

## Comparing Workers' Compensation claims with establishments' responses to the SOII

*Comparing elements of the Workers' Compensation database with data from the Survey of Occupational Injuries and Illnesses is a useful way to determine which types of injuries and illnesses the SOII is most likely to undercount*

Nicole Nestoriak  
and  
Brooks Pierce

The Bureau of Labor Statistics' Survey of Occupational Injuries and Illnesses (SOII) collects and tabulates employer reports on work-related injuries and illnesses. SOII estimates are the primary source of information on nonfatal work-related injuries and illnesses in the United States.

Recent work comparing SOII microdata with other administrative sources of work-related injury and illness data, in particular Workers' Compensation (WC) claims databases, concludes that the SOII substantially undercounts cases. This article focuses on the paper "Capture-Recapture Estimates of Nonfatal Workplace Injuries and Illnesses" by Leslie I. Boden and Al Ozonoff, which compares SOII case records with WC microdata for several States. Their findings indicate that the SOII detects between 50 percent and 75 percent of cases in the States studied.<sup>1</sup>

The present article describes the Boden-Ozonoff study and reports some additional findings that were obtained by analyzing a subset of the data that the Boden-Ozonoff paper used. This new research extends the aggregate results reported by Boden and Ozonoff in order to determine which types of cases the SOII is most likely to undercount. In particular,

the present article focuses on differences in the SOII capture rate by establishment type, by time of case filing, and by type of injury.

### Methods

The basic method underlying the Boden-Ozonoff study involves comparing the SOII list of injury and illness cases with an analogous list, covering the same workforce, from the Workers' Compensation administrative system to determine to what extent the lists overlap. Cases in the WC claims microdata that are not found in the SOII sample are considered missed by the SOII and form the basis of the estimated SOII undercount.

Although this method is logically straightforward, it is difficult to carry out. Because any given injury is processed independently and represented differently in the two systems, it is not always possible to definitively link the case's representation in the SOII with its representation in the WC data. Further, it is often difficult to determine whether or not a reported WC injury or illness case occurred in an establishment that was within the SOII sample. Finally, in comparing the SOII and WC data it is critical to exclude cases outside the scope of one or the other of the data sources; otherwise a simple difference in scope will be misinterpreted as underreporting.<sup>2</sup> It is some-

Nicole Nestoriak and Brooks Pierce are economists in the Office of Compensation and Working Conditions, Bureau of Labor Statistics. E-mail: nestoriak.nicole@bls.gov, pierce.brooks@bls.gov.

times challenging, however, to determine whether or not a given case is in scope for WC or the SOII.

## Data sources

This section describes the data sources for the article and describes in particular the aspects of the data relevant to the matching exercise.

The SOII is an annual establishment survey that most recently sampled approximately 176,000 establishments in private industry. Because the SOII is a survey, it does not give a complete listing of the experiences of every private-sector establishment. Rather, sampled establishments in effect represent the greater universe of establishments. Sampling is a valid approach for producing estimates, but the fact that the SOII is based on a sample rather than a census does make the matching exercise in Boden and Ozonoff's paper more challenging.

SOII respondents are directed to report from on-site injury logs maintained as part of the Occupational Safety and Health Administration's record-keeping requirements. The record-keeping rules dictate that records be maintained at an establishment's physical location; accordingly, BLS samples data at the establishment level rather than at the firm level.<sup>3</sup> Firms with multiple sites or establishments may have some, none, or all of their establishments sampled in any given year. Data for a given survey year are reported to BLS in the first half of the year following the survey year.

For more serious injury or illness cases—those involving at least 1 day away from work beyond the date of injury or onset of illness—the SOII collects detailed information describing the incident and the affected employee. The SOII program refers to these cases as “days away from work” cases. The information that is collected includes the nature and source of the injury or illness, the part of the body affected, and the date of the onset of the injury or illness, as well as the employee's name, date of birth, sex, and race. These data, as well as information on the employer, are used to help identify cases for the purposes of matching SOII records with WC administrative records.

The Boden-Ozonoff group obtained permission from several States to match WC claims microdata with SOII microdata. Because the SOII data are confidential, all data analysis was carried out at BLS. And because WC data include confidential information, there were some data to which BLS did not have access. However, BLS did obtain permission from one State, Wisconsin, to further analyze its 1998–2001 WC data. Boden and Ozonoff also made their intermediate data sets available to BLS, which made

this article's detailed analysis possible.

Workers' Compensation systems differ from State to State, but on the whole they have similar features. Most States mandate coverage of nearly all private-sector workers. WC typically covers almost all medical expenses arising from a work-related injury or illness, it recompenses portions of lost earnings due to temporary injuries or illnesses if the duration of the injury or illness exceeds a minimum waiting period, and it provides partial or total disability payments in the event of permanent injury or illness. Temporary injury and illness cases in Wisconsin from 1998 to 2001 were compensable under WC if they satisfied a 3-day waiting period. An employee generally has 2 years to report a workplace injury to his or her employer, although most injuries are reported much earlier. Some traumatic injuries (vision loss, total loss of a hand or arm, permanent brain injury, etc.) and some occupational diseases (carpal tunnel syndrome, hearing loss, etc.) have no time limit for filing a claim.

Under the WC system, cases may be claimed by workers but disputed by the employer.<sup>4</sup> An employer may believe a given injury is not work related, or the employer may dispute the degree of disability. In such cases the employee may request that the State office of WC resolve the dispute via a hearing before an administrative law judge. Negotiated settlements are possible. The WC data that this article uses include some contested cases and negotiated settlements, but they are not identified separately from the other cases. The Wisconsin WC system reported on average about 50,000 lost-time claims per year over the 2000–06 period. Of these, about 18 percent (an annual average of about 9,200 claims) were marked as denials, as injuries or illnesses that did not require days away from work, or as noncompensable cases. About 13.6 percent (6,800) of claims were litigated annually.<sup>5</sup>

The Boden-Ozonoff study imposes scope restrictions on each data source; the intent is for every data source to refer to the same sets of at-risk private-sector employees. As an example, mining and railroad sector data are excluded because the SOII program does not collect those data through its normal survey instrument. (Rather, it relies on administrative files from the Mine Safety and Health Administration and the Federal Railroad Administration.) As another example, injury and illness cases in the SOII involving fewer than 3 days away from work are excluded, as such cases do not meet the Wisconsin WC system waiting period requirements.<sup>6</sup> Perhaps the most important scope restriction calls for the discarding of WC cases that arose in establishments which are not in the SOII sample. To do so accurately requires that one

identify the establishments from the SOII sample in the WC data, which may be difficult—especially in the case of multiestablishment firms as described earlier. In general one expects such scope restrictions to cause some degree of error beyond the margin of error that would normally be expected. Some of the numerical results in this article are consequently subject to some additional error because of issues of scope caused by data limitations in the Boden-Ozonoff study.

In the end, there are 4 years of SOII and WC injury and illness case data available. These data comprise approximately 217,000 distinct cases.<sup>7</sup> The SOII and WC case lists overlap substantially, but not completely: the SOII list covers about 70 percent of all observed SOII and WC cases, and the WC list covers about 81 percent. In other words, the Boden-Ozonoff study suggests that the SOII estimates undercount observed cases by about 30 percent.<sup>8</sup>

### Single-establishment and multiestablishment firms

Whereas the SOII data come from establishments chosen for the sample, the WC data tend to reflect reporting by firms. Consequently, the WC data are not detailed enough to allow one to consistently determine where within firms injuries and illnesses have occurred. The issue is a problem when a firm has multiple establishments of which only some are sampled by the SOII. Is an injury case apparently missed by the SOII truly a missed case, or rather is it an injury that occurred at an establishment not in the sample? In this circumstance there is some ambiguity about whether to treat the case as one that was misreported to the SOII.

The Boden-Ozonoff study recognizes this issue and makes a statistical adjustment in the instances in which it arises. Nevertheless, because the issue is an important one, it makes sense to show separate results for single-establishment and multiestablishment firms.

The data, when organized in this way, show that the SOII appears to miss more cases in multiestablishment firms. This may be due to an intrinsic difference between single-establishment and multiestablishment firms, or it may result from the method used for matching.

Table 1 presents statistics by establishment status. Of the cases in either the Wisconsin WC data or the SOII data, roughly 56 percent are in single-establishment firms and 36 percent are in multiestablishment firms. The remaining 8 percent are of unknown status because there is not enough information available to label them as either single-establishment or multiestablishment firms.<sup>9</sup>

Table 1 shows that the SOII capture rates are higher when only single-establishment firms are considered: according to the calculations, the SOII captures 77.5 percent of the estimated cases in this subset of the data. The SOII's rate of capture of injuries and illnesses in multiunit establishments is 62.2 percent. In establishments of unknown status, the capture rate is 52.8 percent. The data for establishments of unknown status appear to behave—both here and in other tabulations—more like the multiestablishment than the single-establishment data.

One possible explanation for the differences in capture rates across establishment types is that the single-establishment firms actually do not report their behavior in the same way that establishments in multiestablishment firms do. Note, however, that the WC capture rate is similar across the establishment types. Thus, there appears to be some particular reporting or measurement effect that differs by establishment status within the SOII but not within the WC administrative system.

Another possibility is that the single-establishment firm subset of the data yields more accurate estimates because the method used to adjust the multiestablishment results introduces error. For the single-establishment firm

**Table 1. Capture propensities by status of establishments, 1998–2001**

	Single-establishment firms	Establishments within multiestablishment firms	Establishments within firms of unknown status
Total number of cases .....	121,567	77,967	17,798
Percent of cases captured by the SOII .....	77.5	62.2	52.8
Percent of cases captured by Workers' Compensation .....	79.7	83.3	84.0

NOTE: The "percent captured" rows show the percentage of observed cases captured by the Survey of Occupational Injuries and Illnesses and by Workers' Compensation. Data are calculated using Workers' Compensation cases from single-establishment firms in Wisconsin.

subset of the data, it is rarer to encounter ambiguity concerning whether or not a given WC claim case occurred in an establishment sampled by the SOII. Distinguishing between these two possibilities is an important topic for further study.

The remainder of this article focuses on cases involving single-establishment firms. Although these cases do not represent the full spectrum of cases, using only data from single-establishment firms allows one to avoid situations in which one does not know whether an observed WC case is within the SOII sample or not. Restricting the sample in this manner is akin to restricting the scope of the two data sources in the hope that each data source refers to the same set of workers and injury and illness cases.

**SOII capture propensity by time of WC filing**

The timing of the collection of injury and illness data is another characteristic that differs between WC and the SOII, and it may explain part of the undercount. The SOII collects data in the first 6 months of the year following the year of incidence and only contains cases that are recognized as valid, work-related cases of injuries or illnesses that occurred during or just after the survey year. Cases that are not recognized prior to data collection obviously are not included in the SOII counts. The WC administrative data, however, cover cases that were recorded up to 2 years following the date of incidence.

The extract of the Wisconsin WC data used in this article does not include a list of cases' filing dates. However, the WC system assigns case identifiers sequentially, and the case identifier embeds the year of the filing. From the case identifier one can therefore generate a year and an imputed month of filing for cases in the WC system.<sup>10</sup> Out of the 121,567 cases in single-establishment firms that the SOII captured, 96,884 cases are also in the WC system and are used in this analysis. The remaining 24,683 are in the

SOII records but not the WC records, and they therefore will be dropped from the remainder of this analysis as, by definition, there is no time-of-WC-filing information available for these cases.

Table 2 shows case counts and the “SOII capture propensity” as functions of the year of the WC filing. SOII’s “capture propensity” is defined here as the percent of WC cases that appear in the SOII. A case with a date of injury in 1998 and a WC system identifier indicating a filing in 2000 would be included in the row “2 years after close of survey year.” Note that about 12.8 percent of cases are filed in the year following the survey year. We refer to these as “1-year-after” data for simplicity. A little over 1 percent of cases are filed with a greater lag. The final column shows the SOII capture propensity.

Two broad facts are clear in these data. First, there are a substantial number of cases filed under the WC program after the close of the SOII survey year. Second, the SOII capture propensity is much lower for these particular cases. Together these facts suggest that the WC data include many cases that are not known to SOII respondents, or have not been deemed work related, at the time of the survey response.

Aside from the year of filing, another known fact is the order in which cases are entered into the WC system. Cases in the 1-year-after data occur disproportionately early in the filing sequence. About half of these cases appear to have been filed early in the calendar year following the SOII survey year. For that half, the SOII capture rate is fairly high, approximately 60–65 percent. For the other half of the 1-year-after data, the SOII capture rate is approximately one-third. Thus, the 1-year-after capture rate of 48.0 in table 2 masks variation within the year.

One reasonable conclusion to make is that about half of the 1-year-after filings are either: 1. delayed WC filings from workers in establishments that replied to the SOII with accurate responses, 2. injury and illness cases that

**Table 2. SOII capture propensity by year of WC filing, 1998–2001**

Year of WC case filing	Number of cases	Percent of WC cases	SOII capture propensity
Same year as survey year .....	83,256	86.0	76.1
1 year after close of survey year .....	12,406	12.8	48.0
2 years after close of survey year .....	917	.9	19.2
3 years after close of survey year .....	203	.2	4.9

NOTE: Data are calculated using Workers' Compensation cases from single-establishment firms in Wisconsin.

occurred late in the year and were known to SOII respondents at the time they responded, or 3. a combination of 1 and 2. The remaining half of the 1-year-after filings may reflect continuing or late-developing lost-workday cases attributed to past injuries. There also exist other possibilities, such as reconciled disputes that enter the books late. While the SOII program would obviously like to collect information on all workplace injuries and illnesses occurring in the survey year, the completeness of the data needs to be weighed against the timeliness in generating statistics.

### Other indicators of low SOII capture propensity

The results in the previous section indicate that some WC injury and illness cases are reported well after the close of the survey year, and this raises the question of whether or not these cases are identifiably different in the WC system. In other words, are they recognized by the WC system as distinct from the cases reported within the survey year? The WC system maintains a variety of fields used to aid in administration. Some of these fields have data that correlate with the data that are reported late, and this correlation may help in understanding some of the difficulties in matching administrative data from the WC system with survey data from the SOII.

To understand WC system data, it helps to understand WC filing requirements. If an injury or illness results in days away from work beyond Wisconsin's 3-day waiting period, the employer or its insurer must file a first report of injury within 7 days of onset. The first report contains basic information on the employee and the injury or illness. The employer or its insurer must also file a supplementary report within 30 days of onset. This supplementary report

either indicates the amount and type of WC payments to the employee—including whether the payments are for temporary total or temporary partial disability—or otherwise must indicate a claim denial or investigation. Additional supplementary reports must be filed as payments are changed—for example, because of a change in status from temporary to permanent disability—or stopped, usually by the employee's return to work. The WC data system generates a status flag on the basis of the initial supplementary report, which typically captures payment information soon after the onset of the injury or illness. As shown in table 3, there are clear differences in the SOII capture propensity across status flag values.

The WC data system maintains information on days of Total Temporary Disability (TTD), information that is based on the cumulative supplementary report filings for a given claim. A day of temporary total disability is roughly analogous to a lost workday in the SOII. Although the data are restricted to lost-workday cases in this analysis, many of the claims have a TTD-day value of zero in the WC system.<sup>11</sup>

In an analysis conducted for this article, it was found that cases reported late tend to have a disproportionately high number of atypical status flag values and a disproportionately high number of cases with zero TTD days recorded. It was also found that SOII capture propensity tends to vary by WC status flag and by the incidence of zero TTD days recorded, even among WC cases reported prior to the close of the survey year.

Table 3 shows some of the relevant statistics. The table displays SOII capture rates, the prevalence of zero-TTD-day cases, median case durations, and WC filing lags, all by WC status flag. The average WC filing lag is based on the imputed month of filing, as discussed previously. "Case

**Table 3. SOII capture propensity and other case characteristics, by Workers' Compensation status flag, 1998–2001**

WC status flag	SOII capture propensity	Percent with zero TTD days	Median case duration (in days)	Average filing lag (in months)	Number of cases
Total.....	71.8	11.8	10	2.1	96,884
Award.....	20.2	89.8	0	7.8	1,787
Electronic.....	67.5	9.5	10	1.7	15,986
Final.....	74.2	10.1	10	1.9	78,145
Under Investigation.....	0	0	142	3.0	7
Not final.....	37.4	38.1	4	11.6	12
No lost time.....	44.2	32.1	3	6.3	833
Not required.....	13.0	100.0	0	19.8	97

NOTE: Data are calculated using Workers' Compensation cases from single-establishment firms in Wisconsin.

duration” refers to the number of days away from work due to the injury or illness in question.<sup>12</sup>

About 97 percent of WC cases have a status flag of “electronic” or “final.” Cases marked as “final” have WC payment information included in the initial supplementary filing. A case marked as final is likely to be a rather typical case that has been provisionally recognized by the employer. Cases marked as “electronic” are those filed electronically; unfortunately, there is little else that this status flag reveals about cases. Cases marked as “final” or “electronic” are not expected to be especially unusual as a group. These cases are on average reported relatively promptly to the office that handles WC claims, and they have typical durations.

Of the remaining 3 percent of WC cases, the majority have the “award” status. Cases marked as “award” are those for which a formal order has been written providing compensation for the claim. Cases with award status are typically disputed cases adjudicated in the claimant’s favor or settled by the claimant and the employer’s insurer. The SOII only captures 20 percent of the cases with an “award” status code. When a case is disputed, the final determination of whether the injury or illness is work related can occur long after the year of injury and can result in a lump-sum payment without distinguishing the number of TTD days involved. This reasoning is consistent with the fact that about 90 percent of award-status cases have zero TTD days recorded. The cases with zero TTD days were likely not perceived as recordable cases by the SOII respondents at the time of the survey. The status code “no lost time” indicates the case was initially coded as having no lost workdays. Consequently, a case coded as “no lost time” can be one that did not involve days away from work prior to the initial supplementary report but did involve lost workdays afterward. The category of no lost time is small, and cases in the category tend to have low SOII capture rates, shorter durations than average, and some lag in reporting.

One of the main points of table 3 is that in the WC system, both the type of injury or illness case and the length of time between the onset of the injury or illness and the filing date of the case are related to the likelihood of the case being reported to the SOII. Certain cases or case types are less likely to be captured by the SOII. The SOII probably misses some cases that it should have captured, but because of difficulty in determining which cases are in and out of scope, some of the cases that the SOII is found to “miss” actually could be cases that are outside its scope. In order to provide more clarity, the next section of the article documents the types of injury and illness cases that are more likely to be reported to the SOII.

## Better detection of some injuries and illnesses than others

Both the SOII and WC databases contain information on the broad type of injury or illness relevant to each case. This information is referred to as the “nature” of the case, and it identifies the principal physical characteristics of the injury or illness. It is easy to imagine that some case types are easier to identify in general, or are easier to identify specifically as work related, or are more likely to be perceived as severe and therefore presumably more likely to be reported in the SOII or in WC claims.

Table 4 shows the most common nature-of-injury-or-illness codes in the WC administrative data, ranked in descending order by the SOII capture propensity.<sup>13</sup> Like table 3, table 4 also reports the percent of cases with zero TTD days reported, median case durations, and the average WC filing lag.

Categories within the nature-of-injury-or-illness column that cover problems one could reasonably view as severe, easily identifiable, or having a sudden onset tend to be better captured by the SOII. For example, the capture propensities for amputation cases and severance cases are both about 90 percent. At least according to these data, the vast majority of amputations are reported in the SOII. Cases involving concussions, fractures, punctures and the like also tend to have relatively high SOII capture rates.

Case types such as lacerations, contusions, and strains, in which one might expect somewhat greater heterogeneity of severity or ease of identification, tend to show average SOII capture rates. Given that these kinds of injuries are quite common, documenting sources of heterogeneity within this subset of cases is expected to be an important element of future research.

Injuries that become apparent or worsen over time such as inflammation or carpal tunnel are reported in the SOII much less frequently than the average injury or illness. These case types also tend to show longer-than-average lags between the onset of the injury or illness and the WC filing. Presumably, some of these cases develop too late for inclusion in the SOII’s collection of data; alternatively, the cases may be reported less often to the SOII because of greater difficulty in determining whether or not they are work related.

Note that the SOII appears to capture virtually zero of the hearing loss cases. These cases tend to have long reporting lags and are overwhelmingly reported as having zero TTD days. SOII respondents may not believe these injuries and illnesses to be recordable by the Occupational Safety and Health Administration, or they may simply

**Table 4. SOII capture propensity and other case characteristics, by nature of injury or illness, 1998–2001**

Nature of injury or illness	SOII capture propensity	Percent of cases with zero TTD days	Median case duration (days away from work)	Average filing lag (in months)	Number of cases
Total.....	71.8	11.8	10	2.1	96,884
Amputation.....	90.6	13.7	11	1.6	858
Severance.....	90.0	6.6	13	1.1	122
Dislocation.....	88.4	5.6	12	1.4	414
Foreign body.....	87.5	7.4	5	1.4	410
Multiple physical injuries.....	84.4	10.1	14	1.7	2,080
Fracture.....	82.8	8.9	18	1.2	6,846
Burn.....	82.5	5.6	6	.9	1,322
Infection.....	82.3	21.7	7	1.7	143
Puncture.....	82.0	6.9	6	.9	676
Concussion.....	81.9	2.7	7	.9	149
Hernia.....	79.5	3.3	16	2.7	2,481
Crushing.....	79.0	12.2	12	1.2	1,243
Dermatitis.....	76.4	40.5	10	3.3	304
Sprain.....	75.2	8.0	8	1.3	4,937
Laceration.....	75.2	10.8	9	1.6	5,285
Contusion.....	73.3	8.2	8	1.5	5,773
Strain.....	70.9	11.9	9	1.9	45,296
Other specific injuries.....	69.1	10.6	10	2.5	10,941
Respiratory disorders.....	60.3	19.6	6	3.0	147
Rupture.....	58.5	12.7	25	6.4	461
Carpal tunnel syndrome.....	58.4	9.3	24	4.6	2,649
Inflammation.....	57.3	13.2	12	2.5	1,266
Other cumulative injuries.....	51.1	24.4	9	4.1	1,620
Loss of hearing.....	7.4	94.1	0	10.4	714
Hearing loss (traumatic).....	0	100.0	0	11.4	167

NOTE: Data are calculated using Workers' Compensation cases from single-establishment firms in Wisconsin.

not know they exist at the time of report. Additionally, these may be cases for which employees have stronger incentives to file a WC claim, as hearing aids are not covered by most health insurance plans.

The general patterns in table 4 suggest that the SOII does a very good job of capturing certain classes of cases, but they also suggest that the SOII fails to capture a noticeable fraction of cases—a quarter or more—within certain frequently occurring case types such as strains and sprains. It is possible that differences in circumstances among similar injuries and illnesses within these categories influence measurability. If such an underlying heterogeneity exists, identifying it would be a useful step toward understanding the root causes of the estimated SOII undercount.

THE PURPOSE OF THIS ARTICLE IS TO SHOW some of the dimensions of the estimated SOII undercount. The patterns of variation of the SOII capture rate shown in tables 1–4 suggest various possible explanations for the

undercount. It may be that certain types of cases are inherently difficult to identify as work related, especially in a timely manner. Further, there may be some yet-unknown differences in scope between WC and the SOII. As an example, some of the WC cases with zero reported TTD days may be cases with no lost worktime, cases which by design should not appear in the SOII as days-away-from-work cases. Finally, a precise matching of cases from these two different databases may require data that are better suited for matching than those currently available. That is, some of the estimated undercount may be due to outstanding methodological issues that are difficult to resolve absent finer data. Clearly, there are various hypotheses that have been proposed with the aim of explaining the discrepancies between the WC and SOII databases. These hypotheses will need to be scrutinized and tested further in order to achieve a full understanding of the differences between the ways in which the WC and SOII systems measure workplace injuries and illnesses. □

## NOTES

<sup>1</sup> Leslie I. Boden and Al Ozonoff, "Capture-Recapture Estimates of Non-fatal Workplace Injuries and Illnesses," *Annals of Epidemiology*, June 2008, pp. 500–06. See also John Ruser, "Examining evidence on whether BLS undercounts workplace injuries and illnesses," *Monthly Labor Review*, August 2008, pp. 20–32.

<sup>2</sup> Boden and Ozonoff are aware of such difficulties in comparing the SOII and WC data and take great effort to account for them in their calculations. When making the less straightforward calculations in their study, they often purposefully err on the side of producing a smaller estimate of the SOII undercount. Of course, the SOII and WC data were not designed in anticipation of comparing them, and one should therefore expect some data-related problems to remain.

<sup>3</sup> To construct the SOII sampling frame, BLS takes all units within scope for the SOII from a universe of establishments that report on unemployment insurance. BLS then makes some improvements to this sampling frame on the basis of historical collection experience. The intent is to construct a frame of physical establishment locations; however, in some cases firms are Statewide reporters, in which case they file only one report in each State in which they operate, and the report covers all their establishments in the State. Firms sometimes also have other ways of filing one report that covers multiple establishments (and therefore multiple physical locations).

<sup>4</sup> For evidence on incentives to report injuries to the WC program, see Jeff Bidle and Karen Roberts, "Claiming Behavior in Workers' Compensation," *The Journal of Risk and Insurance*, December 2003, pp. 759–80.

<sup>5</sup> See [www.dwd.state.wi.us/wc/WC\\_Basic\\_Facts.htm#WC\\_Claim\\_and\\_Indemnity\\_Information](http://www.dwd.state.wi.us/wc/WC_Basic_Facts.htm#WC_Claim_and_Indemnity_Information) (visited May 1, 2009).

<sup>6</sup> There are also situations in which the SOII, to ease respondent burden, collects data for only a subset of the cases occurring in a reporting establishment. Other times—though rarely—not all establishments of a given firm are actually able to provide data on all their cases of injuries and illnesses; this often occurs because the boundaries of establishments can be unclear. In such a situation, some sampled units are permitted to provide data that cover more or fewer employees than are officially in the establishment. When, for any of the aforementioned reasons, the SOII does not have data on all the cases in a given establishment, weighting adjustments enable the SOII to statistically account for all cases. However, these situations require further scope adjustments for the purposes of matching SOII data to WC data. The Boden–Ozonoff study makes scope adjustments for establishments from which the SOII, to ease respondent burden, collects data for only a subset of injury and illness cases. It is not able to make scope adjustments when sampled units are permitted to provide data that cover more or fewer employees than are officially in the establishment.

<sup>7</sup> All case totals in this article are weighted totals that are calculated using

SOII sampling weights.

<sup>8</sup> The Boden–Ozonoff study imputes that approximately 24,000 cases are missed by both the WC and SOII systems, and the authors report that the SOII undercount is larger than that of the WC program. The statistics presented here do not include imputations for cases missed by both surveillance systems.

<sup>9</sup> An establishment is identified as part of a multiestablishment firm if there are multiple establishments within the same unemployment insurance reporting number during the survey year. This method of identification oversimplifies because firms can encompass business lines across more than one unemployment insurance reporting number. The establishments of unknown status have unemployment insurance reporting numbers that exist in the sampling frame at the time the sample is drawn, but not during the survey year. These establishments either merged with other establishments, went out of business, or were otherwise redefined in the sampling frame at some point between the date of the drawing of the sample and the survey year.

<sup>10</sup> This is done by assuming a constant rate of filing over the course of the year. That is, a claim with an assigned claim number in the bottom fourth of the distribution of numbers is imputed to have been filed in the first quarter. The imputed-month-of-filing data are not error free, but they do correlate well with the date-of-injury-or-illness data recorded in the BLS system for matched cases. The imputation is therefore believed to be useful.

<sup>11</sup> There are a number of scenarios that can lead to a claim being marked as having zero TTD days in the WC administrative data. As one example, the employer can continue regular salary payments to an employee whose injury or illness has caused days away from work, such that no compensation for lost earnings is due to the employee. As another example, the insurer can erroneously make WC payments (which would initiate a claim in the system) though the waiting period has not been satisfied. Another possibility is for compromise settlements to be recorded as having no compensable TTD days due. One cannot determine the reason that a given case has been designated as a zero-TTD case, but the scenarios noted here suggest that these cases are probably more difficult to capture in the SOII. Cases that truly involve no lost workdays, such as cases of an immediate permanent disability upon injury, are presumably excluded from these data.

<sup>12</sup> The number of days away from work is reported consistently to the SOII. For cases that are in the WC database but not in the SOII database, the number of days away from work is imputed using TTD days.

<sup>13</sup> The nature-of-injury-or-illness codes used in the Wisconsin WC system differ from the codes used by BLS in its publications. Therefore, cases identified as, for example, punctures in table 4 would not necessarily be identified as punctures under the BLS categorization.