Workers’ Compensation and State Employment Growth

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Abstract

Workers’ Compensation reforms have been on the table in virtually every state over the last several years, and many states have launched comprehensive reforms. At least nine states undertook major reforms of their workers’ compensation systems in 2004 alone, and the reforms were driven largely by claims that higher workers’ compensation costs are driving away businesses and the employment that comes with them. This paper examines the relationship between workers’ compensation costs and employment across U.S. states and the District of Columbia from 1976 – 2000. Workers’ compensation costs are found to have a statistically significant negative impact on employment and wages, but the elasticities are very small, suggesting that workers’ compensation costs are not a likely cause of jobs woes in most states. Medical cost inflation is found to be a significant factor in explaining movements in workers’ compensation costs over time.

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Workers’ Compensation and State Employment Growth

1. Introduction

Workers’ Compensation reforms have been on the table in virtually every state over the last several years, and many states have launched comprehensive reforms.\(^1\) At least nine states undertook major reforms of their workers’ compensation systems in 2004 alone, although few states actually enacted substantial reforms. The reform efforts were driven largely by claims that higher workers’ compensation costs drive away businesses and the employment that comes with them. In promoting workers’ compensation reform in California, for example, which passed in April, 2004, Governor Schwarzenegger asserted that “California employers are bleeding red ink from the workers' comp system,” and that their “high costs are driving away jobs and businesses.”\(^2\) Tennessee’s Senator Mark Norris argued during his state’s 2004 reform debate that “one of the greatest impediments to economic development and well-being . . . is the loss of jobs due to Tennessee’s archaic system of workers’ compensation laws.”\(^3\) And the House Minority Leader in Oklahoma judged that “Oklahoma’s expensive, lawyer-friendly workers comp system is a leading cause of ‘job flight’ from Oklahoma, as employers move to states with more business-friendly environments.”\(^4\) Even in states like Florida and Missouri, where the initial reform impetus was insolvency, economic development issues were at the forefront of the debate. In an opinion editorial, the President of the Missouri Chamber of Commerce stated that “[a]s one of the key cost drivers in most businesses, workers’ compensation reform could be one of the most valuable economic development tools Missouri could secure.”\(^5\) Other states with comprehensive reform efforts in 2004 include New York, Texas, Vermont, and Washington.

\(^1\) *Monthly Labor Review* publishes a summary of the previous year’s changes in state workers’ compensation laws every January. See Burton and Spieler (2001) for a detailed discussion of legislative changes made in the 1990s.


\(^5\) Available at http://www.mochamber.org.
Although there is a nearly universal assertion by promoters of workers’ compensation reforms that high cost states lose jobs to relatively low cost states, empirical evidence is rarely, if ever, offered to support the claims. One likely reason is that there is not a great deal of evidence available. Although a voluminous literature exists that explores behavioral aspects of workers’ compensation insurance, including effects on injury rates (Ruser, 1993; Ohsfeldt and Morrissey, 1997), number of claims (Krueger, 1990; Neuhauser and Raphael, 2004), and duration of claims (Meyer et al., 1995; Meyer, 2002; Neuhauser and Raphael, 2004), there has been little systematic study of the direct relationship between workers’ compensation costs and employment, or economic growth more generally. Most of the work that has been done has examined the relationship between workers’ compensation and wages, from which employment effects must be inferred.

The preponderance of the results suggest that most of the employer cost of workers’ compensation insurance is passed on to workers in the form of lower wages, suggesting that employment effects likely are small. Gruber and Krueger (1991) find that 86 percent of workers’ compensation costs are shifted to workers in the form of lower wages. Moore and Viscusi (1990) find that employers’ costs for workers’ compensation are more than fully offset by reduced wages, which suggests that employment should increase in response to higher workers’ compensation costs. A similar finding is reported in Dorsey and Walzer (1983) in their analysis of nonunionized workers, although they find a positive and significant relationship between workers’ compensation and wages for union members. In a regression of wages on the income replacement rate of workers’ compensation benefits, Kaestner and Carroll (1997) find a sizeable elasticity of –1.7, which is consistent with elasticities estimated in Viscusi and Moore (1987) (–1.2) and Ruser (1985) (–1.7 to –2.0). Kaestner (1996) finds that a one percentage point increase in the employer’s cost of workers’ compensation insurance reduces youth employment by about 1.5 percentage points.

To date, the only study to the author’s knowledge that directly investigates the relationship between workers’ compensation costs and employment is Gruber and Krueger.
(1991), which estimates the impact of workers’ compensation costs on employment using micro
data for a limited set of high-risk industries and finds no statistically meaningful relationship.

This paper proceeds to estimate the direct relationship between workers’ compensation
costs and aggregate employment at the state level and considers the workers compensation –
employment relationship across all industries. An additional innovation of the paper is that it
captures the wage and employment effects of workers’ compensation within a structural model
where employment, wages, and workers’ compensation costs are endogenously determined.
Further, the paper offers additional insights into the relationship between unionization and
employment and wages, for which there is currently little consensus, and the effects that
unionization may have on workers’ compensation costs, as well as employment and wage effects
of the minimum wage and unemployment insurance..

The paper proceeds as follows. Section 2 provides a brief description of the workers’
compensation system in the United States and its basic operation. Section 3 discusses the
empirical model, followed by an examination of the data in section 4. Section 5 investigates
econometric issues that arise in the estimation and section 6 presents an analysis of the empirical
results, followed by concluding remarks in section 7.

2. The U.S. Workers’ Compensation System

The workers’ compensation system is the oldest social insurance system in the United
States, adopted by most states in the 1910s. It provides medical care and cash benefits to
workers who are either injured on the job or who contract a work-related illness. In 2001,
roughly 45 percent of workers’ compensation benefits were for medical care (National Academy

Cash benefits to replace lost wages can be temporary while the worker recuperates away
from work or permanent in the case of permanent disability. Further, benefits may be paid to

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6 For a more detailed explanation of the program, see Butler (2002), National Academy for Social Insurance (NASI)
(2003), and Krueger and Meyer (2002).
dependents in the case of work-related fatality. Cash benefits for total disability typically equal some fraction of the pre-disability average weekly wage (often two-thirds) up to a maximum benefit. Cash benefits for a partial disability typically conform to a schedule of benefits linked to specific impairments. Krueger and Meyer (2002) demonstrate that the exclusion of workers’ compensation benefits from income taxation and relatively high replacement rates (again, typically two-thirds) can lead to an after-tax replacement rate greater than 100 percent in some cases.

Fishback and Kantor (1998) describe in great detail the adoption of this system of workers’ compensation in the United States. Prior to commencement of the system, injured workers were entitled compensation only in cases where they could prove (in court) that their employer had failed to exercise “due care” in protecting the worker from injury, and that this negligence was the proximate cause of the injury. Even in cases where negligence were proven, employers were still able to escape liability if they were able to successfully argue that (1) the employee assumed the risk associated with employment, (2) a co-worker caused the accident, or (3) the injured worker contributed negligence. This tort-based system left injured workers with uncertainty of compensation (20 – 60 percent uncompensated, depending on geographic location), long delays (up to five years in some cases), and relatively low levels of compensation. Under the no-fault workers’ compensation system in place today, injured workers do not have to prove that their injuries or illnesses are the fault of someone else, only that they are job-related. Further, injured employees receive statutory benefits in a more timely fashion than would likely occur with a tort claim.

Fishback and Kantor go on to explain why employers willingly accepted the new system and the costs it entailed. Employers benefit because workers’ compensation is the exclusive remedy for injured employees against their employers, even in cases where the employer is negligent, and employers do not face as great a risk of large and unpredictable losses in tort suits as they faced before the system was in place. At the time workers’ compensation was adopted, courts were increasingly favoring injured workers. Further, workers’ compensation allowed
employers to “buy labor peace.” Perhaps most importantly, Fishback and Kantor found in earlier work (1995) that in the early 1900s at least, employers were able to pass higher costs of workers’ compensation onto employees in the form of lower wages. As noted above, research using data for more recent periods yields similar findings.

The U.S. system of workers’ compensation is actually a set of 51 different systems representing each of the fifty states and the District of Columbia, and a federal system to cover federal government employees, coal miners suffering from black lung disease, veterans injured on active duty, and longshore and harbor workers. Depending on the state, the system may be administered by a government agency, private insurance carriers, or a combination of the two. Employers may also be self-insured. In 2001, the latest date for which data are available, 54.8 percent of benefits were paid by private insurers, 22.9 percent from self-insurers, and 16.1 percent from state funds (NASI, 2003). The remainder was paid under federal programs. In all cases, employers are responsible for financing the system, and most large firms are experience rated. In all states but Texas participation is mandatory for all but the smallest employers, generally those with 3 – 5 workers or less. Compensable injuries and illnesses, benefit levels, and other administrative characteristics vary widely across the states.

Figure 1 shows workers’ compensation benefits as a percentage of covered payroll for the U.S. as a whole over the period 1950 – 2000. Benefits increased at moderate rates from 1950 – 1970, rising less than ten percent over each decade. The 1970s and 1980s saw much more dramatic growth in benefits, with ten-year increases of 59.7 percent and 45.4 percent, respectively. The 1990s ushered in a remarkable turnaround, as benefits as a percentage of covered payroll declined 37.6 percent, from 1.69 percent in 1992 to 1.03 percent in 2000.

Although numerous states undertook major workers’ compensation reforms in the 1990s, recent research suggests that other factors were the major force in the decline in benefits payments. Boden and Ruser (2003), for example, found that workers’ compensation reforms in the 1990s were responsible for only 7.0 percent to 9.4 percent of the substantial nationwide decline in days-away-from-work injuries in the 1990s and 6.8 percent of the decline in restricted
workdays. Other likely factors include a shift in employment away from injury-prone sectors, increases in underreporting of workplace injuries and illnesses, cost containment measures on the part of employers and insurers, elimination of workplace hazards, and improved OSHA enforcement (Conway and Svenson, 1998).

3. The Model

The conceptual relationship between workers’ compensation costs and employment is quite simple: mandatory workers’ compensation premium payments decrease the demand for labor \((E^D)\), which results in a reduction of both wages \((w)\) and equilibrium employment \((E)\), the relative declines of which are determined by the relative demand and supply elasticities. If workers’ compensation benefits are valued by workers, higher benefit levels will in turn increase labor supply \((E^S)\), thereby putting additional downward pressure on wages and mitigating the reduction in employment. If workers’ compensation benefits are not valued by workers, the imposition of mandated benefits is equivalent to a tax on labor (see Summers, 1989).

On the supply side, workers’ compensation benefits \((b)\) is the relevant factor, rather than employer costs \((c)\). As detailed below, employer costs for workers’ compensation insurance, which is the relevant factor on the demand side, is well-proxied by benefits, so equilibrium in the labor market may be expressed in terms of workers’ compensation benefits only, along with wages and other determinants \((X)\):

\[
E^S (w, b, X^S) = E = E^D (w, c(b), X^D)
\]

Holding measures of the labor force constant, the wage is in turn a function of employment, implying that employment should appear in the wage equation. Moreover, higher benefits may serve as a substitute for wages (Viscusi and Moore, 1987 and 1991; Moore and Viscusi, 1989; Gruber, 1994), which means that benefits should appear in the wage equation as well. But higher wages may make receiving benefits in lieu of wages more costly, implying a

\footnote{Annual reported work-related injuries fell from 8.3 cases per 100 full-time workers to 5.9 cases per 100 full-time workers between 1990 and 1999.}
negative coefficient on wages in the workers’ compensation equation. Finally, Fortin et al. (1999) find that the duration of workers’ compensation spells in Canada are much higher when the accident occurs in December, which is the beginning of the layoff season in the construction industry, suggesting that employment should enter the workers’ compensation cost equation. Thus, employment, wages, and workers’ compensation benefits (and costs) are likely to be endogenously determined, suggesting the following three-equation system (in linear form):

\( E^c = E^e \left( w, b, X_E \right) = \alpha_E + \beta_E w_i + \delta_E b_i + \phi'E X_E + u_{Et} \) \hfill (2)  
\( w^c = w^e \left( E, b, X_w \right) = \alpha_w + \gamma_w E_i + \delta_w b_i + \phi'_w X_w + u_{wt} \) \hfill (3)  
\( b = b \left( w, E, X_b \right) = \alpha_b + \beta_w w_i + \gamma_b E_i + \phi'_b X_b + u_{bt} \) \hfill (4)

where \( E^c \) and \( w^c \) are equilibrium levels of state employment and wages, \( E \) and \( w \) are current levels of state employment and wages, \( b \) is the current level of workers’ compensation benefits expressed per $1,000 of earnings, the \( X \)'s are vectors of predetermined variables, and the \( u \)'s are zero-mean random shocks. Further, employment and wages are expected to adjust with lags, implying that

\( E_t = E_{t-1} + \lambda_E \left( E^e - E_{t-1} \right) + \nu_{E,t} \) \hfill (5)  
\( w_t = w_{t-1} + \lambda_w \left( w^e - w_{t-1} \right) + \nu_{w,t} \) \hfill (6)

where \( \lambda_E, \lambda_w \in [0,1] \) are speed-of-adjustment parameters and the \( \nu \) are zero-mean random shocks. Substituting (5) and (6) into (2) – (4) yields the following equations to be estimated:

\( E_t = \lambda_E \alpha_E + (1 - \lambda_E) E_{t-1} + \lambda_E \beta_E w_i + \lambda_E \delta_E b_i + \lambda_E \phi'E X_E + \zeta_{Et} \) \hfill (7)  
\( w_t = \lambda_w \alpha_w + (1 - \lambda_w) w_{t-1} + \lambda_w \gamma_w E_i + \lambda_w \delta_w b_i + \lambda_w \phi'_w X_w + \zeta_{wt} \) \hfill (8)  
\( b_t = \alpha_b + \beta_b w_i + \gamma_b E_i + \phi'_b X_b + \zeta_{bt} \) \hfill (9)

where \( \zeta_{Et} = \lambda_E u_{Et} + \nu_{Et}, \zeta_{wt} = \lambda_w u_{wt} + \nu_{wt}, \) and \( \zeta_{bt} = u_{bt} \).

4. **Data**

The data for the analysis covers all 50 states and the District of Columbia for the years 1978 – 2000 (after dropping observations when computing lags).

*Workers’ Compensation Benefits*
Data on workers’ compensation benefits were collected from the Social Security Administration’s *Annual Statistical Supplement to the Social Security Bulletin*. Total benefits paid were divided by total nonfarm earnings (in thousands), as reported by the Bureau of Economic Analysis (BEA), for each state and the District of Columbia over the years 1976 – 2000 to arrive at benefits paid per $1,000 of earnings.

In 2000, the average amount of benefits per $1,000 in earnings was $9.15, and the standard deviation was $5.07. The minimum was $2.06 in the District of Columbia, while the maximum was $38.19 in West Virginia. West Virginia is a substantial outlier, as the next highest value in 2000 was Montana at $15.05. Due in large part to the industry structure in the state, West Virginia’s rate of long-term injuries is more than twice the national average (Rousmaniere and Denniston, 2003), which is likely to be a substantial factor in its relative position across states. West Virginia suffered the greatest growth in benefits payments over the 1976 – 2000 period, with an average increase in benefits per $1,000 payroll of $0.95 per year. Oregon enjoyed an average annual decrease of $0.43 per $1,000 payroll, which was the best performance among the states. The trends in benefits paid for the average U.S. state, West Virginia, and Oregon are shown in Figure 2.

Because premium rates are so closely tied to the amount of benefits paid relative to payroll, the average benefits paid per dollar of payroll in a state also serves as a good proxy for employer cost, which is perhaps the optimal variable for inclusion in the model from a labor demand perspective. The National Academy of Social Insurance (2003) estimated employer cost for workers’ compensation per $100 of covered payroll for the U.S. as a whole for the period 1989 – 2001. An ordinary least squares regression of these data, denoted workers’ compensation

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9 The national data presented above is benefits paid divided by covered payroll. Total payroll is thought to be a better indicator of the workers’ compensation burden at the state level because account is taken for differences in coverage across states.

costs \( (c_t) \), on benefits/earnings \((b_t)\) suggests that benefits is indeed a highly suitable proxy and reveals that workers’ compensation costs are highly elastic with respect to benefits as a share of earnings:

\[
\hat{c}_t = -0.257 + 1.496 b_t \quad \left[ R^2 = 0.96 \right].
\]

Figure 3 shows actual employer costs for workers’ compensation \([c(t)]\), predicted workers’ compensation costs \([\text{Est } c(t)]\), benefits paid/earnings \([b(t)]\), and the residual \([u(t)]\) from estimating (10).

Variation in workers’ compensation benefits explains 96 percent of the variation in average workers’ compensation employer costs. Further, with only 12 observations, the coefficient on \(b_t\) is over 17 times larger than the standard error. Of course, benefits and costs may be more closely related in some states than in others.

The result in (10) suggests that employing benefits/earnings as a proxy for employer costs of workers' compensation in the empirical model, will, if anything, bias the employment-wage-workers’ compensation result upward. Therefore, the use of a proxy has the potential to overestimate the impact of workers’ compensation costs on employment and wages. Of course, although the impact of workers’ compensation employer costs on employment and wages may be the interesting empirical relationship for many policy makers, given that it is equilibrium employment that is being estimated here, benefits is the more appropriate variable to employ in the model.

**Other Endogenous Variables**

Employment data are from the BEA’s Regional Economic Information System (REIS) and represent total employment in each state. Wage data were computed by dividing total nonfarm earnings by total employment. Sources and sample statistics for all data used in the analysis are presented in Table 1.
**Predetermined Variables**

*Employment Equation.* In addition to lagged employment ($E_{t-2}$ is used as an instrument), the wage, and workers’ compensation benefits/earnings, several other variables are included in the employment equation as likely determinants, including both demand-side and supply-side factors.

Per capita income is included as a measure of the local market and is therefore expected to be positively related to employment. Population is also included as a measure of market size, but, along with the labor force participation rate, serves as a measure of the local labor supply as well. Population would be expected to have a positive relationship with employment in both cases, and the coefficient on the labor force participation rate is expected to be positive.

The regional consumer price index (RCPI) is included to account for macroeconomic effects *via* the Phillips Curve, and in that sense is expected to have a negative coefficient. Alternatively, to the extent that price misperceptions occur, a higher RCPI may (erroneously) suggest to firms that their relative prices have increased, and thus stimulate employment. In this case the coefficient on RCPI would be positive. The motor fuel price index is included as a proxy for energy costs and is expected to be negatively related to employment (especially with RCPI held constant).

Empirical evidence on the effects of unionization on employment are mixed, which reflects conflicting theories. To the extent that unions monopsonize labor markets and keep wages above their market-clearing levels, higher rates of unionization would be expected to reduce employment. On the other hand, efficient contracts theory (see Brown and Ashenfelter, 1986 and Hall and Lilien, 1979) suggests that higher levels of unionization should not have a significant effect on employment because contracts will be set at market wages (to maximize the joint rent of the employer and the unionized workers). A recent study using state-level data over a similar time period (1978 – 1994) (Pantuosco *et al.*, 2001), which reviews some of the existing empirical literature, finds unionization to have a negative, but insignificant effect on employment growth. Union density (percentage of nonfarm workers who are union members) is included in
the model, but there is no expectation as to the direction of the effect it has, if any, on employment.

Given a consistent decline in manufacturing employment over the last few decades (see Schiller and Trebing, 2003), due largely to increases in manufacturing productivity, states that are more heavily oriented in manufacturing may be expected to see slower job growth over time. The percentage of workers employed in manufacturing is included to capture this effect and is expected to be negatively related to total employment. Mining and Construction shares of employment are included in the employment equation as further controls for market structure, although both variables serve a more critical role in the workers’ compensation equation, as detailed below. Finally, various demographic variables complete the employment equation, including racial composition, educational attainment, and age structure.

**Wage Equation.** Holding employment and population constant, higher labor force participation rates are expected to reduce the wage because of the greater labor supply it implies. Likewise, population is expected to be negatively related to the wage, holding employment and the labor force participation rate constant. Given the higher wages generally offered to unionized workers, union density is expected to have a positive coefficient in the wage equation. Likewise, because of the generally higher wages offered to manufacturing workers, the percentage of workers employed in manufacturing is expected to have a positive coefficient, as are the mining and construction shares of employment. Energy costs, as measured by the motor fuel price index, could affect the wage either positively or negatively. To the extent that higher non-wage costs reduce the demand for labor, wages would be expected to decline. But to the extent that energy prices represent the cost of operating machinery, higher fuel prices may lead to substitution, putting upward pressure on wages. A set of demographic variables also is included in the wage equation.

**Workers’ Compensation Benefits Equation.** Several variables are included to reflect the likelihood of workers receiving workers’ compensation benefits. The proportions of the population that are 15 – 34 years of age and 55 – 64 years of age are expected to increase
workers’ compensation costs relative to the proportion of the population that is 35 – 54, which is left out of the equation (Butler, 1994). Thus, the coefficients on both variables are expected to be positive. The younger cohort is presumed to lack the experience of older workers and therefore to be at greater risk of injury, while the older cohort is expected to be at greater risk because of generally poorer health and physical conditioning (Rappaport, 2000). Because medical care is a significant component of workers’ compensation benefits, the medical cost index is expected to be positively related to workers’ compensation costs. To the extent that unions enforce safer working conditions and more restrictive hours on the job, union density is expected to be negatively related to workers’ compensation costs. Krueger and Burton (1990) generally find a negative relationship between union membership and workers’ compensation costs when state fixed effects are included in the model, as they are here. They suggest that the negative relationship arises because the relationship is identified by time-series variation in union membership, which was declining over the period of their study while workers’ compensation costs were rising. The data used in this analysis covers periods of both rising and falling workers’ compensation costs. On the demand side, increased levels of poverty and lower personal income (holding wages constant) are expected to increase the likelihood of requesting benefits. Previous research has found some sensitivity of benefits claims with respect to alternative sources of income (see, e.g., Fortin and Lanoie, 1992; Campolieti and Krashinsky, 2003).

**Additional Policy Variables.** Unemployment compensation benefits as a share of earnings is included in the employment, wage, and workers’ compensation equations as an additional policy variable, as is the real minimum wage in the employment and wage equations. The bulk of the relevant literature suggests that more generous unemployment benefits lead to longer unemployment spells (for a review, see Atkinson and Micklewright, 1991 and Krueger and Meyer, 2002). For example, Moffitt (1985) finds the elasticity of unemployment duration with respect to unemployment benefits to be 0.4. Even higher elasticities are found by Lancaster and Nickell (1980, 0.6) and Meyer (1989, 0.8 – 1.0). More recently, Nickell (1998)
finds an elasticity of unemployment with respect to the benefit replacement rate of approximately 1.0.

Extensions of benefits also have been shown to increase the duration of unemployment spells. In an analysis of administrative data from 12 states, Katz and Meyer (1990) find that a one week increase in potential benefit duration increases the average duration of unemployment spells (of unemployment insurance recipients) by 0.16 – 0.20 weeks. Card and Levine (2000) assert that had a 1996 13-week extension in unemployment benefits (to six months) in New Jersey affected claimants from the first day of their spells, the share of claimants exhausting their benefits would have increased by seven percentage points. Katz and Meyer (1990) find evidence that “escapes from unemployment” tend to increase sharply at the point of benefits exhaustion for benefit recipients, but they find no such sharp increases among non-recipients at a similar duration.

In some cases unemployment compensation has even been shown to increase transitions into unemployment, although results suggest that the phenomenon is more likely demand-side (e.g., temporary layoffs) than supply-side (Atkinson and Mickelwright, 1991; see also Krueger and Meyer, 2002). A final way unemployment compensation insurance may affect employment is by reducing the incentive for workers to preempt impending layoffs by changing jobs, a notion for which there is some existing empirical evidence (Light and Omori, 2004).

Similar to the preponderance of findings for workers’ compensation insurance, Anderson and Meyer (2000) find that unemployment insurance premiums are largely passed on to workers in the form of lower wages. The employment effect would therefore be expected to be negative, but small in magnitude.

Standard textbook economic theory predicts that legislated minimum wages, to the extent they are binding (that is, above the equilibrium wage), will reduce employment, all else equal. Empirical evidence largely backs up this view as far as teenagers and other traditionally low-wage workers are concerned, suggesting that a ten percent increase in the minimum wage would yield a one percent to three percent reduction in low-wage employment (Brown, 1988). The
effects on total employment would be expected to be much smaller in magnitude. The inclusion of both average wage and minimum wage in the employment equation here is likely to further erode magnitude or significance of the minimum wage in the employment equation.

*Identification.* Each equation has a unique variable, which itself identifies the system. These are the medical cost index and poverty rate for the workers’ compensation costs equation, lagged wage ($w_{t-2}$ is used as an instrument) for the wage equation, and lagged employment and the regional consumer price index for the employment equation. Further, per capita income is excluded from the wage equation, and real minimum wage, population, labor force participation rate, and the motor fuel price index are excluded from the workers’ compensation costs equation. The system is therefore overidentified.

5. Estimation Issues

The data used in this analysis are time series for a cross-section of the 50 states and the District of Columbia. Thus, $i$-subscripts are added to (7) – (9) and the error terms are given a two-way fixed effects structure:

\[
\begin{align*}
\nu_{Eit} &= \mu_{Ei} + \theta_{Et} + \epsilon_{Eit} \\
\nu_{wit} &= \mu_{wi} + \theta_{wt} + \epsilon_{wit} \\
u_{bit} &= \mu_{bi} + \theta_{bt} + \epsilon_{bit}
\end{align*}
\]

(11)

where the $\mu_i$ are state-specific shocks that do not vary over time, the $\theta_t$ are date-specific shocks that do not vary across states, and the remaining error $\epsilon_{it} \sim N(0, \sigma^2_{\epsilon})$.

The model is estimated by limited information maximum likelihood (LIML) with the variables transformed by the natural logarithm, yielding elasticities.

LIML estimation is used in this study because it was difficult to achieve a reasonable fit in the first stage for the workers’ compensation equation, and the LIML estimator generally is preferred to 2SLS when instruments are weak (see Staiger and Stock, 1997). Moreover, the LIML estimators are invariant to any reparameterization of the model, whereas 2SLS estimators are not (Davidson and MacKinnon, 2004).
LIML involves minimizing the ratio $\kappa = \frac{\text{EqResidVar}}{\text{SysResidVar}}$, where $\text{EqResidVar}$ is the variance of the residuals from regressing the endogenous variables on all predetermined variables appearing in the relevant equation, and $\text{SysResidVar}$ is the variance of the residuals from regressing the endogenous variables on all predetermined variables in the system. The predicted values from the first-stage regression ($\hat{y}$) are used in the second stage in the following form: $y^* = (1 - \kappa) y + \kappa \hat{y}$. Thus, with $\kappa = 0$, the LIML estimates are ordinary least squares estimates (OLS), and with $\kappa = 1$, the LIML estimates are 2SLS estimates.

6. Results

Table 2 presents results from LIML estimation of the system of equations.

Employment and Wage Equations

Workers’ compensation benefits/earnings (which proxies for employer cost), has a significant negative effect on both employment and wages, but the elasticities are quite small: –0.011 and –0.010, respectively.\textsuperscript{11} Thus, a ten percent increase in workers’ compensation benefits/earnings would be expected to yield only a 0.11 percent decline in employment and 0.10 percent decline in real wages. By comparison, a ten percent increase in real wages would be expected to yield a 2.1 percent decline in employment, and a ten percent increase in motor fuel prices should lead to a 0.5 percent decline in real wages. An increase in wages thus has an employment impact almost 20 times greater than a similar increase in workers’ compensation benefits paid relative to payroll, and an increase in motor fuel prices has 5 times the effect on wages as does a similar increase in workers’ compensation benefits paid. The employment impact of a ten percent change in workers’ compensation benefits/earnings is similar (but lower) in magnitude to a similar change in unemployment benefits/earnings, which is 0.17 percent.

The results from the regression of national average employer cost of workers’ compensation on benefits paid relative to payroll (equation 10) allow me to provide a rough

\textsuperscript{11} Both variables are statistically insignificant using two-stage least squares estimation and negative and significant, but smaller in magnitude using ordinary least squares.
estimate of the elasticity of employment and wages with respect to workers’ compensation costs using results from regressions of employment and wages on workers’ compensation benefits.

Consider a simplified model of employment \( E_t \) on workers’ compensation costs \( c_t \), where workers’ compensation costs are proxied by benefits \( b_t \):

\[
E_t = \alpha_0 + \alpha_1 c_t + \varepsilon_t
\]

\[
c_t = \rho_0 + \rho_1 b_t + u_t
\]

Substitution of (13) into (12) yields:

\[
E_t = \left( \alpha_0 + \alpha_1 \rho_0 \right) + \alpha_1 \rho_1 b_t + \left( \alpha_1 u_t + \varepsilon_t \right) = \alpha_0^* + \alpha_1^* b_t + \varepsilon_t^*
\]

If I can devise an unbiased estimated of \( \alpha_1^* \), then a rough estimate of \( \alpha_1 \) can be given as\(^{12}\)

\[
\hat{\alpha}_1 = \frac{\hat{\alpha}_1^*}{\hat{\rho}_1} = \frac{\hat{\alpha}_1^*}{1.496}
\]

Of course, this estimate is more accurate the more similar administrative costs (relative to benefits) are across states.\(^{13}\) Using (15), the results above suggest that a ten percent increase in workers’ compensation costs would lead to a reduction in employment of only \( 0.11/1.496 = 0.07 \) percent, and a reduction in wages of less than 0.07 percent. Again, given that it is equilibrium employment that is being estimated, benefits is the more appropriate measure.

Previous studies of the relationship between workers’ compensation costs and wages suggest that the costs of workers’ compensation generally are passed on to workers in the form of lower wages, which should lead to small employment effects. My results are consistent with these studies in that the employment effects of workers’ compensation are small, but I also find very little effect on wages. Small wage effects coupled with small employment effects suggest

\(^{12}\) An immediate problem with the use of benefits as a proxy for costs in is that by construction, \( b_t \) and \( \varepsilon_t^* \) in (14) are correlated (both depend on \( u_t \)), and thus the least squares estimator of \( \alpha_1^* \) is biased and inconsistent, unless \( u_t = 0 \ \forall t \). While the results charted in Figure 3 suggest that \( u_t = 0 \ \forall t \) is not an unreasonable assumption in this case, the estimation procedure employed effectively instruments for \( b_t \).

\(^{13}\) Workers’ compensation employer cost data or administrative data are not available by state.
that there is very little labor supply and/or labor demand response to changes in workers’ compensation costs.

The relatively low elasticities of employment and wages with respect to workers’ compensation suggests that recent claims by policy makers, businesses, and chambers of commerce that workers’ compensation costs are driving away jobs probably is unwarranted. Simulations suggest that over the 1978 – 2000 period, if the median state (Nevada) had workers’ compensation costs equal to that of the lowest state (the District of Columbia for most years), representing a decrease of 73 percent in 2000 ($6.50/$1,000 vs. $1.74/$1,000), its nonfarm employment would be only 0.17 percent higher in 2000 than was actually the case (Figure 4), or roughly 2,000 jobs. Moreover, while much of the clamoring for reform is recent (nine states with major reform efforts in 2004), workers’ compensation costs actually have declined steadily for the average state since 1992.

[FIGURE 4]

For the most part, other variables reveal their expected effects. In the employment equation, as noted above, the wage has a negative and significant impact. The coefficient on lagged employment is a statistically significant 0.366, which means that the speed of adjustment parameter is 0.634. Thus, roughly 63 percent of adjustments to equilibrium employment occur in one year. Further, while the elasticity of current employment with respect to workers’ compensation benefits/earnings is – 0.011, the elasticity of equilibrium employment (δ̄E in equations 2 and 7) is a somewhat higher – 0.017 (= – 0.011/0.634). Thus, a ten percent increase in workers’ compensation benefits/earnings is expected to lead to a 0.17 percent decline in equilibrium employment.

The speed of adjustment parameter in the wage equation is 0.214 (= 1 – 0.786), suggesting that wages respond very slowly to their equilibrium values, and implying that the elasticity of the equilibrium wage is – 0.047, which is considerably higher than that of the current wage, – 0.010.
Unemployment compensation costs, as proxied by benefits/earnings, have moderately larger effects on employment and wages than do workers’ compensation costs, with employment and wage elasticities of – 0.017 and – 0.011, respectively. The real minimum wage had no statistically significant effect on employment, which is not very surprising given that the minimum wage is not binding for most jobs and that the average wage is also a regressor. As would be expected, the real minimum wage had a positive but modest impact on average real wage, with an elasticity of 0.065. Unionization rates appear to reduce employment levels by a very modest amount, but do not have a statistically significant impact on wages.

Population and per capita income are both positive and significant in the employment equation, suggesting that market size is an important factor in determining employment levels. Population is negative and significant in the wage equation, which along with a negative value for the labor force participation rate reveals labor supply effects, as employment is held constant in the equation and is positive and significant. Likewise, the labor force participation rate is positive and significant in the employment equation, as would be expected with population and wages held constant.

Larger shares of older working-age people (share ages 55 – 64) reduces employment and wages. A younger working age population (share ages 15 – 34) tends to reduce employment as well, probably due to the inclusion of teens, but has no statistically significant impact on wages. The proportion of the population that is black tends to reduce employment and bears no significant impact on wages, while the Hispanic share of the population does not appear to impact employment, but does reduce the average wage by a modest amount. The proportion of the population that is Asian has no statistically significant effect on employment, but tends to increase wages. The proportions of the population with both a BA and higher and with less than a high school education reduce employment and increase wages relative to the population with a high school diploma but no college degree, which was left out of the equation. A large proportion of the population without a high school diploma would be expected to reduce the average wage. Given gains in educational attainment over time, most adults without a high
school diploma are likely older, with many out of the workforce. Contrary to expectations, the manufacturing density of employment was positive and significant, as was the construction share of employment.

*Workers’ Compensation Costs*

As expected, higher medical costs lead to higher workers’ compensation costs. Specifically, medical cost inflation of ten percent leads to workers’ compensation cost inflation of 4.7 percent. Over the time period of this analysis, medical costs increased approximately 356 percent, suggesting that workers’ compensation costs would be much lower today had medical costs kept pace with consumer prices, which advanced only 177 percent over the period. In fact, the results suggest that workers’ compensation costs would have been roughly 80 percent of what they were in 2000, all else equal. Figure 5 compares actual workers’ compensation costs (as measured by benefits/earnings) for the average state over the period 1978 – 2000 to simulated workers’ compensation costs when medical costs rise at the same rate as consumer prices, reflecting an increasing divergence in the two series over time. The large difference in workers’ compensation costs would not have made much of a difference in national employment, however. Total U.S. nonfarm employment would likely have been only 0.1 percent higher in 2000 had medical costs merely kept up with consumer prices, yielding about 158,000 additional jobs by that year.

A higher proportion of older workers is associated with higher workers’ compensation benefits as a share of earnings, but the result is not statistically different from zero, suggesting that the greater feebleness of older workers likely just offsets their greater experience, leading to no difference in demand for benefits from this group relative to younger workers. A similar (but negative) off-setting relationship exists between the proportion of the youngest workers and workers’ compensation benefits/earnings. Union density also has a significantly negative effect on workers’ compensation benefits/earnings, likely reflecting the more restrictive working conditions imposed by unions.
Higher per capita income and lower poverty rates, holding the wage constant, lead to reductions in workers’ compensation costs, which suggests some degree of income substitution in the workers’ compensation system. Substitution does not appear to occur between unemployment insurance benefits and workers’ compensation benefits, however, as the statistical relationship is positive and significant. A less-educated workforce appears to lead to lower benefits relative to earnings, and therefore a less costly workers’ compensation system, but other demographic factors seem to have little effect.

Workers’ compensation benefits/earnings are fairly responsive to changes in the average wage (the elasticity is 0.75). The obvious reasoning is that benefits increase with wages because benefits are a fixed fraction of wages. However, workers’ compensation costs as used here reflect benefits per $1,000 of payroll, so another factor is likely at work. Conceptually, it is not clear why workers’ compensation benefits/earnings would be so responsive to wages.

Surprisingly, the percentage of the workforce employed in mining has a small negative effect on workers’ compensation benefits/earnings (elasticity is –0.1), whereas the expectation is that the relationship would be strongly positive. The raw correlation is positive and significant, but weak, and the correlation becomes negative once account is taken for fixed effects. The construction and manufacturing shares of employment do not appear to be significantly related to workers’ compensation benefits/earnings.

7. Conclusion

This study evaluates the impact of workers’ compensation costs, as measured by workers’ compensation benefits relative to earnings, on total employment and average wages across states over time. The main finding is that higher workers’ compensation benefits/earnings lead to lower wages and employment levels, but the elasticities are quite small: –0.011 and –

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14 The heaviest mining states are Wyoming (8.9 percent, on average, from 1978 – 2000) and West Virginia (5.6 percent), and they have the two highest levels of workers’ compensation benefits relative to earnings. The next two heaviest mining states, Oklahoma (5.3 percent) and Louisiana (3.7 percent) also have relatively high workers’ compensation costs.
0.010, respectively. The elasticities of employment and wages to workers’ compensation costs, as opposed to benefits/earnings, are estimated to be –0.07 percent. The elasticities of equilibrium employment and wages are moderately higher. The study also evaluates the determinants of differences in workers’ compensation benefits/earnings and suggests that medical costs are a substantial factor. Although workers’ compensation benefits/earnings have declined overall since the 1990s, all else the same, benefits, and presumably costs, would have been much lower had medical costs merely grown at the same rate as consumer prices.

Unemployment compensation is shown to have an impact on employment and wages similar to but slightly larger than workers’ compensation. Unionization is found to have a small but significant positive impact on wages and no effect on employment, but tends to reduce workers’ compensation costs. The real minimum wage increases average wage modestly but does not appear to affect total employment.

As noted in the introduction, there has been and continues to be a loud and consistent clamoring for workers’ compensation reform across the states. The results here suggest that the clamoring probably is not warranted. Moreover, data suggest that for most states, workers’ compensation costs actually have seen a considerable decline over the last several years.
REFERENCES


Figure 1
Benefits as a Percentage of Covered Payroll, United States, 1950 – 2000
Figure 2
Benefits / $1,000 Payroll, U.S. Average, Oregon, and West Virginia
Figure 3
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\( **, *, * \) indicates significance at 99%, 95%, and 90% confidence levels, respectively.
Figure 4
Median State (Nevada) Nonfarm Employment, Actual and Simulated with Workers’ Compensation Costs Equal to that of the State with the Minimum Level, 1978 – 2000
Figure 5
Simulated Workers’ Compensation Benefits
Medical Cost Index = CPI, 1978 – 2000