Understanding changes over time in the receipt of workers' compensation benefits

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Abstract

Workers' compensation, the oldest social insurance program in the United States, continues to serve as an important safety net for the vast majority of the workforce. The program supports workers at a particularly vulnerable time: immediately after suffering an occupational injury or illness. Yet, despite this vital role, less is known about the program's long-term trends. To understand these trends, I systematically investigated the reasons for the 43.6 percent decrease in the recipiency rate of cash benefits over the period from 2003 through 2018. I find that 68 percent of this decrease—29.5 percentage points—can be explained by improvements to workplace safety within industry sectors. (JEL No. I18, J28, J32)

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1 Introduction

Workers' compensation (WC) is the oldest social insurance program in the United States (Fishback and Kantor, 2000). Before the introduction of WC, workers suffering occupational injuries and illnesses (OIIs) could seek remuneration only by filing lawsuits against their employers. However, workers frequently recovered nothing for their medical bills and lost wages due to employer legal defenses. For their part, employers faced the risk of extraordinarily large jury verdicts in the cases that they lost. This litigation-based system eventually proved untenable, and led to a compromise known as the "Grand Bargain." The bargain meant that workers gave up their ability to sue in exchange for employers providing medical and cash benefits to workers suffering OIIs, regardless of fault. This no-fault framework forms the basis of WC programs.

WC offers widespread and fundamental protection for workers. In 2022, 146.3 million employees, representing $10.3 trillion in wages, were covered by WC programs (Welch et al., 2024). That same year, there were 156.3 million total employees in the labor market, indicating approximately 93 percent of all employees were covered by WC programs. This breadth of coverage, combined with the assurance of payment for OIIs, makes WC a foundational part of the labor market.

Because of its role in the labor market, WC has been studied extensively, but less is known about the long-term trend in the rate of benefit receipt from the program. In large part, this stems from the scarcity of data on this topic at the national level. Despite this challenge, understanding these long-term trends would help stakeholders make more informed decisions on potential future changes to the program in their states. Future changes could take the form of the amount of compensation paid to workers with OIIs, the freedom with which workers have to choose their medical providers, and the burden of proof that workers need to meet to receive benefits, for instance. These important considerations led to the question I sought to answer in this paper: How has the rate of WC receipt changed over time and why has it done so?

I first analyzed data from the National Council on Compensation Insurance (NCCI). Analysis of these data allowed for an understanding of the overall trends of the two broad types of benefits received under WC programs: payments for medical expenses only ("medical only benefits") and

payments for both medical expenses and lost wages ("indemnity benefits"). Over the period from 2003 through 2018, I found that the rate of medical only benefit receipt decreased by 38.5 percent. Similarly, I showed that the rate of indemnity benefit receipt decreased by 33.1 percent.

Next, to gain a deeper understanding of how the receipt of indemnity benefits changes over time, I analyzed data from the Annual Social and Economic Supplement of the Current Population Survey (ASEC). In particular, I exploited the panel component of the ASEC design: a respondent to the ASEC can answer the supplement in two consecutive years. Based on the design of the ASEC, I created a Linked Sample that included only those respondents who can be reliably linked between two years of the ASEC and then only the second observations of these respondents. From the Linked Sample, I found that the rate of indemnity benefit receipt decreased by 43.6 percent. This indicated a strong, persistent decrease.

I systematically explored this decrease through decomposition analyses. To begin, I decomposed the Linked Sample into new receipt (respondent did not receive WC in their first year, but did in their second year) and continued receipt (respondent received WC in both years). As a result of this initial analysis, I found that 87.9 percent of the overall decrease in receipt was attributed to decreases in new receipt. I then further decomposed changes in new receipt to changes resulting from changing sectoral composition versus changes occurring within industry sectors. I determined that the vast majority of changes in new receipt occured within sector, so that 84.3 percent of the overall decrease in receipt was attributed to decreases of within-sector rates of new receipt. Finally, using data from the the Survey of Occupational Injuries and Illnesses (SOII), I concluded that 67.6 percent of the overall decrease in receipt was attributed to within-sector decreases in the rates of days away from work OIIs. This showed that the majority of the decrease in overall receipt of WC indemnity benefits can be explained by decreases in the within-sector rate of days away from work OIIs.

My paper contributes to the literature a substantial amount of analysis on the reasons behind the long-term trends in WC receipt. To my knowledge, my paper is the first that has systematically explored these reasons. In doing so, my paper complements prior work that has examined WC

over the business cycle. These studies (Dong and Jestrab, 2022; Hartwig et al., 1997) found that a 1% increase in the unemployment rate is associated with between a 0.1% to 0.2% decrease in the frequency of WC recipients. Along these lines, my paper also complements research observing that OIIs themselves respond procyclically to economic conditions, particularly in mining, construction, and manufacturing (Asfaw et al., 2011; Charles et al., 2022). Additionally, I extend the results of previous studies that found that changes to sectoral composition do not serve as a significant explanation for decreases in the rate of OIIs (Ruser, 2014; Cohn and Wardlaw, 2024). And my results show that behavioral factors, such as worker responses to changing insurer behavior (Biddle, 2001) and potential employer retaliation (Biddle and Roberts, 2003), remain an important avenue of inquiry for explaining why recipiency rates have declined so markedly over time.

This paper proceeds as follows. Section 2 provides the background of the WC program. Section 3 describes the methodologies of the datasets that I use in the paper. Section 4 answers *how* WC receipt changes over time. Section 5 answers *why* WC receipt changes over time. Section 6 concludes.

2 Background

WC is primarily a state-based system.[1,2] The state-by-state implementation of WC programs began in Wisconsin in 1911 and continued until Mississippi implemented its program in 1948. Every state in the nation (and Washington, D.C.) has continued to administer its own WC program since its initial implementation. The key aspect of WC is that it is a no-fault system of insurance that pays regardless of whether an employer or employee is responsible for an OII. Forty-seven states and D.C. require employers to provide WC insurance coverage to their employees, with limited exceptions. On the other hand, South Dakota, Texas, and Wyoming do not mandate that employers provide this coverage. The upshot for workers covered under WC policies is that it serves as the

[1]The discussion in this section is based on the report by Welch et al. (2024).

[2]Federal programs cover federal employees, nuclear weapons workers diagnosed with certain conditions due to radiation, beryllium, or silica exposure, coal mine workers diagnosed with Black Lung Disease, land-based maritime workers, and railroad workers.

"exclusive remedy" for OIIs. This means WC precludes the filing of lawsuits seeking additional remuneration except for gross negligence by an employer.

Employers may obtain WC coverage in three main ways, although the available options depend on the law in a given state. First, all states except North Dakota, Ohio, Washington, and Wyoming permit employers to purchase coverage through private insurers. Second, all states except North Dakota and Wyoming permit employers with adequate resources to self-insure their WC risk. Third, 21 states offer coverage through state-administered insurance funds.[3] In two of these 21 states—North Dakota and Wyoming—employers must purchase their coverage through the state-administered fund. In another two of these 21 states—Ohio and Washington—employers must either purchase their coverage through the state-administered fund or self-insure.

Broadly, WC provides two types of benefits: payment for all OII-related medical expenses and payment for part of a worker's lost wages due to an OII. These latter type of benefits are referred to as *indemnity* benefits. In general, workers who receive indemnity benefits also receive payment of their OII-related medical expenses. However, the reverse is not true. Indeed, approximately 75 percent of all recipients of WC benefits receive "medical only" payments.

The amount of indemnity payments an injured worker receives depends on OII duration and extent along with state-specific parameters. With respect to duration, there are two categories of benefits: temporary and permanent. Temporary benefits are paid during the initial days after an OII, after a waiting period of between three to seven days, depending on the state. At the end of a worker's recovery from their OII, they reach so-called *maximum medical improvement*. Impairments remaining after this point may qualify for permanent benefits. With respect to extent, there are two categories of benefits: partial and total. Partial benefits are paid when workers are able to work, but with a loss in work capacity. Total benefits are paid when workers are completely unable to work. Since indemnity benefit types combine both duration and extent, there are benefits for temporary partial, temporary total, permanent partial, and permanent total disabilities. Additionally, WC pays

[3]These states are California, Colorado, Hawaii, Idaho, Kentucky, Louisiana, Maryland, Missouri, Montana, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Washington, and Wyoming.

cash benefits to a workers' family and dependents for fatal OIIs.

States differ widely in their compensation parameters. In January 2021, for instance, Arkansas had a weekly benefit range of $20 to $736 while Iowa had a weekly benefit range of $326 to $1,864 for temporary total disabilities. States often base compensation for temporary partial disability on two-thirds of a worker's pre-OII weekly wage, but Michigan bases its calculation on 80% of spendable earnings. Indiana caps PPD benefits for many OIIs at $390,000, yet Oregon has no such cap. Finally, Alaska limits permanent total disability to 300 weeks, but 32 states have no limit at all.

3 Data

3.1 National Council on Compensation Insurance

The National Council on Compensation Insurance (NCCI) is a nonprofit organization that standardizes the calculation of WC insurance rates across 35 states and the District of Columbia (each of these jurisdictions is colloquially referred to as an "NCCI state"). In addition to these NCCI states, two states, Indiana and North Carolina, report data to the NCCI, bringing to a total of 38 jurisdictions that report data to NCCI. One key output of NCCI consists of state-specific insurance rate recommendations for approximately 550 classification codes to which employers are assigned based on their business operations. These insurance rates then become the basis of the premiums that employers pay to obtain WC insurance coverage for their employees.

As part of its work, NCCI receives data from insurers. Insurers providing WC coverage in NCCI states are required by their state to report this data to NCCI. The data insurers report includes, among other items, data on the medical and indemnity benefits that workers receive. Based on this data, NCCI separately publishes an *Annual Statistical Bulletin*. One exhibit in this report lists the amount, per 100,000 insured workers, of new recipients of medical-only or indemnity benefits for all 38 jurisdictions that report data to NCCI. I call the values in this table "NCCI Data" in the remainder of this paper. While the NCCI Data do not cover every state, these data are of high quality that

allow for analysis of the two key types of WC benefits.

3.2 Annual Social and Economic Supplement

The Current Population Survey (CPS) is conducted by the Census Bureau on behalf of the Bureau of Labor Statistics (BLS). In the United States, it is the primary means of estimating the number of unemployed individuals. To conduct the CPS, the Census Bureau administers this *voluntary* survey to a nationally representative sample of over 60,000 households. A given household is surveyed over 16 months in a 4-8-4 rotating panel: in the CPS for four months, out of the CPS for eight months, and back in the CPS for the final four months. Along with labor force status (employed vs. unemployed), the survey captures demographic information such as age, race, and education.

In addition to the basic CPS described above, households fill out supplemental surveys to provide richer information. The most well-known and widely used of these supplements is the Annual Social and Economic Supplement (ASEC). Using the ASEC, a researcher can obtain data on poverty, geographic mobility, health insurance, and income from a variety of sources, including WC. Previous studies that have investigated various aspects of WC using the ASEC (benefit generosity, Bronchetti and McInerney, 2012; interaction with medical marijuana legalization, Ghimire and Maclean, 2020; interaction with recreational marijuana legalization, Abouk et al., 2023; interaction with paid sick leave programs, Dong et al. (2024)) support the use of the ASEC for WC analyses.

The Census Bureau administers the surveys each year in February through April. Households that provide information on the ASEC include all of the households being sampled for the basic CPS in March. To improve estimates for certain demographic groups along with estimates on coverage under the Children's Health Insurance Program, the Census Bureau surveys additional households, as well.

Since I studied sectoral composition, having a consistent coding of industry sector across time was essential. I used a variable that Flood et al. (2024) created for this purpose and developed a crosswalk between it and the industries as defined by the BLS for its programs, including the

Survey of Occupational Injuries and Illnesses. The crosswalk makes it straightforward to aggregate and analyze the ASEC data by sector.

The number of employees by sector by state by year represent explanatory variables in the next section. While the National Academy of Social Insurance produces estimates of employment covered by WC in each state, these are not disaggregated at any level (Welch et al., 2024). Hence, my best estimate of WC coverage by sector would be the number of employees by state by year. This is because, except for the limited exceptions described in Section 2, employees are required to be covered by WC in almost every state. Indeed, state-year estimates of the total number of employees from the ASEC has a correlation with the estimates from Welch et al. (2024) of over 0.99.

In the ASEC, not every respondent in a given year 1 is linked to a response in year 2. Because of this, I used two samples from the ASEC to study receipt of WC over time in this section. The first sample I called the Full Sample; this included all respondents each year, even those that cannot be linked between two years of the ASEC. The second sample I called the Linked Sample; this includes only those respondents who can be reliably linked between two years of the ASEC and then only the second observations of these respondents.

There are two important considerations when using the Linked Sample to compare to either the Full Sample or the NCCI Data. These considerations arise because the Linked Sample permits analysis of two different types of receipt: new receipt (respondent not a recipient in the first year of response, but is a recipient in the second year) and continued receipt (respondent a recipient in both years). The first consideration is that because I cannot distinguish between the types of receipt in the Full Sample, when I compared the Linked Sample to the Full Sample, I considered both new and continued receipt. The second consideration is that the NCCI Data is constructed most similarly to new receipt, so when comparing the Linked Sample to the NCCI Data, I considered only new receipt.

Of the three states that do not mandate WC coverage (South Dakota, Texas, and Wyoming), I dropped two from my analyses of the ASEC: South Dakota and Wyoming. I included Texas

because Dillender (2015) makes a compelling case that Texas is useful to study in WC contexts. Moreover, Texas reports that approximately 80 percent of private-sector employees in the state are covered by WC. Conversely, there is no information available from South Dakota or Wyoming on the proportion of employees covered by WC in their respective states.

While the ASEC covers only indemnity benefits, the data represents all states, and, importantly, allows for an investigation at the industry sector level.

3.3 Survey of Occupational Injuries and Illnesses

The Survey of Occupational Injuries and Illnesses (SOII) is either administered by state-level agencies on behalf of the BLS or BLS staff in non-participating states. The impetus behind the survey was the signing of the Occupational Safety and Health Act of 1970. Among other provisions, the Act mandated the collection of data on OIIs. The SOII program follows record-keeping guidelines set forth by the Occupational Health and Safety Administration and includes additional information on OIIs that involved at least one day away from work (DAFW). As it relates to this paper, recipients of workers' compensation indemnity benefits should approximate a subset of DAFW cases because indemnity claims typically start when an OII necessitates a worker being away from work (Welch et al., 2024).

The SOII surveys approximately 230,000 establishments and provides them with advance notification of their *obligation* to provide data on OIIs for a specified survey year. Importantly, the Occupational Health and Safety Administration requires private firms to fill out the SOII if they receive such a notice from the BLS. This applies *even if the firm is otherwise exempt* from keeping OII records. Establishments report basic information on themselves (*e.g.,* employee hours worked), summary information on OIIs, and more detailed information on DAFW cases. Each year, the data collection process is completed by the middle of summer.

There are limitations to using the SOII data. For instance, BLS does not publish estimates for each state each year. This is because states need to participate in survey administration for state-level estimates to be released. Additionally, the BLS is aware of issues relating to undercounts

of OIIs. These limitations, which are addressed in detail by National Academies of Sciences, Engineering, and Medicine (2018), make the SOII a potentially problematic dataset with which to work. Despite this, there is no other source of OII data with the scope and history of the SOII. This makes the SOII the best source of OII data for this paper.

4 How has the receipt of workers' compensation changed over time?

In the ASEC, I defined a recipient of WC to be a respondent who reported receiving a positive amount of income from WC over the past year.[4] My working assumption was that respondents were reporting indemnity benefits and not medical benefits. This seemed reasonable because indemnity benefits are paid to the recipient whereas medical benefits are generally paid to the healthcare provider directly from the WC insurer.

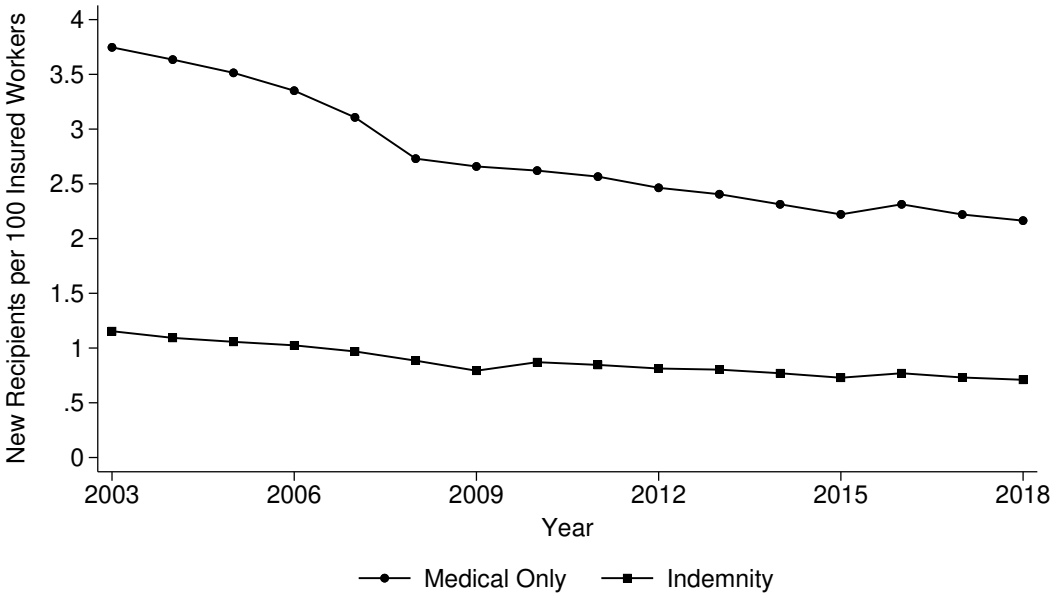
I estimated WC receipt as a rate, and I maintained internal consistency within datasets. The NCCI Data included information only on its estimate of workers insured under WC; this meant the rate for the NCCI Data is in terms of 100 insured workers. Unfortunately, the NCCI Data did not contain information on hours worked. For the ASEC and the SOII, I calculated the rates in terms of 100 full-time equivalent (FTE) employees. Because there is no information in either the ASEC or the SOII on the insurance status of workers, the rates calculated in terms of 100 FTE employees do not consider insurance status. To calculate these rates, I used the following equation:

$$WC\ per\ 100\ FTE = 100 \times \frac{WC}{FTE} = 100 \times \frac{WC}{H} \times 2{,}000 \tag{1}$$

In equation 1, WC refers to the number of WC recipients, FTE refers to the number of full-time equivalent employees and H refers to the total number of employee hours each year. I considered only employees to proxy for workers insured under WC (there is otherwise no coverage indication

[4] This is based on the Flood et al. (2024) variable *INCWKCOM*.

Figure 1: Trends in the Rates of Medical Only and Indemnity Benefit Receipt, NCCI Data, 2003-2018



Data from the *Annual Statistical Bulletin* of the National Council on Compensation Insurance.

in the ASEC). I obtained H based on the hours usually worked per week at a respondent's main job; I chose main job because this is how I infered industry sector of an OII in the next section. Following BLS convention, I considered one year of work to be 50 weeks and 1 FTE employee to be an employee who works 2,000 hours. Thus, $H = 50 \times$ *Hours Usually Worked per Week* and $FTE = H/2{,}000$. Finally, I scaled up to 100 FTE for ease of exposition.

When calculating changes over time, I subtracted the mean of the first three years of the period (2003-2005) from the mean of the last three years of the period (2016-2018). While I used this method due to the relatively few observations of WC receipt over my study period in the ASEC (mean unweighted N = 98), I followed this method with the other datasets in this paper, as well.

4.1 Trends by benefit type

In general, all recipients of WC benefits receive coverage of medical expenses. About 75 percent of WC recipients receive no more than this; they are called recipients of medical only benefits. The other 25 percent of recipients additionally receive indemnity benefits; recipients receiving

indemnity benefits account for about 90 percent of total benefit spending in WC programs (Welch et al., 2024).

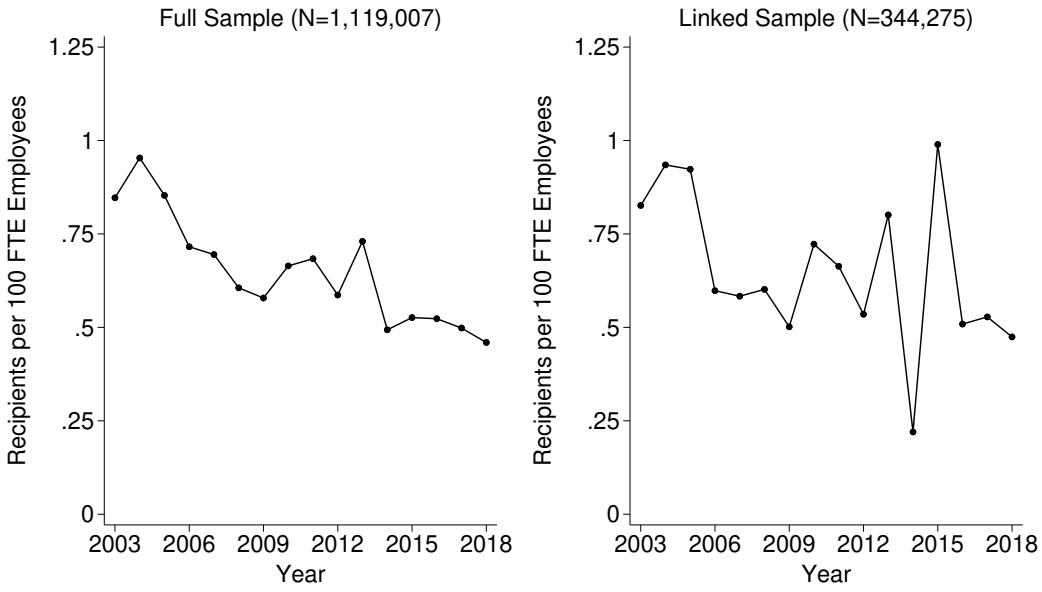
To begin my descriptive analysis of trends, I first used the NCCI Data to examine trends in new receipt of medical-only benefits and new receipt of indemnity benefits over the period from 2003 through 2018. Figure 1 shows these trends as the number of new recipients per 100 insured workers. The trends did not appear to exhibit any substantial degree of cyclicality at the annual level of the data. Over the period, the rate of new receipt of medical only benefits decreased from 3.632 per 100 insured workers to 2.232 per 100 workers, a decrease of 38.5 percent. Similarly, the rate of new receipt of indemnity benefits decreased from 1.101 per 100 workers to 0.737 per 100 workers, a decrease of 33.1 percent. Hence, since the rate of new receipt of medical only benefits decreased more than that of indemnity benefits, the proportion of all recipients who received medical-only benefits decreased slightly, from 76.5 percent to 75.3 percent, a (relative) decrease of 1.5 percent.

These results were indicative of three potential forces. First, the rate of OIIs may have decreased substantially overall, leading to the substantial observed decreased in WC receipt overall. Second, since the rate of medical only receipt decreased more substantially than that of indemnity benefit receipt, this implied that less serious OIIs may be decreasing at a faster rate than more serious OIIs. This is because medical only receipt suggests a recipient has not suffered an OII severe enough to be away from work long enough to satisfy the indemnity benefit waiting period of between three and seven days depending on the state. Finally, these findings may suggest an increasingly more stringent review process for providing medical benefits. A more stringent review process could lead to workers who experience less severe OIIs to either not file a WC application or not be awarded benefits.

4.2 Trends in indemnity benefits

Turning to analysis of the ASEC, Figure 2 shows the trend in the number of recipients per 100 FTE employees in both the Full Sample and the Linked Sample. In the Full Sample, the number of recipients per 100 FTE employees decreased from 0.884 to 0.493, a decrease of 44.2 percent.

Figure 2: Trends in the Rate of Workers' Compensation Recipiency, Indemnity Benefits, 2003-2018

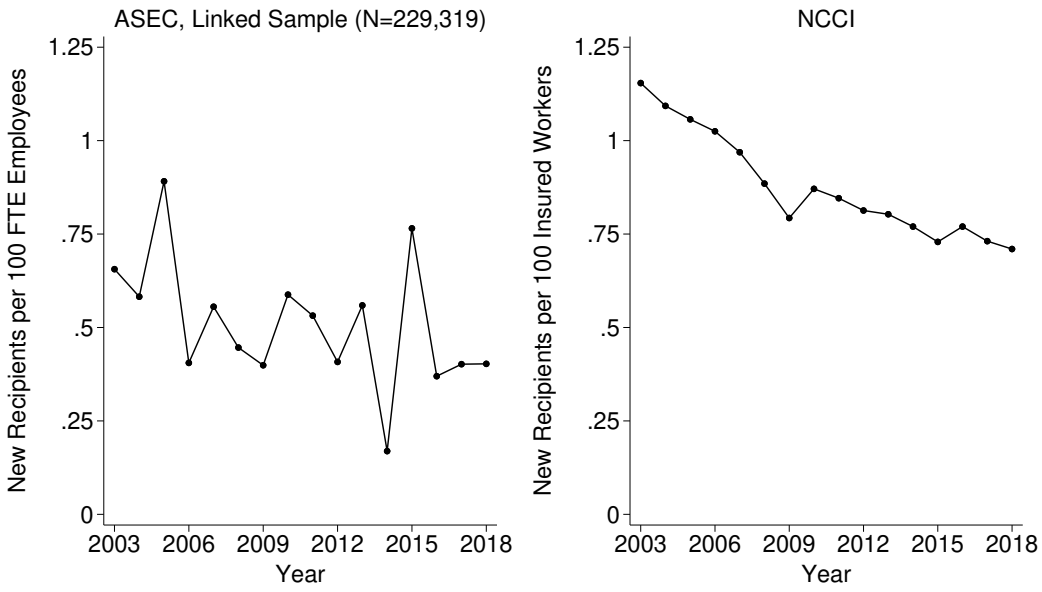


A recipient is defined as a respondent-year with a positive amount of workers' compensation income. The Full Sample included all respondents each year, even those that cannot be linked between two years of the ASEC. The Linked Sample included the second observation of those respondents who can be successfully linked between two years of the ASEC.

In the Linked Sample, the number of recipients per 100 FTE employees decreased from 0.894 to 0.504, a decrease of 43.6 percent. (In Appendix Figure A.1, I show that similar decreases exist when considering the dollar amount of indemnity benefits per 100 FTE employees, adjusted for inflation.) The results indicated a substantial decrease in indemnity benefit receipt over the period. Moreover, these findings suggested that estimates in the change over time from the Full Sample and Linked Sample were qualitatively similar, differing by only 0.6 percentage points, or slightly over 1 percent of the mean of the two values. This supported my use of the Linked Sample in the calculations going forward.

How well did the ASEC capture receipt? Since the NCCI Data is based on administrative data in the NCCI states, I answered this question by comparing the ASEC with the NCCI Data. Whereas the analysis in the preceding paragraph considered all receipt of WC benefits, the NCCI Data comprises new recipients only. Because of this, to compare the ASEC to the NCCI Data, I needed to consider only new recipients in the ASEC. This was possible only using the Linked

Figure 3: Comparison of Trends between the ASEC and NCCI Data, New Recipients of Indemnity Benefits, 2003-2018



A recipient in the ASEC is defined as a respondent-year with a positive amount of workers' compensation income. The Linked Sample included the second observation of those respondents who can be successfully linked between two years of the ASEC. This figure further restricts the Linked Sample to states who report data to the NCCI, but includes South Dakota based on how NCCI report these data.

Sample because I needed to observe a respondent switching from non-receipt to receipt to classify that respondent as a new recipient. Additionally, when comparing the Linked Sample and the NCCI Data, I restricted the Linked Sample to states that report data to the NCCI. Lastly, because of how NCCI reports these data, I included South Dakota in only this analysis.[5]

Figure 3 compares the trend of new recipients in the *modified* Linked Sample to the trend in new recipients from the NCCI Data. The rate of receipt in the modified Linked Sample decreased from 0.710 per 100 FTE employees to 0.391 per 100 FTE employees, a decrease of 44.9 percent. And the rate of receipt as calculated from the NCCI Data decreased from 1.101 per 100 insured workers to 0.737 per 100 insured workers, a decrease of 33.1 percent. It is apparent from this comparison that the ASEC did not capture all receipt. Recall bias with respect to whether respondents to the ASEC remember their WC receipt in the past year likely explained a large portion of the difference. Indeed,

[5]NCCI reports jurisdiction-level rates and countrywide rates per 100,000 insured workers. However, NCCI does not report the total number of insured workers by jurisdiction. This means that I cannot calculate the countrywide rate with South Dakota excluded.

Table 1: Workers' Compensation Changes by Component, Linked Sample, 2003-2018

	(1) Rate, 2003-2005 per 100 FTE	(2) Rate, 2016-2018 per 100 FTE	(2)−(1) Rate Change per 100 FTE	Rate Change as Percent of Total Rate Change
Continued Receipt	0.116	0.069	-0.047	12.1%
New Receipt	0.777	0.435	-0.343	87.9%
Total	0.894	0.504	-0.390	100.0%

Rates are in terms of 100 FTE employees.
The rate columns are means over the sub-periods indicated, either 2003 through 2005 or 2016 through 2018.

the NCCI Data has the advantage of accurately capturing the number of accepted applications for medical only and indemnity benefits, for the majority of the country. But it has the disadvantage that 12 states are not captured by its data. And it does not contain industry sector-level information on where OIIs occurred, making it impossible to perform the decomposition analyses in the next section.

Overall, the analyses in this section documented a substantial downward decrease of 43.6 percent in total WC receipt based on estimations from the Linked Sample. In the next section, I studied the reasons that can explain why this 43.6 percent decrease occurred.

5 Why has the receipt of workers' compensation changed over time?

5.1 The role of new receipt and continued receipt

The decrease in total receipt from 0.894 per 100 FTE employees to 0.504 per 100 FTE employees was due to factors affecting both continued receipt and new receipt. Table 1 shows the breakdown of the decrease in total receipt into both of these components. Decreases in the rate of continued receipt represented 12.1 percent of the change in total receipt. Decreases in the rate of new receipt represented 87.9 percent of the change in total receipt. These results indicated that the primary explanation for the decrease in total receipt were decreases in new receipt.

5.2 The role of sectoral composition

One plausible explanation for the decrease in new receipt was the changing sectoral composition of the economy, from presumably more hazardous goods-producing industry sectors towards safer service-providing industry sectors (Charles et al., 2019). Using new receipt, I investigated this explanation through the following decomposition:

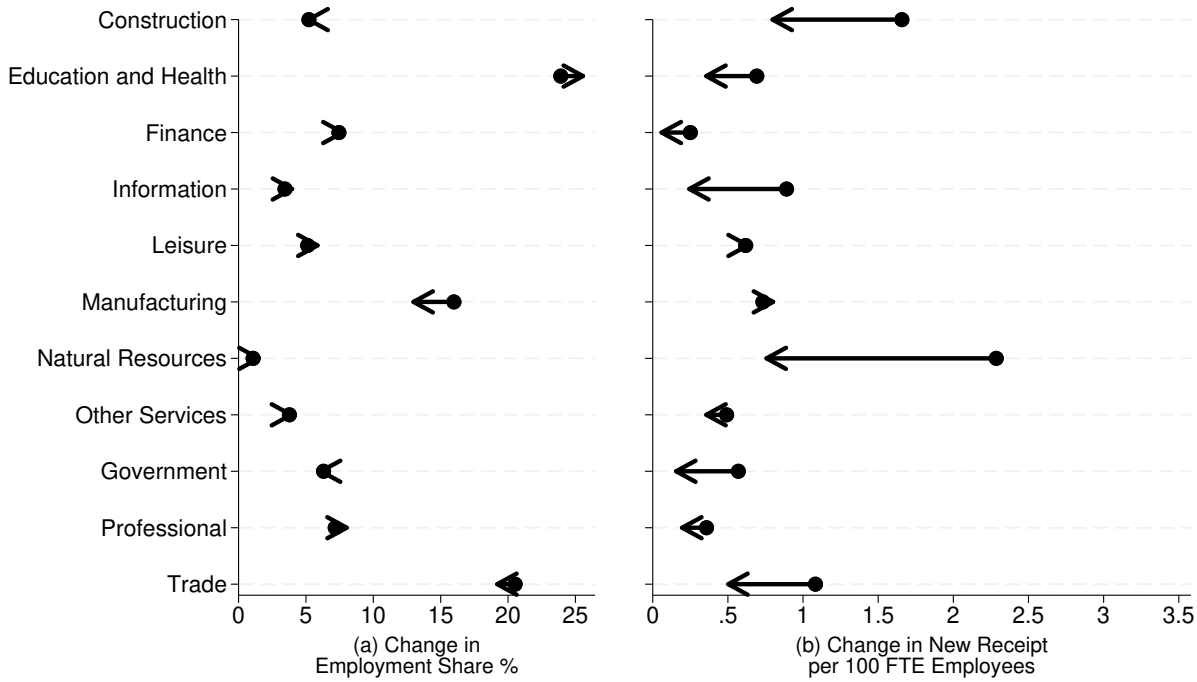
$$\underbrace{\frac{\omega_t}{\eta_t} - \frac{\omega_s}{\eta_s}}_{\substack{\text{Change in} \\ \text{Rate of} \\ \text{New Receipt}}} = \underbrace{\sum_j \left(\frac{\eta_{j,t}}{\eta_t} - \frac{\eta_{j,s}}{\eta_s} \right) \cdot \frac{\omega_{j,t}}{\eta_{j,t}}}_{\text{Composition Effect}} + \underbrace{\sum_j \left(\frac{\omega_{j,t}}{\eta_{j,t}} - \frac{\omega_{j,s}}{\eta_{j,s}} \right) \cdot \frac{\eta_{j,s}}{\eta_s}}_{\text{Within-Sector Effect}} \tag{2}$$

That is, equation 2 decomposes the change in the rate of new receipt into a composition effect due to changing sectoral composition and a within-sector effect. Here, I used employment shares as a proxy for sectoral composition, and I calculated them based on the estimated hours worked as an employee from the ASEC.

In equation 2, subscripts s and t refer to the following sub-periods: $s = 2003, 2004, 2005$ and $t = 2016, 2017, 2018$. Sectors are indexed by j. ω is the count of new receipt in sub-period s or t and, where indicated by subscript, for sector j. η is the count of employee hours in sub-period s or t and, where indicated by subscript, for sector j. The first part of the sum on the right hand side is the effect of an absolute change in employment share weighted by the ending within-sector rate of new receipt (*composition effect*). The second part of the sum on the right hand side is the effect of a change in the within-sector rate of new receipt weighted by the beginning employment share (*within-sector effect*). The counterfactual term $\frac{\omega_{j,t}}{\eta_{j,t}} \cdot \frac{\eta_{j,s}}{\eta_s}$, which is added and subtracted on the right hand side to obtain the decomposition, represents the ending within-sector rates of new receipt weighted by the beginning sectoral composition. Summing over j would provide the ending overall rate of new receipt had the sectoral composition remained constant. The components of the decomposition are not causal estimates, but it is unlikely that causal estimates could be obtained in this context under any empirical approach.

I performed the decomposition based on the industry sectors that the BLS refers to as super-

Figure 4: Components of the Decomposition Calculation, Change in Rate of New Receipt of Workers' Compensation Benefits, 2003-2018



Results: *Change in Rate of New Receipt:* -0.343 per 100 FTE employees. *Composition Effect:* -0.014 per 100 FTE employees. *Within-Sector Effect:* -0.329 per 100 FTE employees.

sectors. (I refer to these supersectors as *sectors* in this paper. Table A.1 in the Appendix shows a crosswalk between the sectors in this paper and two-digit NAICS codes.) To maintain consistency with the next Subsection, and due to the relatively small sample size of new receipt each year (yearly mean unweighted N = 98), performing the decomposition down to more detailed industry identifiers was not feasible.

Figure 4 displays the sector-level components that enter into the calculation of both the composition and within-sector effects. (Appendix Table A.2 includes all of the underlying numerical values in the calculation.) Sub-figure (a) shows the beginning and ending employment share values as percentages, with arrows indicating the direction of the change. Sub-figure (b) does the same for new receipt per 100 FTE employees.

Changes in sectoral composition occurred primarily due to shifts in employment away from the Manufacturing and Trade sectors and towards the Education and Health and Professional sectors.

By contrast, five sectors experienced an increase or decrease in employment share of less than 0.5 percentage points: Construction, Finance, Natural Resources, Other Services, and Government. However, these changes were not weighted equally in the calculation. Construction, Leisure, Manufacturing, Natural Resources, and Trade all had ending rates of new receipt greater than 0.5 per 100 FTE employees. Hence, the relatively small employment changes in the Construction and Natural Resources sectors received approximately the same weight as the relatively large changes in the Leisure, Manufacturing, and Trade sectors. It was not surprising, then, that the estimated composition effect was relatively small: -0.014 per 100 FTE employees, or 4.1 percent of the -0.343 per 100 FTE employees change in new receipt over the period. This result suggested a minimal role for changing sectoral composition in driving the decrease in new receipt.[6]

All sectors except two, Leisure and Manufacturing, experienced decreases in within-sector rates of new receipt. Notably, the increases in those two sectors were less in magnitude than the decrease in any other sector. Moreover, those sectors comprised approximately 21 percent of employment at the beginning of the period. In combination, this offset the calculation of the within-sector effect by 0.012 per 100 FTE employees. Overall, the estimated within-sector effect was -0.329 per 100 FTE employees, or 95.9 percent of the -0.343 per 100 FTE employees change in new receipt over the period. This estimate implied that the changes in new receipt resulted almost completely from within-sector decreases.

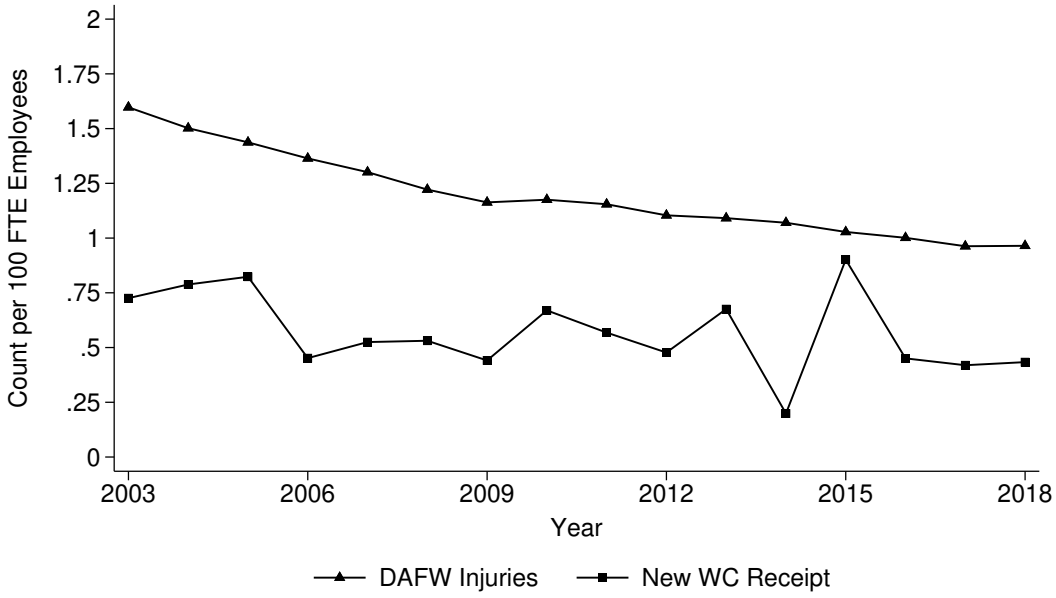
5.3 The role of occupational injuries and illnesses

Another plausible explanation for the decrease in new receipt was the long-term decrease in OIIs (Cohn and Wardlaw, 2024). Because the ASEC reports the receipt of WC indemnity benefits and WC indemnity benefits generally require workers to be out of work initially, OIIs that lead to days away from work (DAFW) were the most appropriate type of OII to study.

It was valuable to first compare the trend in the rate of DAFW OIIs to the trend in the rate of

[6]This interpretation is robust to swapping the time periods of the weights in the calculation. These changes would result in a composition effect of -0.004 per 100 FTE employees and a within-sector effect of -0.339 per 100 FTE employees.

Figure 5: Trends in the Rates of Days Away From Work Occupational Injuries and Illnesses and New Workers' Compensation Receipt, 2003-2018



new receipt. Indeed, through this comparison alone, I could determine how much of the decrease in the rate of new receipt could be explained by the decrease in the rate of DAFW OIIs. Figure 5 shows the trend in the number of DAFW OIIs per 100 FTE employees and the trend in the number of new WC receipt per 100 FTE employees over the study period of 2003 through 2018. Over the period, the rate of DAFW OIIs decreased from 1.510 to 0.976, a decrease of 35.3 percent. The rate of new WC receipt decreased from 0.777 to 0.435, a decrease of 44.1 percent. Taken together, this implied that 80.2 percent (= $35.3/44.1 \times 100\%$) of the decrease in new WC receipt could be explained by the decrease in the rate of DAFW OIIs.

To further understand this decrease, I performed a decomposition analogous to equation 2 on the rates of DAFW OIIs:

$$\underbrace{\frac{\delta_t}{\eta_t} - \frac{\delta_s}{\eta_s}}_{\substack{\text{Change in} \\ \text{Rate of} \\ \text{DAFW OIIs}}} = \underbrace{\sum_j \left(\frac{\eta_{j,t}}{\eta_t} - \frac{\eta_{j,s}}{\eta_s} \right) \cdot \frac{\delta_{j,t}}{\eta_{j,t}}}_{\text{Composition Effect}} + \underbrace{\sum_j \left(\frac{\delta_{j,t}}{\eta_{j,t}} - \frac{\delta_{j,s}}{\eta_{j,s}} \right) \cdot \frac{\eta_{j,s}}{\eta_s}}_{\text{Within-Sector Effect}} \tag{3}$$

Similar to equation 2, equation 3 decomposes the change in the rate of DAFW OIIs into a compo-

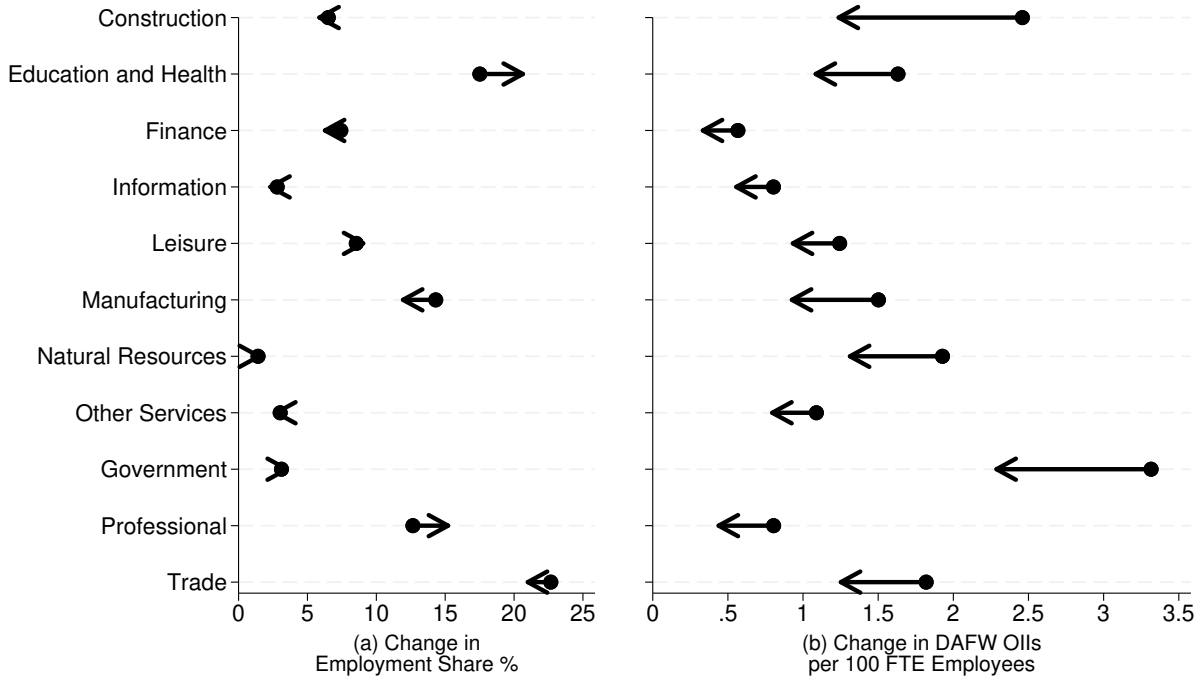
sition effect and a within-sector effect. Again, I used employment shares as a proxy for sectoral composition, but here I estimated hours from within the SOII to be internally consistent within the dataset.

In equation 3, subscripts s and t refer to the following sub-periods: $s = 2003, 2004, 2005$ and $t = 2016, 2017, 2018$. Sectors are indexed by j. δ is the count of new receipt in sub-period s or t and, where indicated by subscript, for sector j. η is the count of employee hours in sub-period s or t and, where indicated by subscript, for sector j. The first part of the sum on the right hand side is the effect of an absolute change in employment share weighted by the ending within-sector rate of DAFW OIIs (*composition effect*). The second part of the sum on the right hand side is the effect of a change in the within-sector rate of DAFW OIIs weighted by the beginning employment share (*within-sector effect*). The counterfactual term $\frac{\delta_{j,t}}{\eta_{j,t}} \cdot \frac{\eta_{j,s}}{\eta_s}$, which is added and subtracted on the right hand side to obtain the decomposition, represents the ending within-sector rates of DAFW OIIs weighted by the beginning sectoral composition. Summing over j would provide the ending overall rate of DAFW OIIs had the sectoral composition remained constant.

Figure 6 displays the sector-level components that enter into the calculation of both the composition and within-sector effects. (Appendix Table A.3 includes all of the underlying numerical values in the calculation.) Sub-figure (a) shows the beginning and ending employment share values as percentages, with arrows indicating the direction of the change. Sub-figure (b) does the same for DAFW OIIs per 100 FTE employees.

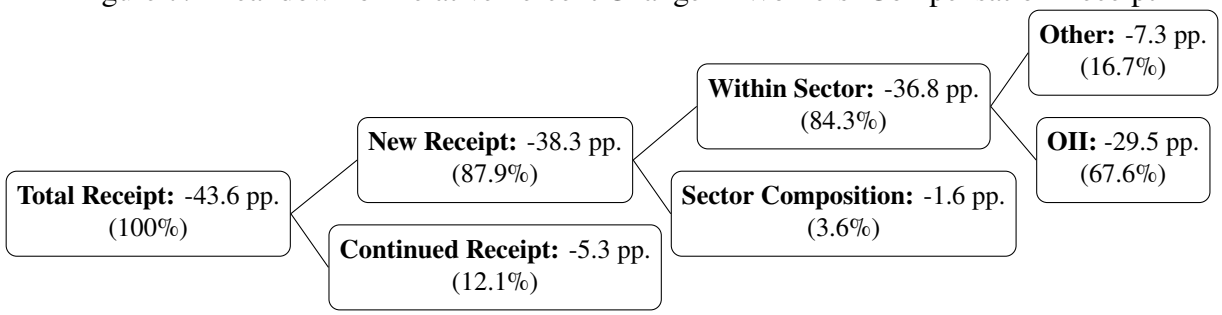
Changes in sectoral composition occurred primarily due to shifts in employment away from the Finance, Manufacturing and Trade sectors and towards the Education and Health and Professional sectors. Curiously, the Finance sector exhibited a substantial decrease in employment share when estimated from the SOII data (from 7.423 percent to 6.271 percent), yet a relatively small increase in employment share when estimated from the ASEC data (from 7.447 percent to 7.715 percent). This was despite the sector starting at similar shares of employment in the two datasets. Along these lines, five sectors experienced an increase or decrease in employment share of less 0.5 percentage points, but these also did not perfectly coincide with the estimates from the ASEC: Information,

Figure 6: Components of the Decomposition Calculation, Change in Rate of Days Away From Work Occupational Injuries and Illnesses, 2003-2018



Results: *Change in Rate of DAFW OIIs:* -0.534 per 100 FTE employees.
Composition Effect: -0.000 per 100 FTE employees. *Within-Sector Effect:* -0.533 per 100 FTE employees.

Figure 7: Breakdown of Relative Percent Change in Workers' Compensation Receipt



pp. are contributions in percentage points of the specified component to the total relative percent change. Percents in parentheses show percent of total relative percent change. Sums may not equal totals due to rounding.
OII: Occupational injury and illness.

Leisure, Natural Resources, Other Services, and Government. Such discrepancies likely resulted from the differing survey methodologies of each sample—a voluntary household-based survey (ASEC) versus a mandatory firm-based survey (SOII). The estimated composition effect from the SOII was tiny: -0.000 per 100 FTE employees, or merely 0.1 percent of the -0.534 per 100 FTE employees change in DAFW OIIs over the period. This means there was an almost nonexistent role for changing sectoral composition driving the decrease in the overall rate of DAFW OIIs.[7]

Every sector experienced substantial decreases in the rate of DAFW OIIs, with the largest decreases seen in the Construction and Government sectors. The largest weights in calculating the within-sector effect, however, were in the Education and Health and Trade sectors. Based on these factors, the estimated within-sector effect from the SOII was -0.533 per 100 FTE employees, which explains over 99.9 percent of the -0.534 per 100 FTE employees change in DAFW OIIs over the period. From this estimate, I concluded that almost all of the change in the rate of DAFW OIIs was a result of within-sector effects.

5.4 Synthesis of results

Figure 7 brings together the results from this section via a breakdown of the 43.6 percentage point decrease in the rate of total WC receipt from 2003 through 2018.[8]

The figure shows that the most important contributor to the 43.6 percentage point decrease in WC receipt was the broad-based decrease in DAFW OIIs, which contributed 29.5 percentage points, or 67.6 percent, of the total. A natural question to ask is: what has led to these decreases in OIIs? Cohn and Wardlaw (2024) offer several potential explanations. These include an increase in automation, the use of robotics, and the implementation of real-time monitoring through the use of smart sensors. Adoptions of safety training and ergonomic designs within organizations have contributed, as well. Additionally, the Occupational Safety and Health Administration implemented several new safety regulations starting in the early 2000s. These regulations included updates pertaining to commercial driving, bloodborne pathogens, construction cranes, and chemical labeling.

The least important contributor was changing sectoral composition, which can explain only 1.6 percentage points, or 3.6 percent, of the total decrease. Here, one may be concerned with the relatively high level of aggregation I employed in my analyses, at the level of BLS supersectors. However, Cohn and Wardlaw (2024) found composition effects played little role in explaining the decrease in the rate of OIIs over 1999 through 2022, approximately the same time period as my paper. Since Cohn and Wardlaw conducted their analysis at the level of 867 detailed occupations, the level of aggregation in my paper would seem to be only a minor limitation.

Changes in continued receipt contributed 5.3 percentage points, or 12.1 percent. Factors affecting continued receipt imply that the duration for which workers are receiving benefits has decreased over time. These decreases could have occurred for a variety of reasons, and it is

[7]This interpretation is robust to swapping the time periods of the weights in the calculation. These changes would result in a composition effect of -0.004 per 100 FTE employees and a within-sector effect of -0.530 per 100 FTE employees.

[8]To obtain the contribution of decreases in the rate of DAFW OIIs, I used the calculation in Subsection 5.3 that decreases in the rates of DAFW OIIs explained 80.2 percent of the decrease in within-sector rates of new WC receipt. While this value is more rigorously stated to be a first approximation of the true value, I used the calculation that over 99.9 percent of the decrease in the rates of DAFW OIIs were within sector. Thus, 80.2 percent was exceedingly close to the true value and was appropriate to incorporate in these calculations.

exceedingly unlikely that all of them can be identified. One possible explanation was that the severity of OIIs decreased over the period. That is, as OIIs became less severe, workers received WC benefits for a shorter duration. Another possible explanation was a decrease in the generosity of a WC program for the characteristics of a given recipient, indicating that the program was providing benefits for a shorter duration.

What could be the other factors, accounting for 7.3 percentage points, or 16.7 percent, of the decrease in total receipt? Prior work has found that fear of retaliation for applying for WC benefits may decrease receipt. Approximately 20 percent of surveyed workers who lost more than seven days of work due to an OII responded that they did not apply for WC benefits due to fear of retribution (Biddle et al., 1998). Additionally, union workers, who have stronger job protections than nonunion workers, have been found 60 percent more likely to receive WC benefits than similar nonunion workers (Hirsch et al., 1997). Given the well-known decline in unionization over time (Pew Research Center, 2025), an increase in application hesitancy over the study period could plausibly have served as a factor that reduces receipt. Increased access to other programs may have contributed to the decrease in receipt of WC, as well. For instance, Dong et al. (2024) estimated through a difference-in-differences approach that implementation of mandated paid sick leave reduced the likelihood of benefit receipt by 13.5 percent. Since 11 states implemented paid sick leave during the study period, this could also plausibly reduced receipt. Continuing to explore the impact of factors like these can serve as the basis for future research.

6 Conclusion

This paper systematically investigated the reasons for the long-term decrease in WC receipt over the period from 2003 through 2018. Analysis of the NCCI Data showed that the rate of new receipt for medical-only benefits decreased by 38.5 percent and for indemnity benefits by 33.1 percent. The more substantial decrease in medical-only receipt may imply that less serious OIIs were decreasing at a faster rate than more serious ones. To understand these trends in more depth, I turned to the

ASEC, which provides data on all states and allows for a study at the sector-level. I showed that the rate of receipt decreased by 43.6 percent over the study period. Then, I used decomposition analyses to first attribute the vast majority of this decrease—87.9 percent—to a decrease in the rate of new receipt. This was driven almost entirely by within-sector changes rather than shifts in sectoral composition. The primary mechanism for this change was a decrease in within-sector DAFW OIIs. This ultimately explained 67.6 percent of the total decrease in receipt. My results suggested the decrease in WC receipt was primarily due to improvements to workplace safety.

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Appendix

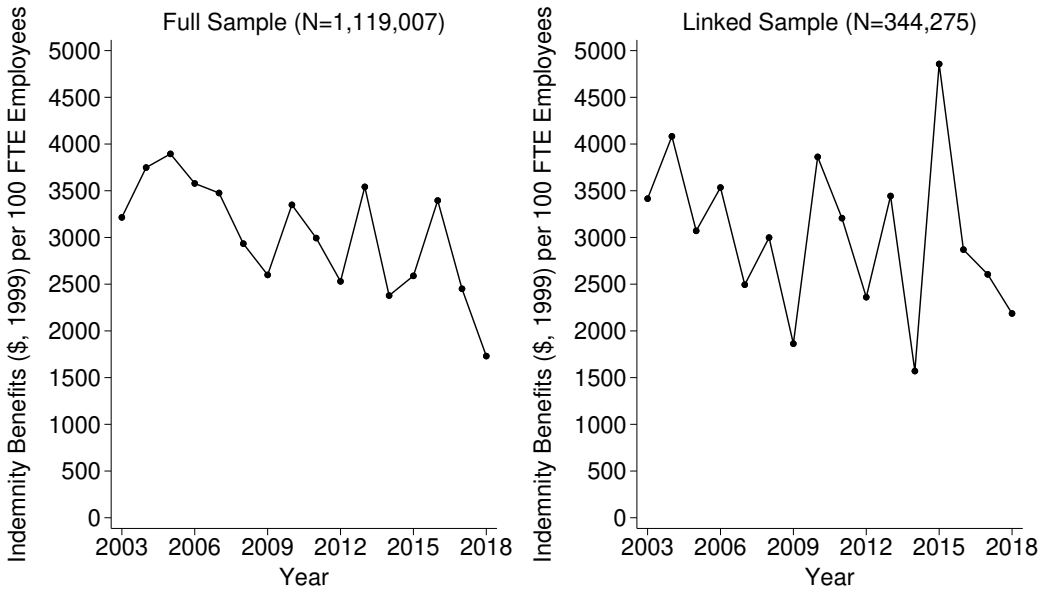
Figure A.1 shows the amount of indemnity benefits, adjusted for inflation (base year = 1999), over the period from 2003 through 2018. In the Full Sample, the amount of indemnity benefits decreased from $3,563 per 100 FTE employees to $2,767 per 100 FTE employees, a decrease of 22.3 percent. In the Linked Sample, the amount of indemnity benefits decreased from $3,698 per 100 FTE employees to $2,843 per 100 FTE employees, a decrease of 23.1 percent.

Table A.1 shows a crosswalk between sectors in the paper and two-digit NAICS codes.

Table A.2 shows the numerical values in the calculation of the composition and within-sector effects of the change in the rate of new receipt.

Table A.3 shows the numerical values in the calculation of the composition and within-sector effects of the change in the rate of DAFW OIIs.

Figure A.1: Trends in the Amount of, Indemnity Benefits, 2003-2018



A recipient is defined as a respondent-year with a positive amount of workers' compensation income. The Full Sample includes all respondents each year, even those that cannot be linked between two years of the ASEC. The Linked Sample includes the second observation of those respondents who can be successfully linked between two years of the ASEC.

Table A.1: Sector Definitions

Sector	NAICS Two-Digit Sector
Construction	Construction: NAICS 23
Education and Health	Educational Services: NAICS 61
	Health Care and Social Assistance: NAICS 62
Finance	Finance and Insurance: NAICS 52
	Real Estate and Rental and Leasing: NAICS 53
Information	Information: NAICS 51
Leisure	Arts, Entertainment, and Recreation: NAICS 71
	Accommodation and Food Services: NAICS 72
Manufacturing	Manufacturing: NAICS 31-33
Natural Resources	Agriculture, Forestry, Fishing and Hunting: NAICS 11
	Mining, Quarrying, and Oil and Gas Extraction: NAICS 21
Other Services	Other Services (except Public Administration): NAICS 81
Government	Government
Professional	Professional, Scientific, and Technical Services: NAICS 54
	Management of Companies and Enterprises: NAICS 55
	Administrative and Support and
	Waste Management and Remediation Services: NAICS 56
Trade	Wholesale Trade: NAICS 42
	Retail Trade: NAICS 44-45
	Transportation and Warehousing: NAICS 48-49
	Utilities: NAICS 22

Sector definitions based on Supersector classifications by the Bureau of Labor Statistics.

Table A.2: Results of Decomposition of Change in Rate of New Receipt, 2003-2018

Total Change in Rate of New Receipt = -0.343 per 100 FTE employees

Panel A: Composition Effect

Sector	(1) Absolute Change in Emp. Share %	(2) Ending New Receipt per 100 FTE	(1)×(2) Composition Effect Contribution per 100 FTE
Construction	-0.031	0.798	0.000
Education and Health	1.643	0.357	0.006
Finance	0.267	0.059	0.000
Information	0.525	0.244	0.001
Lesiure	0.728	0.632	0.005
Manufacturing	-3.000	0.801	-0.024
Natural Resources	0.411	0.758	0.003
Other Services	0.124	0.357	0.000
Government	-0.191	0.156	0.000
Professional	0.848	0.196	0.002
Trade	-1.325	0.503	-0.007
		Composition Effect	-0.014
		Composition Effect as Percent of Total Change	4.1%

Panel B: Within-Sector Effect

Sector	(1) Absolute Change in New Receipt per 100 FTE	(2) Beginning Emp. Share %	(1)×(2) Within-Sector Effect Contribution per 100 FTE
Construction	-0.860	5.220	-0.045
Education and Health	-0.336	23.916	-0.080
Finance	-0.191	7.447	-0.014
Information	-0.647	3.443	-0.022
Lesiure	0.013	5.126	0.001
Manufacturing	0.067	15.984	0.011
Natural Resources	-1.528	1.078	-0.016
Other Services	-0.135	3.773	-0.005
Government	-0.414	6.309	-0.026
Professional	-0.162	7.175	-0.012
Trade	-0.580	20.528	-0.119
		Within-Sector Effect	-0.329
		Within-Sector Effect as Percent of Total Change	95.9%

Table A.3: Results of Decomposition of Change in Rate of Days Away from Work Occupational Injuries and Illnesses, 2003-2018

Total Change in Rate of DAFW OIIs = -0.534 per 100 FTE employees			
Panel A: Composition Effect			
Sector	(1) Absolute Change in Emp. Share %	(2) Ending DAFW OIIs per 100 FTE	(1)×(2) Composition Effect Contribution per 100 FTE
Construction	-0.646	1.237	-0.008
Education and Health	3.122	1.085	0.034
Finance	-1.152	0.334	-0.004
Information	-0.497	0.556	-0.003
Lesiure	0.498	0.932	0.005
Manufacturing	-2.372	0.926	-0.022
Natural Resources	0.063	1.312	0.001
Other Services	-0.290	0.795	-0.002
Government	0.389	2.287	0.009
Professional	2.551	0.439	0.011
Trade	-1.666	1.252	-0.021
		Composition Effect	0.000
		Composition Effect as Percent of Total Change	0.1%
Panel B: Within-Sector Effect			
Sector	(1) Absolute Change in DAFW OIIs per 100 FTE	(2) Beginning Emp. Share %	(1)×(2) Within-Sector Effect Contribution per 100 FTE
Construction	-1.222	6.516	-0.080
Education and Health	-0.547	17.518	-0.096
Finance	-0.233	7.423	-0.017
Information	-0.247	2.802	-0.007
Lesiure	-0.311	8.548	-0.027
Manufacturing	-0.576	14.313	-0.082
Natural Resources	-0.616	1.415	-0.009
Other Services	-0.294	3.022	-0.009
Government	-1.029	3.117	-0.032
Professional	-0.366	12.658	-0.046
Trade	-0.567	22.668	-0.129
		Within-Sector Effect	-0.533
		Within-Sector Effect as Percent of Total Change	99.9%