1. Introduction

State workers’ compensation (WC) programs are among the largest forms of social insurance, with a primary goal of providing income support to families facing unanticipated economic hardship when a worker is injured or becomes ill on the job. Throughout the 1990s, WC was larger than unemployment insurance, AFDC/TANF, Supplemental Security Income (SSI), and Food Stamps in terms of total expenditures (Green Book, 2000). The programs also generate substantial controversy, and several states are well-known for recent political debates over whether the high costs of WC outweigh the social insurance benefits it provides. However, the existing literature on WC programs proffers remarkably little evidence on the benefits of WC for injured workers or the extent to which worker's compensation indemnity benefits help to protect the material well-being of these workers and their families.

This paper investigates the consumption-smoothing effect of WC benefits for households affected by a work-related injury (or illness). In doing so, I seek to answer two key questions: First, at current benefit levels, to what extent do WC benefits help households to smooth consumption over the loss of earned income that results from a workplace injury? Second, what is the optimal level of WC benefits that balances the trade-off between the value of smoother consumption for affected households and the costs associated with distortionary effects on individual labor supply behavior?

To address the first of these questions, I use data from the Health and Retirement Study (HRS) to estimate the effects of benefit generosity on changes in household food and housing consumption for a sample of individuals who report having incurred a work-related, work-limiting health problem. My findings indicate a significant consumption-smoothing role for WC benefits: Specifically, I find that a 10 percent increase in benefit eligibility offsets the drop in household consumption when a worker becomes injured on the job by 2.5 to 4 percent. I also show that the consumption-smoothing benefits of WC are larger for households with limited pre-injury assets, and that the results are robust to several changes to the original specification. Moreover, my estimates indicate that if WC benefits were very low, equal to the 10th percentile of their current distribution, the implied drop in household

There is a small, but growing, body of research on the earnings losses experienced by workers who are injured on the job, which I discuss in more detail below. (See, for example: Biddle (1998), Reville (1999), Reville and Schoeni (2001), or Boden and Galizzi (1999, 2003).)
consumption upon a work-related injury would be in the range of 20 to 30 percent. In short, my results suggest that WC benefits are indeed helping injured workers and their families to maintain smoother consumption.

Estimates of the degree of consumption smoothing provided by WC benefits should clearly be of interest to policy makers, in that they represent the relative success or failure of the program in helping to support the material well-being of injured workers and their families. However, the economic significance of the consumption-smoothing benefits of these programs can only be determined when they are weighed against the costs associated with the incentive effects of WC on individual labor supply decisions.

Accordingly, a second goal of the paper is to examine the inherent trade-off between the benefits and costs of increased WC generosity. To do so, I adopt from the public finance literature a model for optimal social insurance, developed by Baily (1978) and Chetty (2006) in a framework of unemployment risk. I adapt the model for the case in which workers instead face risk of on-the-job injury. The model provides an explicit formula for the optimal level of WC benefits, which depends directly upon my empirical estimates of the consumption smoothing provided by WC. Applying my estimates to this formula, I find that the optimal level of wage-replacement for WC is lower than current values for plausible levels of risk aversion and for a range of empirical estimates of the distortionary effects of program generosity on individual behavior. That is, the consumption-smoothing benefits of WC are found to be economically small relative to the negative incentive effects of increased benefit generosity on labor supply behavior.

The existing literature on work-related injuries and state WC programs provides extensive empirical evidence on the costs of WC in terms of distortionary effects on labor supply. There is a large volume of literature that estimates the effects of variation in WC benefits on outcomes like the frequency of injuries/claims and the duration of time spent out of work due to work-related injuries. On the other hand, there is surprisingly little evidence in the literature as to the benefits of WC for the eligible population of workers injured on the job. A set of recent papers has examined the adequacy of WC benefits in replacing earnings losses associated with a work-related injury or illness; however, studies of earnings losses may yield an incomplete understanding of the impact of a workplace injury or illness.

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on household well-being. A need for additional research on the economic consequences of workplace injuries and illnesses has been suggested by Reville et al. (2001), who specifically call for evaluations of the adequacy of WC using measures other than earnings or income losses.

This paper contributes new insight on the extent to which WC programs protect the material well-being of households affected by workplace injuries and illnesses. An additional contribution involves my use of data on household consumption expenditures to measure material well-being for households of injured workers. The underlying argument is that household consumption, as opposed to earnings or income, may provide a more appropriate and direct measure of material well-being for households affected by a work-related injury. Standard economic models of utility maximization are based on consumption rather than income, and with concave utility, households will prefer to smooth consumption over fluctuations in income, like that due to a job-related disability that is perceived to be temporary. To the extent that households are able to do so, current period consumption levels will provide a more complete picture of a household’s material well-being than will current period income measures (Cutler and Katz, 1992). Furthermore, Meyer and Sullivan (2003) provide convincing evidence that for households with fewer resources, consumption is measured more accurately than income in survey data and is more closely linked to material hardship. Meyer and Sullivan conclude that policy makers should examine consumption data when determining appropriate benefit levels and evaluating the effectiveness of transfer programs.

My paper also complements related studies from outside the literature on work-related injuries and illnesses. Stephens (2001) uses data from the PSID to examine the long-run consumption effects of disability (not necessarily work-related) and finds a significant reduction in household food consumption in the long-run. The long-term change in consumption is not as large as the earnings decrease faced by the disabled individual, suggesting a degree of consumption smoothing for households affected by disability. However, while Stephens points out that disabled households benefit from increased transfer income, the paper does not specifically consider the effects of disabilities caused by work or whether WC is a source of consumption

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4Specifically, household income and material well-being rarely depend entirely upon the earnings of a single worker: The loss of earned income from a workplace injury or illness may be offset by increased labor supply of the spouse or other household members or may be mitigated by income from multiple government programs designed to help families in the case of such adverse labor market events (e.g., SSI, disability, and welfare).
smoothing for these households. Meyer and Mok (2008) also study the effects of disability on household consumption and several other outcomes. They find large and persistent negative impacts of disability on household food and housing consumption, especially for households with a chronic or severely disabled head. Moreover, the authors document that social insurance only partially reduces the drop in consumption around disability and that only half of the severely disabled individuals in their sample receive income from major transfer programs like Social Security disability insurance or Security Income.

The methodological approach of my paper is similar to that of Gruber (1997), which finds significant consumption-smoothing effects of unemployment insurance benefits, using data from the PSID on individuals experiencing periods of job displacement. However, while unemployment insurance (UI) is somewhat similar to WC in design and objective, it is not clear whether WC should have a smaller or more substantial consumption-smoothing impact than unemployment insurance. Without moral hazard effects, on-the-job injuries are likely more unexpected than unemployment and can result in longer time out of work, so injured individuals are less likely to be able to rely on their own savings (or other forms of self-insurance, like increased spousal labor supply) in order to smooth consumption. However, if many reported work-related injuries are actually planned or anticipated, individuals may be more prepared to smooth consumption than those experiencing a job loss. Thus, the extent to which WC provides consumption smoothing for workers who experience a job-related injury remains an empirical question, to which this paper provides an answer.

The paper proceeds as follows: Section 2 provides a brief background on WC benefits in the United States. Section 3 discusses the Health and Retirement Study (HRS) data used in the paper, specifically focusing on the information provided by the HRS on work-related disabilities and household consumption expenditures. Section 4 describes the key empirical methods used to estimate the consumption-smoothing benefits of WC, and Section 5 presents the main results of the paper. Section 6 performs an exercise to determine the optimal level of WC benefits, using empirical estimates from my own work as well as those obtained in previous research. Section 7 concludes and discusses implications for policy and future research.

2. Background on State WC Programs

Workers’ Compensation (WC) is the main form of indemnity for American workers who are injured or become ill on the job. By law, firms are
required to obtain WC insurance to provide a state-mandated amount of cash benefits, medical care, and rehabilitation services, when necessary, to injured workers. Well over 90 percent of the wage and salaried workforce is covered, and workers become eligible to receive WC as soon as they enter covered employment. State WC programs comprise one of the largest forms of social insurance in the U.S.: In 2003, $59.4 billion were paid in WC benefits (including medical costs), and employer costs for WC amounted to $80.8 billion (Sengupta et al., 2005). As a source of support for disabled workers, WC is surpassed only by Social Security disability insurance and Medicare.

WC is a "no-fault" insurance system in which firms accept liability regardless of who is at fault in return for that liability being limited to the benefits specified by state WC laws. Thus, WC makes firms’ costs of providing support for injured workers less uncertain than if injuries were compensated on a case-by-case basis through the civil justice system. The fact that workers’ injuries are covered by WC without regard to fault means that in order to receive benefits for a workplace injury or illness, employees do not have to prove that their employer was negligent, only that the impairment is "work-related." In exchange for the no-fault coverage, employees forgo their rights to sue employers in order to recover full economic losses or non-pecuniary losses when such injuries occur. Provision of coverage is mandatory for nearly all firms and all states.

When a worker files a claim for a work-related illness or injury, WC provides immediate coverage of all medical and rehabilitation costs and, after a state-determined waiting period (3 to 7 days), provides cash benefits for four classifications of disability. Over 70 percent of all WC claims are for 'temporary total disability' (TTD) benefits, which are paid to individuals who are unable to work for a finite period of time. If an injury persists beyond the date at which maximum medical improvement has been achieved,  

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5 The $21.4 billion difference between total employer costs and total benefits paid out is comprised of administrative costs, attorney fees, and profits of carriers.

6 See Bronchetti and McInerney (2009) for more information on the calculation of firm premiums, the degree of experience rating in the program, and the sources of workers’ compensation insurance for firms.

7 Examples of employers who are exempt from securing workers’ compensation insurance include firms with fewer than three employees and sole proprietorships. In states in which workers’ compensation is not mandatory (New Jersey, Texas, and Wyoming), employers opting out of the system forfeit protection from lawsuits and assume full liability for workplace injuries. The vast majority of firms in these states elect coverage under the workers’ compensation system.
it is reclassified as a permanent disability.

While there is substantial variation across states in the legislated parameters that determine benefits, TTD benefits are calculated similarly across all states. Specifically, an injured worker’s weekly TTD benefit will equal a fraction (the replacement rate, typically 66.7 percent) of the workers’ pre-injury gross weekly wage. The weekly benefit amount is then subject to minimum and maximum benefit amounts that vary significantly across states. In some states benefits are also adjusted to reflect the worker’s marital status and number of dependents.

The maximum benefit level frequently binds: Nearly half of workers earn a wage high enough that their benefit would be limited by the maximum amount (Meyer, 2002). Indeed, in my sample of injured workers in the Health and Retirement Study (HRS), the maximum binds for 46 percent of the sample. For this group of injured workers, the nominal replacement rate (i.e., the ratio of weekly TTD benefits to weekly pre-injury gross wages) will be less than two-thirds. However, WC benefits are not subject to income or payroll taxation. With legislated replacement rates at two-thirds of the workers’ previous average weekly wage, exemption of benefits from income taxation implies a much more generous after-tax replacement rate. Finally, each state also sets a waiting period before cash payments can begin. Workers are later compensated for this time if their injury persists beyond the length of the state-determined retroactive period, which is usually a few weeks.

Table 1 illustrates the cross-state variation in key characteristics of WC benefits in 2002. The most notable difference in benefit generosity across states is in the maximum weekly benefit amounts. For instance, while Illinois has a maximum weekly benefit of $990, in the same year, injured

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8In this case, if the worker remains totally disabled and unable to work, he becomes eligible for ‘permanent total disability’ benefits, which are typically the same weekly amount as TTD benefits and can continue to be paid for life. On the other hand, if the injury is only partially disabling but is expected to persist indefinitely, the worker is eligible to receive ‘permanent partial disability’ (PPD) benefits, which are less generous than TTD or PTD benefits. (The fourth category, ‘temporary partial disability’ is relatively uncommon.) For injuries listed in the workers’ compensation statute (e.g., the loss of an arm), benefits are paid according to a state-specific schedule linking a benefit amount to the given impairment. Determination of PPD benefits for non-scheduled impairments like back injuries is less consistent across states. Lastly, survivors’ benefits are paid to families of workers who are killed on the job.

9The pre-injury weekly wage is calculated as the individual’s average gross weekly wage over the 52-week period before the injury or illness occurred.
workers in New York receive a maximum of $400 per week. As for minimum benefit amounts, six states had no minimum benefit level, while in other states, minimum weekly benefits were relatively generous. Finally, the lengths of the waiting periods vary from 3 to 7 days, and retroactive periods range from zero days to six weeks.

[TABLE 1 HERE]

3. Data

To examine the effects of workplace injuries on the material well-being of households, this paper uses nationally representative micro data from the Health and Retirement Study (HRS). The HRS has collected longitudinal data on individuals nearing (or of) retirement age biennially since 1992. The initial sample was comprised of almost 8,000 households that contained at least one individual born between 1931 and 1941. These age-eligible respondents and their spouses were interviewed, and the initial wave contained about 13,000 respondents. In 1998, a "War Baby" cohort of about 4,500 individuals born between 1942 and 1947 (and their spouses) was introduced to the HRS. This paper employs data on both original HRS respondents and members of the War Baby cohort, resulting in a sample of men and women born between 1931 and 1947 and their spouses. The HRS data include information on many topics, such as demographics, employment, health status, and disability, as well as extensive information on income sources and program participation. More importantly, the HRS is the only nationally representative micro data set that provides information on food and housing consumption and permits identification of injuries related to work without conditioning on WC receipt. The ability to identify individuals

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10The primary data in this paper are based on restricted-access HRS geocode data; state identifiers are masked in the public-use HRS files. Interested users should contact hrsquest@isr.umich.edu for further information on gaining access to restricted HRS data.

11The National Longitudinal Survey of Youth (NLSY) and the Survey of Income and Program Participation (SIPP) also allow for identification of work-related injuries and illnesses without conditioning on workers’ compensation receipt; however, neither of these surveys contain information on household consumption expenditures. The Panel Study of Income Dynamics (PSID), on the other hand, contains household consumption data for prime-aged workers but does not permit identification of workers injured on the job except through reports of workers’ compensation receipt.
with work-related injuries who would be eligible to receive WC \textit{without conditioning on receipt of benefits} is important, since the decision to take up WC is endogenous with respect to changes in household consumption upon injury.

The HRS contains several questions that allow researchers to identify individuals with work-related injuries, illnesses, or disabilities, who would be potential WC recipients. First, I limit the sample based on the question in the survey that asks, ”Do you have any impairment or health problem that limits the kind or amount of work that you can do?” Because I am examining changes in consumption when a worker becomes ill or injured, the sample includes only those who report a work-related disability in a given period \(t\), but who did not report a work-limiting health problem in period \(t-1\). Next, to attribute such an injury/illness to the workplace, I include only those respondents who answered in the affirmative the question that asks whether the work-limiting impairment discussed above ”was in any way caused by the nature of [the respondent’s] work.”\footnote{The questionnaire also inquires whether ”the impairment or health problem just mentioned was the result of an accident or injury,” and if so, whether the accident took place at work, home or elsewhere. An alternative would be to include only respondents who answer that their health problem is the result of an accident or injury that occurred at work.} This definition of on-the-job injuries includes in the sample individuals with impairments like carpal tunnel syndrome, which would not have been caused by a specific workplace incident. Additionally, inclusion in the sample is conditional on employment in period \(t-1\) because employment determines WC eligibility and because the primary effect of a workplace injury on household material well-being is through lost earnings of the injured worker.\footnote{Because the HRS data are collected biennially, there could be some individuals who are unemployed at the time of the \(t-1\) interview, but who accept a job and experience a work-related injury before the period \(t\) interview. These individuals would be excluded from my sample.} Therefore, the final sample includes all individuals who are employed (without a work-limiting disability) at the \(t-1\) interview and who report having a work-limiting disability caused by their work at the period \(t\) interview.\footnote{This sample only includes observations for which this is the first reported work-limiting disability in the HRS. Allowing for subsequent reports of work-related injuries would result in an additional 11 observations.}

Measures of both food and housing consumption expenditures are available in the HRS for all waves except Wave 4.\footnote{Therefore, consumption changes are missing for Wave III to Wave IV (1996 to 1998)} Three measures of household
food consumption are reported in the HRS: 1.) food consumption at home (not including food stamps), 2.) food consumption away from home (including "take-out" or food "ordered in"), and 3.) the value of food stamps used by the household. These three types of food expenditures are first deflated into 1992 dollars using the corresponding component of the CPI-U in the month of the interview, and food consumption is measured as the sum of the real components. Although food expenditure information is a limited measure of household consumption, it has been used in a number of previous papers as a measure of household consumption behavior. A benefit of using food expenditures to represent household consumption is that food is a non-durable good and should be closely tied to changes in household utility. A potential concern about representing household consumption with food expenditures is that food is a necessary good; however, as Stephens (2003) notes, empirical estimates of the income elasticity of food fall in a range around 0.6 to 0.7, implying that food consumption is indeed responsive to changes in income. Next, I measure housing consumption as the rent or mortgage payments paid toward the respondent’s primary residence, deflated again by the appropriate CPI-U component. A problem with this measurement is that current payments toward housing may not accurately depict a respondent’s value of housing consumption. For example, if a disabled worker moves in with a relative, his monthly expenditures on housing will likely not reflect the value he places on that consumption. More importantly, current period housing expenditures will not accurately reflect the value of housing consumed if a household has paid off its mortgage and owns its home outright; this may be relatively more common in my sample of older individuals from the HRS than in surveys of prime-aged respondents. To address these concerns, I examine changes in food and housing consumption both together and separately.

One important issue with my measures of consumption is the timing of these questions in the HRS. The questions concerning food consumption and Wave IV to V (1998 to 2000). While measures of housing consumption are available for these years, I employ only the years of data for which I can measure changes in both food and housing consumption.

In the HRS, the value of food stamps is not to be included in the reported value of spending of food consumed at home. Specifically, if the respondent has reported receiving any food stamps, the question regarding spending on food consumed at home reads, “In addition to what you bought with food stamps, about how much do you (or other family members now living here) spend on food that you use at home in an average week?”

See, for example, Gruber (1997, 2000), Stephens (2003), and Haider and Stephens (2003), and Meyer and Mok (2008).
refer to the point of interview: Households are asked how much they spend on food at home and food away from home in a "typical week," while the value of food stamp expenditures is reported for the previous month.\textsuperscript{18} The frame of reference for rent and mortgage payments is also the point of the HRS interview. Importantly, this timing is consistent with the information on whether an individual has a work-limiting disability as well as with the information used to construct respondents’ pre-injury weekly wages. On the other hand, information on WC income is reported for the previous calendar year. Thus, a regression of household consumption changes on WC benefits received would be biased by measurement error. I avoid this bias by examining instead the relationship between consumption changes upon incurring a workplace injury and the potential WC benefit for which an individual is eligible. I discuss the use of WC benefit eligibility as the key independent variable in more detail below.

Table 2 reports mean characteristics for the sample of workers with work-related disabilities as well as for the sample of workers in the HRS who never experience a job-related injury or illness and the sample of workers who never experience any work-limiting disability. On average, when compared to the samples of respondents never injured on the job or never becoming disabled (at work or otherwise), workers in my sample are more likely to be male and have less education and are slightly less likely to be married or non-white. Not surprisingly, workers reporting job-related injuries or illnesses have lower average weekly wages (and are thus eligible for lower weekly WC benefits).\textsuperscript{19}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|
\hline
Characteristic & Sample with Work-Related Disabilities & Sample Never Injured & Sample Never Become Disabled \\
\hline
Gender (Male) & 0.55 & 0.50 & 0.60 \\
\hline
Education Level & 12 & 14 & 16 \\
\hline
Marital Status (Married) & 0.60 & 0.65 & 0.70 \\
\hline
Race (Non-White) & 0.25 & 0.20 & 0.20 \\
\hline
Average Weekly Wages & \$500 & \$700 & \$800 \\
\hline
\end{tabular}
\caption{Mean Characteristics for the Sample of Workers with Work-Related Disabilities and the HRS Samples Never Injured or Never Become Disabled.}
\end{table}

A noteworthy observation from the sample characteristics in Table 2 is that the fraction of the injured workers in my sample who report having received WC benefits in the last calendar year is only 15.1 percent. This take-up rate is low relative to other estimates in the literature. In a study of WC claiming behavior using administrative data on injured workers in

\textsuperscript{18}The HRS reports the value of food stamps received in the previous month rather than food stamp expenditures. I assume that all food stamps received are used by the household.

\textsuperscript{19}While weekly workers’ compensation benefits are lower for these workers, their average nominal replacement rate (the ratio of weekly benefits to pre-injury gross weekly wages) is higher than for the other samples.
Michigan, Biddle and Roberts (2003) document that only about 39 percent of these workers ever file for WC indemnity benefits. One explanation for an even lower participation rate in my sample is under-reporting of WC income in survey data sets like the HRS. Meyer et al. (2008) compare self-reports of the amount of transfer income received in several public-use micro data surveys to national administrative reports of benefit outlays and find substantial under-reporting of WC income. Specifically, the authors find that only about 40 percent of workers compensation benefits received are reported in the SIPP and CPS, and the reporting rate is even lower for the PSID. The claiming rate from Biddle and Roberts (2003) and the reporting rate from Meyer et al. (2008) are remarkably consistent with the participation rate in my sample of injured workers in the HRS. That is, if only 39 percent of the sample of injured workers claims WC benefits, and only 40 percent of those claimants report their WC income in the HRS, I should observe about 15.6 percent of my sample receiving benefits.

Another potential explanation for the relatively low rate of benefit receipt for this sample concerns the use of self-reported measures of disability status to identify potential WC recipients. The self-reported information on the presence of a work-limiting disability may not be accurate if individuals in my sample exaggerate the degree of their work-limiting health problem, perhaps in order to justify reduced labor supply or increased participation in other programs. However, in a study of the magnitude of bias in self-reported disability measures, Benitez-Silva et al. (2004) use data from the HRS and examine the validity of a disability status indicator similar to the one used in this paper to identify individuals with work-limiting health problems. In assessing whether self-reported disability is systematically biased, relative to a more objective definition of disability used by the Social Security Administration, the authors find little empirical evidence to support the pervasive concern over using self-reported measures of disability in behavioral models. The results of their study are consistent with the view that individual respondents do not systematically misreport their health or

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20Note that the reporting rate in Meyer et al. (2008) is the percentage of received workers’ compensation benefits that are reported in these surveys, not the percentage of recipients who report having received benefits. Nonetheless, underreporting is a likely explanation for the low rate of reported take-up in my sample.

21The disability status indicator in Benitez-Silva et al. (2004) takes the value 1 if a respondent answers yes to both of the following questions: “Do you have any impairment or health problem that limits the amount of paid work you can do? If so, does this limitation keep you from working altogether?”
disability status in anonymous non-governmental surveys like the HRS.

4. Empirical Methods

To determine the consumption-smoothing benefits of WC, I estimate the effect of WC benefit eligibility on the change in consumption when a worker is injured (or becomes ill) at work. Using the sample of workers with work-related disabilities described above, I estimate models of the form:

$$\Delta C_{ist} = \alpha + \beta_1 BEN_{ist} + \beta_2 X_{it} + \tau_t + \gamma_s + \beta_3 \varphi_{st} + u_{ist}$$ (1)

where $\Delta C_{ist}$ is the change in (log) household consumption for individual $i$ when he becomes injured (in state $s$ and year $t$), $X_{it}$ is a vector of personal characteristics that may affect the magnitude of the consumption change upon injury, $\tau_t$ is a set of fixed time effects, $\gamma_s$ is a set of fixed state effects, $\varphi_{st}$ is a set of state/year-specific controls, and $BEN_{ist}$ is the (log) WC indemnity benefit for which the individual is eligible. A positive coefficient on the benefit variable would represent a consumption-smoothing effect of WC.

For the dependent variable, I employ three measures of consumption: the change in total household food and housing expenditures, and the changes in household food consumption and housing consumption, separately. These dependent variables are top- and bottom-coded at the 99th and 1st percentiles of their distributions, respectively.

The key independent variable of interest is clearly the benefit variable. For each individual in year $t$, I calculate a potential weekly benefit based on his or her gross weekly wage in year $t - 1$, the replacement rate, and the maximum and minimum benefit amounts in his or her state during year $t$. Potential benefits are adjusted according to marital status and number of dependents in states and years where such allowances apply. I use temporary total disability (TTD) schedules in each state and year to compute the benefit variable because all WC claims are initially filed as temporary cases and because TTD cases comprise more than 70 percent of WC cases in any given year (Meyer, 2002). To be consistent with the measurement of household consumption changes, weekly WC benefits are deflated into 1992 dollars using the CPI-U for the year of injury.

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22Information on state-year replacement rates, maximum and minimum benefit levels, and dependent allowances come from the U.S. Chamber of Commerce’s annual publication, *Analysis of Workers’ Compensation Laws (1994-2002).*
The use of a "potential benefit" as the key independent variable, rather than the actual amount of WC benefits received, is crucial for several reasons. First, using benefit eligibility instead of actual benefits received avoids problems associated with noisy reporting of actual WC income. Perhaps more importantly, take-up of WC and the amount of WC benefits received are endogenously determined with respect to the change in consumption upon incurring a work-related disability. Biddle and Roberts (2003) document that up to 60 percent of workplace injuries never result in a claim for WC indemnity benefits, and as discussed above, the participation rate for my sample of injured workers in the HRS appears even lower. To the extent that the factors determining the decision to file for WC and the amount of benefits received are correlated with consumption changes resulting from the injury, estimates of equation (1) using actual benefits received cannot be used to predict the response to future changes in WC laws. An alternative method would be to predict WC benefits received with a measure of benefit eligibility that should be uncorrelated with the change in consumption other than through the WC system, using a two-stage instrumental variables approach rather than the reduced-form regression described above. This two-stage approach would solve the endogeneity problem, but it would yield an estimate of the effect of WC benefit receipt on changes in consumption.

The argument of this paper is that the policy variable of interest is the consumption-smoothing effect of legislated changes in WC benefits, since policy makers can control legislated benefits but cannot directly control WC take-up. This is the parameter estimated by $\beta_1$ in equation (1). While $\beta_1$ is often referred to in this literature as a "reduced-form" effect, here it could also accurately be characterized as an estimate of the average intention-to-treat (AIT) effect (see, for example, Manski (1996) or Angrist, Imbens and Rubins (1996)). The AIT measures the effect of the treatment (i.e., benefit amount) on eligible subjects, regardless of whether or not they participate in the program (i.e., take up WC benefits). The AIT is one of the most relevant parameters for policy analysis when the policy maker has little influence on whether eligible individuals take up the program.

To explore the importance of the various controls, and for the sake of robustness, I employ four different specifications of equation (1). Clearly, 23 Under-reporting of income from workers’ compensation benefits and other transfer programs is examined in Meyer et al. (2008). The authors compare administrative reports of workers’ compensation benefits paid out to self-reports of workers’ compensation income received in the SIPP, PSID, and CPS, and find that only about 40 percent of workers’ compensation income is reported in these surveys.
each of the four regression specifications will include the potential WC benefit variable described above. Because the potential WC benefit variable is a function of pre-injury wages, I must also control for the separate influence of pre-injury earnings on changes in household consumption when a worker becomes injured on the job. I therefore include in each regression the individual’s (log) after-tax weekly wage in period $t-1$. That the model controls for after-tax weekly wages is crucial since WC benefits are exempt from income taxation. Because the HRS does not include detailed information on income taxes paid, marginal tax rates are constructed using the TAXSIM model, the NBER’s Fortran program to simulate total (state and federal) marginal tax rates for individuals. TAXSIM permits the calculation of a total (state plus federal) marginal tax rate for each member of my sample based on information about the respondent’s age, income, deductions, and number of dependents.

The parsimonious model includes controls for age, sex, marital status, race, and education of the injured workers, as well as controls for family size (levels and changes), which will affect the consumption “needs” of the household. In model 2, I expand the regressions to include state fixed effects in order to capture time-invariant state omitted variables, such as differences in the cost of living or industrial composition across states, which are likely to be correlated with both WC benefit levels and consumption expenditures. Once state fixed effects are included, identification of the model comes from changes in state WC laws over time, nonlinearities in benefit formulas, and individual benefit variation within states. Next, I address the concern that WC benefit generosity may be correlated with consumption opportunities in a particular state and year. Benefits may be higher and consumption changes upon injury may be smaller in states experiencing economically prosperous times. To this end, model 3 incorporates state/year unemployment rates and a state/year-specific housing price index (constructed from the Freddie Mac Conventional Mortgage Home Price Index) in the regression in order to capture differences in consumption opportunities across states and time.

Finally, recall that the level of WC benefits for which an individual is eligible is a direct function of his average weekly wage in the previous (i.e.,

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24See www.nber.org/~/taxsim for more detailed information.

25Note that the input variables used in the computation of these marginal tax rates are values from period $t-1$, so that the simulated tax rates should not be confounded by workers’ compensation receipt or by reduced labor income due to injury or illness.
pre-injury) period. Bronchetti and McInerney (2009) show that the empirical relationship between WC receipt and cash benefit levels depends crucially on the extent to which one controls for the influence of past wages. Similarly, conditioning more carefully on past wages may also be important for unbiased estimation of the relationship between WC benefits and changes in household consumption upon injury. We expect past weekly wages to influence the change in household consumption directly, as they represent the loss of earned income from the injured worker. However, past weekly earnings may also affect the change in household consumption indirectly if they capture, for instance, the accumulation of other resources that may be used to smooth consumption, spousal commitment to the labor force, or eligibility for other income support programs. Since I have no reason to know the particular form that the relationship between wages and household consumption growth assumes, model 4 flexibly conditions for the influence of past wages with a 5-piece linear spline in pre-injury average weekly wages. Specifically, let the \( L - 1 \) selected quantiles of \( \ln(wage_{t-1}) \) be \( KW_2, \ldots, KW_L \), respectively. Then the spline is formed by entering as regressors the variables \( W_1, \ldots, W_L \), where \( W_1 = \ln(wage_{t-1}) \), and \( W_i = \max(0, W_1 - KW_i) \) for \( i = 2, \ldots, L \). Choosing quintiles of the sample wage distribution as knot points, the resulting set of five variables forms a flexible function that controls for past wages and allows more precise identification of the effects of WC benefits on household consumption changes upon injury.\(^{26}\)

5. Results

5.1. Consumption-Smoothing Effects of WC

Results from regressions of the reduced-form models given by equation (1) are presented in Table 3. For each model, in the first column, I report results of the regression which uses as the dependent variable the change in total food plus housing consumption upon a work-related disability; the second and third columns report results for the changes in food and housing consumption separately. Model 1 is the simple regression suggested by equation (1), wherein consumption changes are regressed upon the log of the individual's pre-injury average weekly wage, the log of his/her potential weekly WC benefit, a vector of personal characteristics, and a set of year

\(^{26}\)Neither reducing the spline to 4 pieces by choosing quartiles as knot points nor expanding the spline to 8 pieces (choosing the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles as knot points) changed the coefficients of interest remarkably.
dummies. Model 2 adds state fixed effects, model 3 includes state/year-specific controls (unemployment rates and an index of housing prices), and model 4 includes a 5-piece linear spline in past wages.

The independent variable of most interest is the (log) of the weekly WC benefit entitlement. The estimated coefficients on the benefit variable are positive, representing a consumption-smoothing effect of WC, irrespective of the model or dependent variable employed. For the simple model without state fixed effects, the estimate is statistically different from zero only for housing consumption. The estimate of 0.184 indicates that a 10 percent increase in WC benefit eligibility is associated with a 1.84 percent increase in the change in housing consumption upon incurring a job-related disability.

Once state fixed effects are added in the second model, however, the results suggest a significant consumption-smoothing effect of WC for total food plus housing consumption, as well as for both categories of consumption separately. For a 10 percent increase in the potential WC benefit entitlement, the drop in total food plus housing consumption is offset by 2.34 percent, while the change in food consumption is increased by 2.52 percent, and the change in housing consumption is increased by 2.56 percent. The coefficient on the benefit variable is now statistically significant at the two percent level for each measure of the consumption change.

That the inclusion of state fixed effects increases the magnitudes of the consumption-smoothing estimates substantially is puzzling. The change in the results from model 1 to model 2 indicates an omitted variables bias in the first model and suggests a negative correlation between state fixed effects and WC benefit levels. In other words, WC benefits are more generous in states in which the adverse effect of injury on household consumption is larger. One possibility is that the fixed effects are picking up the industrial/occupational composition of the state population. That is, perhaps benefits are more generous, and the adverse effects of injuries on consumption are larger in states with a higher proportion of workers in injury-prone industries and occupations. However, including thirteen industry and nine occupation dummies in model 1 does not change the results noticeably. Another possible explanation, given the small sample size, is that a few individual observations are exerting undue influence on the results, and state fixed effects are picking up the influence of these outliers. When I examine the sensitivity of the results to influential observations by running median regressions for the pooled sample (i.e., model 1), however, the results look very similar to the estimates for model 1 in Table 3, suggesting that state fixed effects are not simply controlling for the influence of individual outliers.

Including state/year-specific controls in the third model does not change
the parameters of interest dramatically. The results from model 3 suggest that a 10 percent increase in potential weekly benefits would offset the drop in total consumption by 2.63 percent, the change in food consumption by 2.54 percent, and the decrease in housing consumption by 2.66 percent. The coefficient on the state-year unemployment rate is negative, suggesting larger drops in consumption for injured workers in states with higher unemployment.

Under the specification of model 4, a 5-piece linear spline in wages is included to control more carefully for the influence of past weekly wages on household consumption changes upon injury. When I flexibly condition on past wages in this way, the estimated consumption-smoothing effects of WC benefits increase in magnitude. A 10 percent increase in benefit eligibility now offsets the loss in total consumption by 3.63 percent, the decrease in food consumption by 3.37 percent, and the decline in housing consumption by 3.73 percent.

The bottom of the table describes the predicted changes in annual consumption if WC benefits were very low, equal to the 10th percentile of their current distribution. Under model 2, at 10th percentile benefit levels, the predicted drop in annual food plus housing consumption would be about $1262, which amounts to a decrease of 18.3 percent. Decreases in food consumption and housing consumption account unequally for this change; the estimates predict a decrease in food consumption of $734 (19.9 percent) and a drop in housing consumption of $396 (13.0 percent). Under model 3, which includes state/year-specific controls like unemployment rates and a housing price index, the predicted drop in total consumption is $1,593 (or 20.6 percent). This change in the predicted decrease in total consumption appears to be coming from a larger predicted drop in housing consumption under model 3. Finally, the results from model 4 suggest even larger drops in consumption if benefits were set at a level equal to the 10th percentile of their current distribution. The predicted drop in total consumption is not $2,044 (or 28.2 percent), while the predicted loss in annual food consumption is $1,183 (26.7 percent), and the predicted loss in annual housing consumption is $996 (21.9 percent).

Of course, the implied 20 to 30 percent declines in food and housing consumption represent more than a loss in material well-being for the injured worker; they also indicate a sizeable decrease in material well-being for the other members of his or her household. Thus, WC appears to be providing important and substantial social insurance benefits for both injured workers and their families.
5.2. Sensitivity of Results to Selection Bias

One might be concerned about selection bias to the reduced-form estimates of $\beta_1$ if increased generosity of WC benefits causes more workers to experience a workplace injury (e.g., through reduced effort devoted to workplace safety, as in Krueger (1990)). If those marginal workers who are induced by a change in benefits to become injured have systematically different consumption preferences that are not controlled for in my model, my estimates of $\beta_1$ will be biased.\(^{27}\)

The existing literature on the incentive effects of WC provides mixed evidence on the magnitude of this effect. Several papers find evidence of a positive relationship between WC benefits and non-fatal injury rates (e.g., Chelius (1982), Ruser (1985, 1991)) or between benefit levels and program participation rates (e.g., Krueger (1990), Hirsch et al. (1997), Neuhauser and Raphael (2004)). The estimated elasticities from these studies, which differ widely in terms of data sources and methodologies, range from non-significant to 0.7. Bronchetti and McInerney (2009) find no statistically significant effect of variation in WC benefits on participation in the program after controlling flexibly for the confounding influence of wages on both benefits and WC receipt.

Because none of these papers directly examines the question of the responsiveness of injury rates to benefit generosity for the years of interest or for older workers like those in my sample, I estimate a simple probit model of the effect of WC benefit generosity on the likelihood of incurring a work-related, work-limiting disability using a sample of HRS respondents. The dependent variable is a dummy variable for becoming injured or ill on the job (as defined above), and the sample includes both workers who experience a workplace injury at some point in the HRS and those who do not. The probit specification includes the same controls as model 3 of the consumption-smoothing regressions, namely demographic controls, state and year fixed effects, and state-year economic controls (unemployment rates and an index for housing prices).

The probit results are reported in Table 4. The coefficients on the demographic variables generally have the expected sign. The estimated effect of a 10 percent increase in WC benefit levels on the marginal probability of

\(^{27}\)Another way in which workers could differentially select into the sample is if increased benefits cause longer injury durations so that with increased benefit generosity, individuals are more likely to be observed with a work-limiting health problem at the point of interview.
a work-related injury or illness is 0.0033, and the corresponding probit coefficient on the benefit variable is not statistically different from zero. These results suggest that sample selection is not likely to be causing significant bias to my estimates of the consumption-smoothing effects of WC benefits.

TABLE 4 HERE

5.3. Consumption-Smoothing for Households with Limited Assets

The extent of consumption-smoothing provided by WC benefits will depend on the degree to which injured workers are able to self-insure against lost earnings from a work-related injury. All else equal, the consumption-smoothing effects of WC benefits should be larger for households without substantial assets upon which to draw when an on-the-job injury is incurred. The HRS provides detailed information on the financial resources available to households, including information on the value of real estate assets, resalable vehicles, owned businesses, stocks, bonds, IRA accounts, certificates of deposit, checking accounts, and other savings. Along with this data on household assets, the HRS surveys also provide a measure of outstanding debt for these households. Hereafter, I refer to "net household assets" as the difference between the summed value of assets listed above and the value of debt outstanding.

Table 5 displays reduced-form estimates from regressions of equation (1), for the portion of the sample with net household assets below the 25th percentile and above the 25th percentile. Regardless of whether the regressions include a separate control for the level of pre-injury net assets, the results indicate a larger coefficient on the benefit variable for the subsample of households with lower pre-injury assets. That is, WC benefits have a more significant consumption-smoothing effect for households who have accumulated less in assets up to the point of injury and therefore are less able to smooth their consumption through this form of self-insurance.

The first row of results are for regressions of equation (1) that do not include a control for the level of the household’s (real) pre-injury assets. In other words, under this specification, the level of pre-injury assets is assumed to affect household consumption changes only through its interaction with

\[ I \text{ employ the Model 3 version of (1) which includes the (log) potential weekly WC benefit, the (log) after-tax weekly wage, demographic controls, year and state fixed effects, and the state-year unemployment rates and housing price index.} \]
other independent variables, most importantly, the WC benefit entitlement. The second row of results, for the model in which a separate control for the level of pre-injury assets is included in the regression, strengthens the conclusion that WC benefits have larger consumption-smoothing effects for households with low pre-injury wealth. A 10 percent increase in potential WC benefits offsets the drop in total food plus housing consumption by 4.03 percent for those with assets below the 25th percentile. For the group of injured workers with assets above the 25th percentile, an increase in benefits of the same magnitude offsets the drop in total consumption by only 1.97 percent. The result of larger consumption-smoothing effects for the low asset group also holds when I examine food and housing consumption separately, although the estimates are no longer as precise.

[TABLE 5 HERE]

6. Optimal WC Benefits

Estimates of the consumption-smoothing effects of WC should be of concern to policy makers because they reflect the benefits of a social insurance program that is designed to support workers facing economic hardship brought on by a workplace injury or illness. The results presented in this paper indicate a substantial consumption-smoothing role for WC benefits when a worker becomes injured on the job.

While the magnitudes of these estimated consumption-smoothing effects are interesting on their own, their substantive meaning can only be determined by weighing them against the distortionary effects of WC on individual behavior. The public finance literature provides a starting point for analyzing the social welfare implications of varying the generosity of WC benefits. A classic paper by Baily (1978) approaches the question of optimal unemployment insurance benefits in a two-period model in which individuals consume and save in the first period and face an exogenous probability of unemployment in the second period. Upon job loss in the second period, the individual can then deterministically vary his unemployment duration (e.g., by varying search effort) according to the level of unemployment benefits provided. Baily derives a formula for optimal unemployment insurance benefits that involves three empirically estimable parameters: the change

\footnote{The estimated effects of benefits on total food plus housing consumption are statistically significant for both asset groups.}
Chetty (2006) expands upon this analysis in two key ways. First, Chetty shows that Baily’s result depends on an assumption that third and higher-order terms of the utility function are ignorable (i.e., individuals have no precautionary savings motives), and he provides a formula for optimal level of unemployment insurance benefits when this assumption is relaxed. Second, he demonstrates that a Baily-type expression for optimal benefits holds in a more general dynamic framework in which workers face a persistent risk of unemployment, and is robust to the inclusion of leisure value of unemployment, borrowing constraints, private insurance decisions, and other extensions of Baily’s model.

6.1. Applying the Model for Optimal Benefits

The models can be applied to the case of work-related injuries and illnesses. To emphasize the intuition of the resulting formula for optimal WC benefits, I apply a simple and illustrative model from Chetty (2006).

In this one-period model, a worker faces risk of on-the-job injury only at the beginning of the period, and then lives until the end of the period. He arrives at the beginning of the period having accumulated wealth equal to \( W_0 \). With probability \( p \), he incurs an on-the-job injury, making him temporarily unable to work, and then receives WC benefits, \( b \), for the duration of time he spends away from work. With probability \( (1 - p) \), he receives no injury and continues to work at his job that pays wage \( w \), with no further risk of job loss or injury, for the remainder of his life. I assume that the probability of injury (and thus, of benefit receipt), \( p \), is exogenous with respect to the level of WC benefits. This assumption is supported by some of the evidence in the literature: Bronchetti and McInerney (2009), for example, find that the reduced-form effect of WC benefit generosity on

30 Chetty demonstrates that ignoring third-order terms of \( u \) can lead to substantial approximation error in Baily’s solution. Chetty’s formula requires only that fourth and higher order terms of the utility function are small (\( u''' \approx 0 \)).

31 Note that there is no take-up decision modeled here; if a worker is injured on the job and is temporarily unable to work, he automatically receives WC benefits for the duration of time out of work due to the injury.
the number of WC claims is not statistically different from zero when one
controls for the confounding influence of past earnings on both benefits and
claims decisions. Bartel and Thomas (1985) and Lanoie (1992) also find
the effect of variation in benefit generosity on the number of WC claims
to be statistically insignificant. I discuss the implications of relaxing this
assumption in my concluding remarks.

In the employed and uninjured state, he pays a lump-sum tax of \( \tau \),
which finances WC. In reality, if a worker is injured on the job, there is an
exogenous component to the duration of his injury in the time necessary for
him to recuperate; however, beyond that time, he may extend the duration
of time out of work by devoting less effort to rehabilitation, exaggerating
the seriousness of his injury, et cetera. For now, assume for simplicity that
the duration of time out of work due to an injury can be entirely determined
by the worker. Let \( D(b) \), denoted \( D \) below, be the fraction of the period
the worker spends away from work due to his injury or illness, which will
be a function of the amount of benefits available to him. By definition, \( D \)
must be greater than or equal to zero.

Finally, suppose that the costs of effort devoted to rehabilitation and
return-to-work, the benefits of increased recovery time in terms of better
return-to-work outcomes (assuming that the effects of increased health out-
weigh those of potential loss in human capital), and any leisure value of
non-work due to injury can be described by an increasing, concave function
of \( D \), denoted \( g(D) \).

Applying the model from Chetty (2006) in this way, the individual takes
\( b \) and \( \tau \) as given and chooses consumption if employed, \( c_e \), consumption if
injured, \( c_i \), and \( D \), to

\[
\max(1 - p)U(c_e) + p[U(c_i) + g(D)]
\] (2)

subject to a budget constraint in each state:

\[
W_0 + (w - \tau) - c_e \geq 0
\]

\[
W_0 + bD + w(1 - D) - c_i \geq 0
\]

Here, the utility function, \( U(\cdot) \), is assumed to be strictly concave and
state-independent, implying that an individual values a given level of con-

---

32 Allowing for a stochastic component to injury duration introduces further uncertainty
for workers. If the stochastic and deterministic parts of \( D \) enter additively, the optimal
benefits formula can be written as in (6), but requires a positive correction factor that
augments the consumption drop upon injury.

33 Here \( U(\cdot) \) is assumed to be strictly concave and state-independent.
sumption equally, regardless of whether he is employed or away from work due to injury. An additional implicit assumption is that the utility functions of those workers who become injured take the same form as for those workers who do not ever become injured. Finally, note that to guarantee an interior solution (i.e., that the individual’s optimal choice of $D$ takes a non-zero value), $g(D)$ must be sufficiently concave (or $g'(D)$ must be sufficiently high at low levels of $D$).

Let $V(b, \tau)$ denote the maximal value for the expression above for a given level of WC benefits, $b$, and taxes, $\tau$. The social planner’s choice of the optimal levels of WC benefits and taxes, $(b, \tau)$, is subject to a balanced-budget constraint for the WC system so that $pbD = (1 - p)\tau$. As shown in Chetty (2006), the optimality condition ($dV/db(c^*) = 0$) can be expressed as

$$U'(c_e) \left[ 1 + \frac{b}{D} \frac{dD}{db} \right] = U'(c_i)$$

which requires that the marginal benefit of raising $c_i$ by $1$ (the right hand side) be equal to the marginal cost of raising $\tau$ in the employed state to cover the $1$ increase in $b$.

### 6.2. A Formula for Optimal Benefits

The key technique to turn this optimality condition into an approximate formula for the optimal benefit rate involves rearranging and approximating $\frac{U'(c_i) - U'(c_e)}{U'(c_e)}$ by taking a Taylor series expansion around the average worker’s utility at the consumption level in the employed state. If third and higher-order terms of $U(\cdot)$ are ignored, the condition for optimal WC benefits can be expressed as:

$$\gamma \frac{\Delta c}{c}(b^*) \approx \varepsilon_{D,b}$$

where $\frac{\Delta c}{c} = \frac{c_e - c_i}{c_e}$ is the consumption drop due to a work-related injury, $\gamma = -c U''(c)/U'(c)$ is the coefficient of relative risk aversion, and $\varepsilon_{D,b} = \frac{d \log D}{d \log b}$ is the elasticity of expected injury duration with respect to benefits.

This formula is equivalent to that derived in Baily (1978) and is intuitively simple. The optimal benefit is defined by setting the proportional drop in consumption due to a work-related injury, times the degree of relative risk aversion, equal to the elasticity of injury duration with respect to a change in benefits. Thus, the welfare gains of a marginal increase in benefits in terms of smoother consumption for households affected by work-related injury risk, the magnitude of which will depend on the degree
of risk aversion, are balanced against the social welfare costs of a marginal increase in benefits in terms of increased time spent away from work due to a work-related injury.

However, Chetty (2006) finds that ignoring third-order terms of the utility function when taking the Taylor series expansion described above can lead to substantial approximation error when calculating optimal benefits. When this assumption is relaxed, the approximation for optimal WC benefits is given by:

$$\gamma \frac{\Delta c}{c}(b^*) \left[ 1 + \frac{1}{2} \rho \frac{\Delta c}{c}(b^*) \right] \approx \varepsilon_{D,b}$$

where all terms are defined as above, and $\rho = -\frac{U'''(c)}{U''(c)}$ is the coefficient of relative prudence.

Moreover, Chetty (2006) demonstrates that this formula can also be applied in a continuous-time, dynamic lifetime utility in which workers face a persistent risk of entering the injured state and is robust to the inclusion of several extensions to Baily’s model (e.g., leisure value of unemployment, borrowing constraints, private insurance decisions). In short, the conclusion is that the formula for the optimal level of benefits described above applies in a much more general setting than was previously thought; $b^*$ still depends only on the key parameters in (5).

6.3. Calculating Optimal WC Benefits

The formulas above in equations (4) and (5) can be implemented using empirical estimates of their key inputs in order to calculate the optimal level of WC indemnity benefits. First, consider the parameter $\varepsilon_{D,b}$, which, in the general case, is the effect of a 1 percent increase in benefits on the fraction of his life that the agent spends out of work due to work-related injury/illness. If the frequency of workplace injuries is not affected by $b$,

34 The optimal benefits formula for the dynamic model coincides with the formula in (5) with two exceptions. The parameters now represent average behavioral responses across states (employed/uninjured and injured) and time. The elasticity term on the right hand side represents the effect of a 1 percent change in $b$ on the fraction of his life that the individual spends out of work due to work-related injury/illness, and the change in $c$ is now the mean proportional change in $c$ upon work-related injury. The second difference between the formula for the dynamic model is that $\varepsilon_{D,b}$ is multiplied by $\frac{1}{1-D}$ (where $D$ is the fraction of life spent out of work due to injury). This represents a feedback effect of raising benefits on tax revenues: Raising consumption while injured by $1$ both increased injury/claim duration and reduces tax revenue since workers spend less of their lives employed.
then \( \varepsilon_{D,b} \) is equivalent to the elasticity of average injury/claim duration with respect to benefits.³⁵

This relationship has been examined in the empirical literature, and the resulting evidence on the magnitude of the duration elasticity is reviewed in Krueger and Meyer (2002) and in Fortin and Lanoie (1998). Table 6 briefly describes the results of a few key studies on the incentive effects of WC benefits. In the exercise below, I consider multiple values for \( \varepsilon_{D,b} \), incorporating these estimates of the duration elasticities in computing optimal benefits.³⁶

[INSERT TABLE 6 HERE]

This paper provides the first empirical estimates of the extent of consumption smoothing provided by WC benefits (i.e., the parameter \( \Delta \log C(b) \)). Depending on the regression specification employed, my reduced-form estimates of the consumption-smoothing effects of WC benefits suggest that a 10 percent increase in benefit levels offsets the loss in household consumption due to a work-related injury/illness by about 2.5 to 4 percent (or elasticities in the range of 0.25 to 0.4). In calculating the optimal level of WC benefits, I use two different estimates of the effect of benefits on the change in total food plus housing consumption. First, I calculate the optimal rate of wage-replacement based on the reduced-form consumption-smoothing estimate from model 3 (0.263), which includes state fixed effects and state-year economic controls. Next, I recalculate the optimal benefit level using the estimated consumption-smoothing effect from model 4 (0.363), which adds a 5-piece linear spline in pre-injury wages.

To be clear, it is important to note that in applying the optimal benefit formulas, \( \Delta \log C(b) \approx -\Delta \log C \), where \( \Delta \log C \) is a function of the replacement rate of benefits to pre-injury wages. Instead, my estimates from model 3, for example, imply that \( \Delta \log C = -0.243 + 0.263 \log \text{(BEN)} \).³⁷ Dividing the

³⁵Recall the assumption that the elasticity of injury frequency with respect to benefits is zero. This is supported by the empirical results in Bronchetti and McInerney (2009) as well as others.

³⁶Note also that the parameter \( \varepsilon_{D,b} \) involves the total derivative of \( D(\cdot) \) with respect to \( b \), which would include any effects of \( b \) on other behaviors that feed back into the choice of \( D \). Fortunately, reduced-form studies like those described in Table 6 identify exactly this parameter. The same applies for the parameter \( \Delta \log C(b) \) and the reduced-form estimates from Section 5 of this paper.

³⁷The reduced-form regression results from Model 3 imply that in the absence of WC benefits, the average percentage decline in (log) total household consumption is 24.3%.
coefficient on the benefit variable (0.263) by the mean replacement rate for
my sample (0.782) allows me to calculate the optimal replacement rate, $R$,
from $\Delta \log(C) = -0.243 + 0.3363R$.

Table 7 presents the results of optimal benefit calculations using my esti-
mates of the consumption-smoothing effects of WC benefits and considering
several different values for $\varepsilon_{D,b}$, all of which are consistent with empirical
estimates provided in the literature. In either panel, the first column con-
siders a "base case," in which the elasticity of time out of work with respect
to benefits equals 0.3, which is consistent with the estimated effect of benefit
variation on the duration of claims from Meyer et al. (1995). Applying
my estimate of the impact of benefit generosity on total food and housing
consumption changes from model 3 to the formula in (4) from Baily (1978),
I find that the optimal benefit-wage ratio ranges from zero (at very low lev-
eels of risk aversion) to 0.544 at the highest level of risk aversion considered
($\gamma = 5.0$).

Using my consumption-smoothing estimate from model 4 and the for-
formula in (4), the optimal rate of wage replacement is higher for every level
of risk aversion, topping out at about 56 percent for the very highest value
of $\gamma$. The last column of each panel examines the optimal benefit-wage re-
placement rate for this base case (where $\varepsilon_{D,b} = 0.3$), employing instead the
more general optimal benefits formula in (5), from Chetty (2006). Here,
I find that for all levels of risk aversion, optimal benefits are more gener-
ous than when calculated under the original formula. For very high levels
of risk aversion, the optimal rate of wage-replacement is approximately 60
percent. However, for this relatively small estimate of the distortionary
behavioral effects of WC benefits, the optimal benefit-wage ratio is substan-
tially less than the mean for my sample (0.782), regardless of which formula
is employed.

[INSERT TABLE 7 HERE]

The second column in each panel calculates optimal benefit levels from
equation (4) when $\varepsilon_{D,b} = 0.4$. This case would be consistent with larger
estimates of the duration-benefit elasticity from Meyer et al. (1995) or from
Butler and Worrall (1985). This slightly larger estimate of $\varepsilon_{D,b}$ decreases
the optimal rate of wage replacement relative to the base case by 10 to 50
percent, depending on the level of risk aversion. In case 3, I allow the
distortionary effects of worker’s compensation benefits on injury frequency
and duration to be even larger, setting $\varepsilon_{D,b}$ equal to 0.7. In this state of the world, optimal WC benefits are found to be extremely low: The optimal rate of wage-replacement is positive only for higher levels of risk aversion, and even at $\gamma = 5.0$, optimal benefits only replace 30 percent of pre-injury after-tax wages (or 43 percent using my estimate from model 4). In the final case, where $\varepsilon_{D,b}$ equals 1.0, optimal benefits are only non-zero for the highest levels of risk aversion, and are always lower than 25 percent, regardless of which consumption-smoothing estimates or levels of risk aversion are used.

The key result of my optimal benefit calculations is that the average real rate of wage replacement in my sample, which is over 75 percent, is higher than optimal. For plausible levels of risk aversion and a wide range of estimates of the effects of WC benefit variation on the average duration of work-related injuries, the optimal rate of after-tax wage replacement is found to be lower than 50 percent. Even for the highest levels of risk aversion examined, the optimal benefit-wage ratio is never higher than 60 percent.

7. Conclusions

This study provides the first and only evidence as to the adverse effects of work-related injuries and illnesses on household consumption and the extent to which WC benefits help to dampen those effects. I have shown that WC indemnity benefits provide significant consumption smoothing to households affected by a work-related injury or illness. A 10 percent increase in benefit generosity is found to offset the adverse effect of a workplace injury on household consumption by about 2.5 to 4 percent. Moreover, my results suggest that if WC benefits were at very low levels (equal to the 10th percentile of their current distribution), the drop in household consumption upon incurring a work-related injury would be in the range of 20 to 30 percent. In short, WC benefits appear to play an important role in protecting the material well-being of households impacted by work-related, work-limiting injuries and illnesses.

My findings also indicate larger consumption-smoothing benefits of WC for households with limited pre-injury wealth. This finding is consistent with evidence from the literature on consumption-smoothing provided by unemployment insurance (see, for example, Browning and Crossley (2001)) and complements the research on moral hazard and income effects in unemployment insurance (e.g., Chetty, 2008) and health insurance (Nyman, 2003).
The extent of consumption smoothing provided by WC is a crucial parameter for determining the optimal level of WC benefits. Despite the finding of a considerable consumption-smoothing role for WC, this paper also demonstrates that current benefit levels are higher than optimal. Even for the most optimistic of my estimates of the consumption-smoothing effects, relatively high levels of risk aversion, and small estimates of the distortionary effects of WC on the duration of WC claims, the optimal benefit-wage replacement rate is 20 percentage points lower than the mean replacement ratio for my sample of injured workers (78 percent). Moreover, the model above assumes that variation in benefit generosity does not impact the frequency of work-related injuries; allowing increased benefits to positively affect the frequency of job injuries would yield an even lower optimal rate of wage-replacement. In essence, the distortionary effects of WC insurance on individual labor supply behavior are large enough to outweigh the substantial consumption-smoothing benefits of the insurance for injured workers documented herein.

If one takes the results of the optimal benefits calculations literally, it is natural to ask why real WC wage-replacement rates are much higher than my calculations indicate is optimal. One possibility is that the estimates in this paper understate the consumption-smoothing effects of WC for the entire population of working-age adults for whom WC benefits are legislated. The Health and Retirement Study (HRS) is the only national micro data set appropriate for studying the extent to which WC benefits offset consumption losses upon a work-related injury; however, the HRS samples primarily individuals who are of (or near) retirement age. Clearly, the consumption-smoothing effects of WC benefits could differ in magnitude for older workers, relative to their prime-aged counterparts. My estimates may understate the consumption-smoothing effects of WC for the working-age population if workers’ becoming injured/ill on the job later in their careers have accumulated more wealth with which to smooth consumption, or if older workers are more likely than younger workers to perceive a given injury as permanent (in terms of return-to-work probability) and reduce post-injury consumption accordingly. Were it possible to estimate the consumption-smoothing effects of WC for a sample of prime-aged injured workers without conditioning on WC receipt, such an exercise would provide valuable evidence as to the external validity of this paper’s results. Unfortunately, alternative data sets with information on both household consumption and the incidence of work-related injuries and illnesses for individuals of working age are not available at this time.

Because the optimal benefits formula was originally derived in a frame-
work of unemployment insurance (UI), it is also worthwhile to compare my consumption-smoothing estimates for WC to those of Gruber (1997) for UI. The estimated consumption-smoothing effects of these two programs are on the same order of magnitude, despite the fact that legislated WC benefits are much more generous than those prescribed by the UI system. Specifically, Gruber (1997) finds that a 10 percentage-point increase in the rate of wage replacement provided by UI offsets the drop in household consumption upon job loss by 2.65 percent, while my reduced-form estimates from Model 3 suggest that a 10 percentage-point rise in the WC benefit-wage replacement rate would reduce the decline in household consumption by 3.36 percent.

I find that current WC benefits are much higher than optimal, while Gruber (1997) shows that the current UI benefit-wage replacement rate is close to the optimal level. If in fact my estimates of the consumption-smoothing benefits of WC are generalizable to the working population for which benefits are legislated, this discrepancy may reflect differences in the two systems that are not captured by the optimal benefits model above. A fairly obvious example is that WC benefits may also be compensating workers for the physical discomfort or pain caused by work-related injuries and illnesses, an element which is absent in the discussion of unemployment. Moreover, the discussion above disregards the effects of WC for firms, who benefit from reduced uncertainty in firm costs of work-related injuries relative to a system in which workers could sue employers for damages due to on-the-job injuries and illnesses. It may be the case that higher-than-optimal wage-replacement is, in a sense, compensating workers for forfeiting the option to do so. Also, the model above considers only the optimal rate of wage-replacement provided by WC benefits. It ignores, among other things, key structural features of state WC programs like the waiting periods and retroactive periods, which serve as deductibles that must be paid in order to receive benefits. Incorporating these components of WC programs may yield different predictions for the optimal level of benefits.

This paper’s key contribution is to offer new evidence on the effects of work-related injuries on household material well-being and the relative success of WC in protecting the well-being of households affected by a workplace injury. However, the evidence provided here is hardly sufficient for understanding the economic impacts of work-related injuries on workers and their families. Despite the large volume of research on workplace injuries and WC programs, we still know remarkably little about the effects of work-related injuries on longer-term outcomes like health, return-to-work labor supply and earnings capacity, reliance on other transfer programs, and the proba-
bility of re-injury. Given these deficiencies, future research on both short and long-term effects of workplace injuries on outcomes reflecting worker well-being would be useful.

Acknowledgements

I am grateful to Bruce Meyer, Chris Taber, Dennis Sullivan, and many others for helpful discussions and comments. I thank Michael Nolte and Stacey Bruestle at the Michigan Center on the Demography of Aging (MiCDA) for patient assistance with restricted access HRS data during my visits to the MiCDA data enclave. I also thank Dan Feenberg at the NBER for the use of his TAXSIM model to calculate marginal tax rates for individuals in my sample (www.nber.org/~taxsim). This material is based in part upon work completed under a National Science Foundation Graduate Research Fellowship. All errors are mine.

References


Table 1
Legislated Workers’ Compensation Parameters for a Representative Set of States, 2002

<table>
<thead>
<tr>
<th>State</th>
<th>Replacement Rate (%)</th>
<th>Max. Weekly TTD Benefit</th>
<th>Min. Weekly TTD benefit&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Waiting period</th>
<th>Retroactive period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona&lt;sup&gt;a&lt;/sup&gt;</td>
<td>66.7</td>
<td>314.01</td>
<td>——</td>
<td>7 days</td>
<td>14 days</td>
</tr>
<tr>
<td>California</td>
<td>66.7</td>
<td>490.00</td>
<td>126.00</td>
<td>3 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Colorado</td>
<td>66.7</td>
<td>645.96</td>
<td>——</td>
<td>3 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Connecticut&lt;sup&gt;a&lt;/sup&gt;</td>
<td>75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>887.00</td>
<td>177.40</td>
<td>3 days</td>
<td>7 days</td>
</tr>
<tr>
<td>Florida</td>
<td>66.7</td>
<td>594.00</td>
<td>20.00</td>
<td>5 days</td>
<td>21 days</td>
</tr>
<tr>
<td>Hawaii</td>
<td>66.7</td>
<td>400.00</td>
<td>141.00</td>
<td>3 days</td>
<td>——</td>
</tr>
<tr>
<td>Illinois</td>
<td>66.7</td>
<td>989.65</td>
<td>371.12</td>
<td>3 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Indiana</td>
<td>66.7</td>
<td>548.00</td>
<td>50.00</td>
<td>7 days</td>
<td>21 days</td>
</tr>
<tr>
<td>Iowa</td>
<td>80&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1069.00</td>
<td>0.92</td>
<td>3 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Massachusetts&lt;sup&gt;a&lt;/sup&gt;</td>
<td>60</td>
<td>890.94</td>
<td>178.19</td>
<td>5 days</td>
<td>21 days</td>
</tr>
<tr>
<td>Minnesota</td>
<td>66.7</td>
<td>750.00</td>
<td>130.00</td>
<td>3 days</td>
<td>10 days</td>
</tr>
<tr>
<td>Mississippi</td>
<td>66.7</td>
<td>322.90</td>
<td>25.00</td>
<td>5 days</td>
<td>14 days</td>
</tr>
<tr>
<td>New Jersey</td>
<td>70</td>
<td>591.00</td>
<td>158.00</td>
<td>7 days</td>
<td>8 days</td>
</tr>
<tr>
<td>New Mexico</td>
<td>66.7</td>
<td>480.47</td>
<td>36.00</td>
<td>7 days</td>
<td>28 days</td>
</tr>
<tr>
<td>New York</td>
<td>66.7</td>
<td>400.00</td>
<td>40.00</td>
<td>7 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Ohio</td>
<td>72&lt;sup&gt;c&lt;/sup&gt;</td>
<td>628.00</td>
<td>209.33</td>
<td>7 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>66.7</td>
<td>662.00</td>
<td>331.00</td>
<td>7 days</td>
<td>14 days</td>
</tr>
<tr>
<td>South Carolina</td>
<td>66.7</td>
<td>549.42</td>
<td>75.00</td>
<td>7 days</td>
<td>14 days</td>
</tr>
<tr>
<td>Texas</td>
<td>70&lt;sup&gt;c&lt;/sup&gt;</td>
<td>533.00</td>
<td>80.00</td>
<td>7 days</td>
<td>28 days</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>66.7</td>
<td>647.00</td>
<td>20.00</td>
<td>3 days</td>
<td>7 days</td>
</tr>
</tbody>
</table>

Source: Analysis of Workers’ Compensation Laws, 2002 (U.S. Chamber of Commerce).

<sup>a</sup> In these states, benefit amounts are adjusted for dependents and/or marital status.

<sup>b</sup> In these states, the replacement rate is a percentage of after-tax /"spendable" earnings.

<sup>c</sup> In Ohio, the replacement rate is 72% for the first 12 weeks and 66.7% thereafter.

<sup>d</sup> In many states, the minimum is reduced to a % of the worker’s avg. weekly wage if less.
# Table 2

**HRS Sample Characteristics by Job Injury and Disability Status**

(Unweighted sample means; Standard deviations in parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Injured never disabled</th>
<th>Never injured at work</th>
<th>Never disabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>57.9 (5.5)</td>
<td>57.8 (5.8)</td>
<td>57.5 (5.8)</td>
</tr>
<tr>
<td>Male</td>
<td>0.575 (0.495)</td>
<td>0.464 (0.499)</td>
<td>0.464 (0.499)</td>
</tr>
<tr>
<td>Married</td>
<td>0.744 (0.437)</td>
<td>0.780 (0.414)</td>
<td>0.790 (0.407)</td>
</tr>
<tr>
<td>Less than high school</td>
<td>0.293 (0.456)</td>
<td>0.194 (0.395)</td>
<td>0.172 (0.378)</td>
</tr>
<tr>
<td>High school grad</td>
<td>0.531 (0.500)</td>
<td>0.508 (0.500)</td>
<td>0.506 (0.500)</td>
</tr>
<tr>
<td>At least some college</td>
<td>0.176 (0.381)</td>
<td>0.298 (0.457)</td>
<td>0.322 (0.467)</td>
</tr>
<tr>
<td>White</td>
<td>0.868 (0.339)</td>
<td>0.850 (0.357)</td>
<td>0.844 (0.363)</td>
</tr>
<tr>
<td>Black</td>
<td>0.088 (0.284)</td>
<td>0.118 (0.322)</td>
<td>0.119 (0.323)</td>
</tr>
<tr>
<td>Hispanic and other</td>
<td>0.044 (0.205)</td>
<td>0.033 (0.178)</td>
<td>0.038 (0.191)</td>
</tr>
<tr>
<td>Household size</td>
<td>2.724 (1.506)</td>
<td>2.587 (1.199)</td>
<td>2.599 (1.195)</td>
</tr>
<tr>
<td>Average weekly wage t-1</td>
<td>451.72 (372.66)</td>
<td>534.91 (435.77)</td>
<td>566.74 (451.59)</td>
</tr>
<tr>
<td>Potential weekly WC benefit</td>
<td>256.16 (131.71)</td>
<td>276.04 (139.77)</td>
<td>286.44 (139.51)</td>
</tr>
<tr>
<td>Receive WC</td>
<td>0.150 (0.358)</td>
<td>0.014 (0.118)</td>
<td>0.012 (0.108)</td>
</tr>
<tr>
<td>WC benefits received</td>
<td>740.11 (2708.62)</td>
<td>19.04 (344.44)</td>
<td>12.80 (285.41)</td>
</tr>
<tr>
<td>Food consumption t-1</td>
<td>5234.46 (3073.55)</td>
<td>5438.24 (5464.74)</td>
<td>5540.13 (6045.72)</td>
</tr>
<tr>
<td>Housing consumption t-1</td>
<td>3754.61 (4692.75)</td>
<td>4338.92 (6232.41)</td>
<td>4623.60 (6718.09)</td>
</tr>
<tr>
<td>Food + housing consumption t-1</td>
<td>8989.07 (6208.15)</td>
<td>9777.17 (8755.37)</td>
<td>10163.73 (9513.19)</td>
</tr>
<tr>
<td>Change in food consumption</td>
<td>-117.50 (2624.52)</td>
<td>-131.42 (2306.64)</td>
<td>-104.18 (2302.00)</td>
</tr>
<tr>
<td>Change in housing consumption</td>
<td>476.62 (3325.34)</td>
<td>815.70 (4617.17)</td>
<td>982.56 (4948.98)</td>
</tr>
<tr>
<td>Change in food+housing</td>
<td>374.90 (4169.66)</td>
<td>722.85 (5408.67)</td>
<td>913.67 (5671.40)</td>
</tr>
<tr>
<td>N</td>
<td>273</td>
<td>12,689</td>
<td>8,935</td>
</tr>
</tbody>
</table>

---

*a All dollar values are deflated into 1992 dollars using the appropriate component of the CPI-U.
*b All samples are conditional on employment in t-1 and include only individuals with complete, non-missing food and housing consumption data.
*c Injured workers are individuals who report a work-related, work-limiting disability in period t, conditional on no work-limiting disability in period t-1.
*d Sample includes those who never experience a work-limiting disability related to their work.
*e Sample includes those who never experience any work-limiting disability.
Table 3
Consumption-smoothing Effects of Workers’ Compensation Benefits for Injured Workers
(Results from reduced-form regression of equation (1); Standard errors in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>(Model 1)</th>
<th>(Model 2)</th>
<th>(Model 3)</th>
<th>(Model 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food + Housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>0.069</td>
<td>0.072</td>
<td>0.234</td>
<td>0.256</td>
</tr>
<tr>
<td>Housing</td>
<td>0.184</td>
<td>0.252</td>
<td>0.256</td>
<td>0.263</td>
</tr>
<tr>
<td>WC benefit</td>
<td>(0.090)</td>
<td>(0.090)</td>
<td>(0.093)</td>
<td>(0.109)</td>
</tr>
<tr>
<td>Log after-tax weekly wage t-1</td>
<td>-0.055</td>
<td>-0.073</td>
<td>-0.108</td>
<td>-0.122</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.048)</td>
<td>(0.062)</td>
<td>(0.065)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.152</td>
<td>-0.148</td>
<td>-0.189</td>
<td>-0.174</td>
</tr>
<tr>
<td></td>
<td>(0.090)</td>
<td>(0.098)</td>
<td>(0.108)</td>
<td>(0.106)</td>
</tr>
<tr>
<td>Household size t-1</td>
<td>0.034</td>
<td>0.038</td>
<td>0.021</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.027)</td>
<td>(0.030)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>∆ in household size</td>
<td>0.102</td>
<td>0.048</td>
<td>0.117</td>
<td>0.142</td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.062)</td>
<td>(0.036)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>State-year unemp. rate</td>
<td>-0.1699</td>
<td>-0.047</td>
<td>-0.037</td>
<td>-0.166</td>
</tr>
<tr>
<td>State-year housing price index</td>
<td>-0.090</td>
<td>-0.004</td>
<td>-0.001</td>
<td>-0.009</td>
</tr>
</tbody>
</table>

Implied %Δ in C at 10th percentile of benefits
-4.4% -4.8% -7.0% -18.3% -19.9% -13.0% -20.6% -20.1% -13.8% -28.2% -26.7% -21.9%

Implied annual Δ in C at 10th pctile of benefits
-282 -112 -147 -1262 -396 -1593 -762 -828 -2044 -1183 -996

Demographic vars.? Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
State dummies? No No No Yes Yes Yes Yes Yes Yes Yes Yes
Earnings spline? No No No No No No No No No Yes Yes
R² 0.1338 0.1082 0.2316 0.3857 0.3884 0.4589 0.4294 0.3966 0.4612 0.4684 0.4166 0.4684

Notes: All values are deflated into 1992 dollars using the appropriate component of the CPI-U. Consumption data are measured weekly to be consistent with WC benefits. All regressions have 248 observations and include dummies for the year of injury. Standard errors are corrected for clustering at the state level. Demographic controls include age, education, race, and gender.
Table 4  
Effect of WC Benefits on Likelihood of Becoming Injured On the Job  
(Results from selection probit; Standard errors in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Average derivative</th>
<th>Probit coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log potential weekly WC benefit (1992 $)</td>
<td>0.0033 (0.0038)</td>
<td>0.0729 (0.0828)</td>
</tr>
<tr>
<td>Log after-tax weekly wage t-1 (1992 $)</td>
<td>-0.0046 (0.0026)</td>
<td>-0.0996 (0.0056)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0002 (0.0002)</td>
<td>-0.0040 (0.0049)</td>
</tr>
<tr>
<td>Male</td>
<td>0.0122 (0.0027)</td>
<td>0.2587 (0.0548)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.0087 (0.0032)</td>
<td>-0.1720 (0.0582)</td>
</tr>
<tr>
<td>Less than high school</td>
<td>0.0088 (0.0032)</td>
<td>0.1729 (0.0574)</td>
</tr>
<tr>
<td>More than high school</td>
<td>-0.0105 (0.0023)</td>
<td>-0.2553 (0.0639)</td>
</tr>
<tr>
<td>White</td>
<td>0.0021 (0.0056)</td>
<td>0.0468 (0.1308)</td>
</tr>
<tr>
<td>Black</td>
<td>-0.0033 (0.0060)</td>
<td>-0.0763 (0.1469)</td>
</tr>
<tr>
<td>Household size t-1</td>
<td>0.0002 (0.0010)</td>
<td>0.0034 (0.0210)</td>
</tr>
<tr>
<td>Change in household size</td>
<td>-0.0007 (0.0015)</td>
<td>-0.0156 (0.0318)</td>
</tr>
<tr>
<td>State unemployment rate</td>
<td>-0.0022 (0.0024)</td>
<td>-0.0474 (0.0517)</td>
</tr>
<tr>
<td>State-year housing index</td>
<td>-0.0001 (0.0001)</td>
<td>-0.0017 (0.0024)</td>
</tr>
<tr>
<td>Year dummies?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State dummies?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*a* Standard errors are corrected for dependence between repeated observations on the same individuals. 

*b* For consistency with the consumption-change regressions, I include only observations from 1992-94, 1994-96, and 2000-02.
Table 5
Consumption-smoothing Effects of WC According to Pre-Injury Asset Level
(Results from reduced-form regressions of equation (1); Standard errors in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Assets &lt; 25th Percentile</th>
<th>Assets &gt; 25th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food + Housing</td>
<td>Food</td>
</tr>
<tr>
<td>(Without control for real assets)</td>
<td></td>
<td>0.0277</td>
</tr>
<tr>
<td></td>
<td>(0.226)</td>
<td>(0.622)</td>
</tr>
<tr>
<td>Log potential weekly WC benefit</td>
<td></td>
<td>-22.2%</td>
</tr>
<tr>
<td>(With control for real assets)</td>
<td></td>
<td>0.403</td>
</tr>
<tr>
<td></td>
<td>(0.251)</td>
<td>(0.702)</td>
</tr>
<tr>
<td>Log potential weekly WC benefit</td>
<td></td>
<td>-29.1%</td>
</tr>
</tbody>
</table>

N 65 183

a For this sample, the 25th percentile of the distribution of net household assets is $6547.40 (in 1992 dollars). All values are deflated into 1992 dollars using the appropriate component of the CPI-U.
b All regressions include the (log) after-tax weekly wage in t-1, demographic controls, state and year dummies, state-year unemployment rates and housing price indices. Standard errors are corrected for clustering at the state-year level.
Table 6
The Effects of Workers’ Compensation Benefit Generosity on the Duration of Claims

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent Variable and Sample</th>
<th>Elasticity of Claim Duration with Respect to Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butler and Worrall (1985)</td>
<td>Length of claims for low-back injuries in Illinois</td>
<td>0.2 - 0.4</td>
</tr>
<tr>
<td>Krueger (1991)</td>
<td>Length of claims for all injuries in Minnesota in 1986</td>
<td>&gt;1.5</td>
</tr>
<tr>
<td>Meyer, Viscusi, and Durbin (1995)</td>
<td>Length of claims for all injuries in Kentucky and Michigan in the early 1980s</td>
<td>0.3 - 0.4</td>
</tr>
<tr>
<td>Neuhauser and Raphael (2004)</td>
<td>Duration of temporary total disability claims in California before and after 1994 and 1995 benefit increases (0.6 to 0.8 with selection correction)</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Table 7
Optimal Workers’ Compensation Benefit Calculations

(Optimal Benefit Level Calculated Using Regression Results from Model 3)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base Case $(\varepsilon_{D,b}=0.3)$</td>
<td>Case 2 $(\varepsilon_{D,b}=0.4)$</td>
</tr>
<tr>
<td>1.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.5</td>
<td>0.128</td>
<td>0</td>
</tr>
<tr>
<td>2.0</td>
<td>0.277</td>
<td>0.128</td>
</tr>
<tr>
<td>2.5</td>
<td>0.366</td>
<td>0.247</td>
</tr>
<tr>
<td>3.0</td>
<td>0.425</td>
<td>0.326</td>
</tr>
<tr>
<td>3.5</td>
<td>0.468</td>
<td>0.383</td>
</tr>
<tr>
<td>4.0</td>
<td>0.500</td>
<td>0.425</td>
</tr>
<tr>
<td>4.5</td>
<td>0.524</td>
<td>0.458</td>
</tr>
<tr>
<td>5.0</td>
<td>0.544</td>
<td>0.485</td>
</tr>
</tbody>
</table>

(Optimal Benefit Level Calculated Using Regression Results from Model 4)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>Base Case $(\varepsilon_{D,b}=0.3)$</td>
<td>Case 2 $(\varepsilon_{D,b}=0.4)$</td>
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<tr>
<td>1.5</td>
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<td>2.5</td>
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<td>0.343</td>
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<td>0.400</td>
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<tr>
<td>5.0</td>
<td>0.558</td>
<td>0.515</td>
</tr>
</tbody>
</table>

$^a$ For both the Baily (1978) and Chetty (2006) optimal benefits formulas, the underlying utility function is assumed to be of the CRRA form with coefficient of relative risk aversion $= \gamma$. The coefficient of relative prudence, used in calculating the Chetty (2006) optimal benefit level, is simply $\rho = \gamma + 1$. 