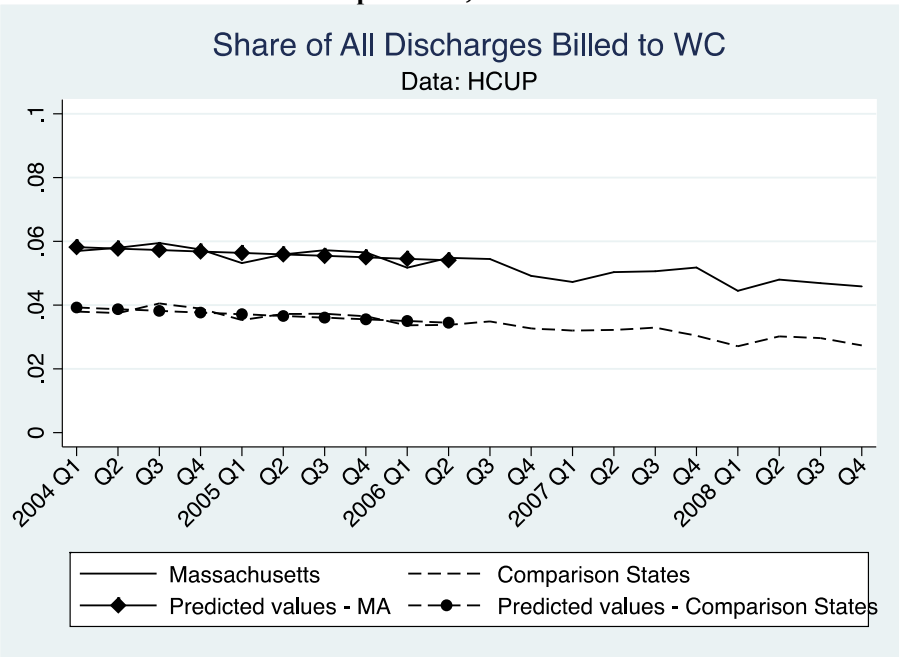
SOURCE: BLS Survey of Occupational Injuries and Illnesses.

Figure 4 Emergency Room Discharges Billed to Workers' Compensation per 100 County Residents, 2004–2008



SOURCE: Healthcare Cost and Utilization Project.

Figure 5 Share of Emergency Room Discharges Billed to Workers' Compensation, 2004–2008



SOURCE: Healthcare Cost and Utilization Project.

Table 1 Mean Per-Capita Discharges in Massachusetts and Comparison States in Prereform Period (discharges per 100 county residents)

	Massachusetts	Comparison states
Total emergency room discharges	8.65	7.26
WC	0.49	0.26
Share discharges billed to WC	0.06	0.04
Uninsured	1.00	2.14
Privately insured	3.84	3.54
Medicaid	1.74	0.77
Medicare	0.71	0.41
N	140	590

NOTE: County-quarter observations for the years 2004 and 2005. Observations are weighted by county population estimates for 20- to 64-year-olds from the Small Area Health Insurance Estimates files from the Census Bureau.
SOURCE: Authors' calculations.

Table 2 Effects of Massachusetts (MA) Health Care Reform on Emergency Room Discharges Billed to Workers' Compensation (WC) and Other Payers

Panel A: Per-Capita Results						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	−0.577***	−0.031***	−0.335***	−0.170**	0.165***	−0.008
	(0.141)	(0.009)	(0.027)	(0.070)	(0.044)	(0.015)
Post period × MA	−0.733***	−0.041***	−0.538***	−0.111*	0.350***	0.037***
	(0.129)	(0.006)	(0.031)	(0.063)	(0.047)	(0.015)
Prereform MA mean	8.649	0.486	0.997	3.84	1.74	0.709
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	**−6.7**	**−6.4**	**−33.6**	**−4.4**	**9.5**	−1.1
Post period	**−8.5**	**−8.4**	**−54.0**	**−2.9**	**20.1**	**5.2**
County-quarter observations	1,460	1,460	1,460	1,460	1,460	1,460
R^2	0.962	0.945	0.982	0.871	0.970	0.962
Panel B: Share of Discharges Billed to Different Payers						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	–––	−0.0003	−0.028***	0.019***	0.028***	0.003***
	–––	(0.0005)	(0.002)	(0.004)	(0.002)	(0.001)
Post period × MA	–––	−0.0005	−0.042***	0.038***	0.046***	0.008***
	–––	(0.0006)	(0.002)	(0.004)	(0.002)	(0.001)
Prereform MA mean	–––	0.056	0.115	0.453	0.194	0.081
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	–––	−0.5	**−24.3**	**4.2**	**14.4**	**3.7**
Post period	–––	−0.9	**−36.5**	**8.4**	**23.7**	**9.9**
County-quarter observations	–––	1,460	1,460	1,460	1,460	1,460
R^2	–––	0.941	0.986	0.966	0.979	0.962

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. DD = differences-in-differences. Regressions include 1,460 county-quarter observations from 2004 through 2008. Regressions include controls for implementation period, post period; quarter and county fixed effects; county-level unemployment, median income, and percent black; and share of discharges comprised of the following types of injury: cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. Robust standard errors are presented in parentheses. Regressions are weighted by the county population.
SOURCE: Authors' calculations.

Table 3 Effects of Massachusetts (MA) Health Care Reform on Emergency Room (ER) Discharges Billed to Workers' Compensation, Robustness Checks

	Main results (1)	Include lead terms (2)	Drop MD (3)	Drop NJ (4)	Drop VT (5)	State level (6)	Synthetic control (7)
Panel A: Workers' Compensation Discharges (per capita)							
DD coefficients							
Implementation period × MA	−0.031***	−0.029**	−0.038***	−0.020**	−0.031***	−0.044	−0.059***
	(0.005)	(0.011)	(0.009)	(0.009)	(0.009)	(0.026)	(0.016)
Post period × MA	−0.041***	−0.038***	−0.045***	−0.034***	−0.042***	−0.049***	−0.033**
	(0.006)	(0.009)	(0.007)	(0.007)	(0.006)	(0.013)	(0.016)
Effect sizes (DD coefficient as a % of prereform mean, 0.486)							
Implementation period	**−6.4**	**−6.0**	**−7.8**	**−4.1**	**−6.4**	−9.1	**−12.1**
Post period	**−8.4**	**−7.8**	**−9.3**	**−7.0**	**−8.6**	**−10.1**	**−6.8**
Panel B: All ER Discharges (per capita)							
DD coefficients							
Implementation period × MA	−0.577***	−0.364**	−0.680***	−0.426***	−0.603***	−0.711*	−0.901***
	(0.141)	(0.181)	(0.147)	(0.137)	(0.143)	(0.367)	(0.186)
Post period × MA	−0.733***	−0.519***	−0.863***	−0.542***	−0.768***	−0.784***	−0.678***
	(0.129)	(0.169)	(0.145)	(0.134)	(0.131)	(0.192)	(0.177)
Effect sizes (DD coefficient as a % of prereform mean, 8.649)							
Implementation period	**−6.7**	**−4.2**	**−7.9**	**−4.9**	**−7.0**	**−8.2**	**−10.4**
Post period	**−8.5**	**−6.0**	**−10.0**	**−6.3**	**−8.9**	**−9.1**	**−7.8**
Panel C: Share of Discharges Billed to Workers' Compensation							
DD coefficients							
Implementation period × MA	−0.000	−0.002*	−0.0001	0.0002	−0.0004	−0.001	−0.001
	(0.000)	(0.001)	(0.0006)	(0.0006)	(0.0006)	(0.001)	(0.001)
Post period × MA	−0.001	−0.002**	0.0005	−0.0009	−0.0007	−0.001	0.001
	(0.001)	(0.001)	(0.0007)	(0.0007)	(0.0007)	(0.001)	(0.001)
N	1,460	1,460	980	1,040	1,180	80	80

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. DD = differences-in-differences. Regressions include controls for implementation period, post period, quarter and year fixed effects. In columns (1)–(5), county-quarter-level regressions also include county fixed effects; county-level unemployment, median income, and percent black; and share of discharges comprised of the following types of injury: cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. In columns (1)–(5), county-quarter-level observations are weighted by the county population. Columns (6) and (7) present results at the state-quarter level. In column (6), state-level regressions include state fixed effects; state unemployment, median income, and percent black; and state share of discharges comprised of external cause of injury and are weighted by state population in column (6). Column (7) presents results from constructing a synthetic control group and cells are weighted by their contribution to the synthetic control state. In the per capita results presented in Panels A and B, Maryland contributes 9.2%, New Jersey contributes 0%, and Vermont contributes 90.8% (Massachusetts contributes 100% of the treatment group). For the results presented in Panel C describing the share of all discharges billed to WC, Maryland contributes 8.9%, New Jersey contributes 26% and Vermont contributes 65.2%. We construct the synthetic control group using the following covariates: state population age 20–64, share of population residing in a metro area, mean household income, share black, share uninsured, state unemployment rate, distribution of employment by 1-digit industry, distribution of population age 18–64 by age category, distribution of educational attainment, and WC discharges per capita in 2004 Q1 and 2004 Q2 (or share of discharges billed to WC in 2004 Q1 and 2004 Q2 in Panel C). Robust standard errors are in parentheses (columns [1]–[6]).

SOURCE: Authors' calculations.

Table 4 Heterogeneous Effects by Admission Day and Time

	Main results	Weekend admission	Weekday admission
	(1)	(2)	(3)
Panel A: Discharges Billed to Worker's Compensation (per capita)			
DD coefficients			
Implementation period × MA	−0.031***	−0.002	−0.027***
	(0.009)	(0.002)	(0.007)
Post period × MA	−0.041***	−0.004**	−0.035***
	(0.006)	(0.001)	(0.005)
Prereform MA mean	0.486	0.083	0.403
Effect sizes (DD coefficient as % of prereform mean)			
Implementation period	**−6.4**	−2.4	**−6.7**
Postperiod	**−8.4**	**−4.8**	**−8.7**
Panel B: All Emergency Room Discharges (per capita)			
DD coefficients			
Implementation period × MA	−0.577***	−0.150***	−0.415***
	(0.141)	(0.041)	(0.101)
Post period × MA	−0.733***	−0.167***	−0.551***
	(0.129)	(0.037)	(0.092)
Prereform MA mean	8.649	2.454	6.195
Effect sizes (DD coefficient as % of prereform mean)			
Implementation period	**−6.7**	**−6.1**	**−6.7**
Post period	**−8.5**	**−6.8**	**−8.9**
Panel C: Share of Emergency Room Discharges Billed to Worker's Compensation			
DD coefficients			
Implementation period × MA	−0.0003	0.0011**	−0.0005
	(0.0005)	(0.0005)	(0.0006)
Post period × MA	−0.0005	0.0007	−0.0007
	(0.0006)	(0.0005)	(0.0007)
N		1,460	

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level.
DD = differences-in-differences; MA = Massachusetts. Regressions are weighted by the county population. Regressions include controls for implementation period, post period; quarter and county fixed effects; county-level unemployment, median income, and percent black; and share of discharges caused by cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. Robust standard errors are in parentheses.
SOURCE: Authors' calculations.

Table 5 Effect of Massachusetts (MA) Health Reform on Claiming Workers' Compensation (WC) by Likelihood of Fraudulent Claiming

	Main results	Wounds and musculoskeletal	Wounds	Musculoskeletal
	(1)	(2)	(3)	(4)
Panel A: Discharges Billed to WC (per capita)				
DD coefficients				
Implementation period × MA	−0.031***	−0.026***	−0.013***	−0.012***
	(0.009)	(0.007)	(0.004)	(0.003)
Post period × MA	−0.041***	−0.034***	−0.018***	−0.015***
	(0.006)	(0.005)	(0.003)	(0.002)
Prereform MA mean	0.486	0.393	0.237	0.156
Effect Sizes (DD coefficient as % of prereform mean)				
Implementation period	**−6.4**	**−6.6**	**−5.5**	**−7.7**
Post period	**−8.4**	**−8.7**	**−7.6**	**−9.6**
Panel B: All Emergency Room Discharges (per capita)				
DD coefficients				
Implementation period × MA	−0.577***	−0.155***	−0.069***	−0.078***
	(0.141)	(0.046)	(0.021)	(0.027)
Post period × MA	−0.733***	−0.181***	−0.079***	−0.090***
	(0.129)	(0.040)	(0.018)	(0.026)
Prereform MA mean	8.649	2.992	1.396	1.595
Effect sizes (DD coefficient as % of prereform mean)				
Implementation period	**−6.7**	**−5.2**	**−4.9**	**−4.9**
Post period	**−8.5**	**−6.0**	**−5.7**	**−5.6**
Panel C: Share of Emergency Room Discharges Billed to WC				
DD coefficients				
Implementation period × MA	−0.0003	−0.0004	0.002	−0.003**
	(0.0005)	(0.0013)	(0.002)	(0.001)
Post period × MA	−0.0005	−0.0007	0.004*	−0.004***
	(0.0006)	(0.0016)	(0.002)	(0.001)
Prereform MA mean	0.056	0.131	0.169	0.097
N	1,460	1,460	1,460	1,460

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. DD = differences-in-differences. Wounds are coded as discharges with a 3-digit ICD-9 code between 850 and 989. Musculoskeletal injuries are coded as discharges with a 3-digit ICD-9 code between 710 and 739 or between 840 and 848. Regressions are weighted by the county population. Regressions include controls for implementation period, post period; quarter and county fixed effects; county-level unemployment, median income, and percent black; and share of discharges caused by cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. Robust standard errors in parentheses. Regressions are weighted by the county population.
SOURCE: Authors' calculations.

Appendix Table 1 Effects of Massachusetts (MA) Health Care Reform on Emergency Room Discharges Billed to Workers' Compensation (WC) and Other Payers, Standard Errors Clustered by State

Panel A: Per-Capita Results						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	−0.577***	−0.031**	−0.335***	−0.170**	0.165**	−0.008
	(0.068)	(0.006)	(0.021)	(0.058)	(0.046)	(0.010)
Post period × MA	−0.733***	−0.041***	−0.538***	−0.111	0.350***	0.037**
	(0.075)	(0.002)	(0.038)	(0.072)	(0.050)	(0.010)
Prereform MA mean	8.649	0.486	0.997	3.84	1.74	0.709
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	**−6.7**	**−6.4**	**−33.6**	**−4.4**	**9.5**	−1.1
Post period	**−7.3**	**−8.4**	**−54.0**	−2.9	**20.1**	**5.2**
County-quarter observations	1,460	1,460	1,460	1,460	1,460	1,460
R^2	0.962	0.945	0.982	0.871	0.970	0.962
Panel B: Share of Discharges Billed to Different Payers						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	–––	−0.0003	−0.028***	0.019**	0.028***	0.003*
	–––	(0.0003)	(0.001)	(0.005)	(0.003)	(0.001)
Post period × MA	–––	−0.0005	−0.042***	0.038***	0.046***	0.008***
	–––	(0.0005)	(0.001)	(0.006)	(0.003)	(0.001)
Prereform MA mean	–––	0.056	0.115	0.453	0.194	0.081
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	–––	−0.5	**−24.3**	**4.2**	**14.4**	**3.7**
Post period	–––	−0.9	**−36.5**	**8.4**	**23.7**	**9.9**
County-quarter observations	–––	1,460	1,460	1,460	1,460	1,460
R^2	–––	0.941	0.986	0.966	0.979	0.962

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. DD = differences-in-differences. Regressions include 1,460 county-quarter observations from 2004 through 2008. Regressions include controls for implementation period, post period; quarter and county fixed effects; county-level unemployment, median income, and percent black; share of discharges comprised of the following types of injuries: cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. Standard errors clustered by state in parentheses. Regressions are weighted by the county population.
SOURCE: Authors' calculations.

Appendix Table 2 Effects of Massachusetts (MA) Health Care Reform on Emergency Room Discharges Billed to Workers' Compensation (WC) and Other Payers, Standard Errors Clustered by County

Panel A: Per-Capita results						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	−0.577***	−0.031***	−0.335***	−0.170**	0.165***	−0.008
	(0.160)	(0.008)	(0.045)	(0.080)	(0.058)	(0.022)
Post period × MA	−0.733**	−0.041***	−0.538***	−0.111	0.350***	0.037
	(0.316)	(0.011)	(0.057)	(0.145)	(0.120)	(0.039)
Prereform MA mean	8.649	0.486	0.997	3.84	1.74	0.709
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	**−6.7**	**−6.4**	**−33.6**	**−4.4**	**9.5**	−1.1
Post period	**−7.3**	**−8.4**	**−54.0**	−2.9	**20.1**	5.2
County-quarter observations	1,460	1,460	1,460	1,460	1,460	1,460
R^2	0.962	0.945	0.982	0.871	0.970	0.962
Panel B: Share of Discharges Billed to Different Payers						
	Total discharges	WC	Uninsured	Private	Medicaid	Medicare
DD coefficients						
Implementation period × MA	–––	−0.0003	−0.028***	0.019***	0.028***	0.003**
	–––	(0.0007)	(0.004)	(0.006)	(0.004)	(0.001)
Post period × MA	–––	−0.0005	−0.042***	0.038***	0.046***	0.008***
	–––	(0.0011)	(0.004)	(0.011)	(0.006)	(0.001)
Prereform MA mean	–––	0.056	0.115	0.453	0.194	0.081
Effect sizes (DD coefficient as a % of prereform mean)						
Implementation period	–––	−0.5	**−24.3**	**4.2**	**14.4**	**3.7**
Post period	–––	−0.9	**−36.5**	**8.4**	**23.7**	**9.9**
County-quarter observations	–––	1,460	1,460	1,460	1,460	1,460
R^2	–––	0.941	0.986	0.966	0.979	0.962

NOTE: * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. DD = differences-in-differences. Regressions include 1,460 county-quarter observations from 2004 through 2008. Regressions include controls for implementation period, post period; quarter and county fixed effects; county-level unemployment, median income, and percent black; share of discharges comprised of the following types of injuries: cuts, drownings, falls, fires, firearms, motor vehicles, nature/environment, poisoning, strikes, suffocation, and overexertion. Standard errors clustered by county in parentheses. Regressions are weighted by the county population.
SOURCE: Authors' calculations.