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CENTER FOR HEALTH AND SAFETY IN THE WORKPLACE

Identifying Permanently Disabled Workers with Disproportionate Earnings Losses for Supplemental Payments

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Prepared for the California Commission on Health and Safety and Workers' Compensation

This research was sponsored by the California Commission on Health and Safety and Workers' Compensation and was conducted in the RAND Center for Health and Safety in the Workplace, a research center of RAND Justice, Infrastructure, and Environment.

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Preface

In September 2012, the State of California adopted Senate Bill 863, a sweeping reform of the state's workers' compensation system. The goal of the bill was to contain medical costs for injured workers while restoring some of the permanent disability benefits that had been lost from previous reform efforts. The bill made many changes to the disability benefit system, one of which was the creation of a "return-to-work program." This program, which is to be funded at $120 million per year, would provide supplemental payments to injured workers whose permanent disability benefits are disproportionately low in comparison to their earnings loss. The bill provided the Director of the Department of Industrial Relations (DIR) wide leeway in the design and implementation of the program. In addition, the bill required the Director, in consultation with the California Commission on Health and Safety and Workers' Compensation (CHSWC), to determine eligibility and the amount of payments to be made based on a study. This study, funded by CHSWC, represents RAND's efforts to help DIR and CHSWC in developing a methodology for the eligibility determination and benefit amounts for the new Return-to-Work program. This work builds on many previous RAND efforts to help CHSWC, DIR, and the State of California improve the adequacy and efficiency of the workers' compensation system through research and analysis.

About the RAND Center for Health and Safety in the Workplace

The RAND Center for Health and Safety in the Workplace is dedicated to reducing workplace injuries and illnesses. The center provides objective, innovative, cross-cutting research to improve understanding of the complex network of issues that affect occupational safety, health, and workers' compensation. Its vision is to become the nation's leader in improving workers' health and safety policy. Program research is supported by government agencies, foundations, and the private sector.

The center is housed in the RAND Safety and Justice Program, which addresses all aspects of public safety and the criminal justice system, including violence, policing, corrections, courts and criminal law, substance abuse, occupational safety, and public integrity. The center also draws on the expertise in RAND Health, one of the most trusted sources of objective health policy research in the world.

Questions or comments about this report should be sent to the project leader, Seth Seabury, an Associate Professor at the University of Southern California and adjunct economist at RAND (seabury@usc.edu). For more information on the RAND Center for Health and Safety in the Workplace, see http://www.rand.org/jie/centers/workplace-health-safety.html or contact the director (chsw@rand.org).

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The return-to-work program is designed to provide supplemental payments to injured workers whose permanent disability benefits are disproportionately low compared to their earnings loss. In exploring ways to best implement this program, we sought to determine how to identify the workers who should be eligible for the benefit, how to identify, compare, and calculate pre-injury and post-injury earnings, how to calculate payment amounts, and whether the program could be designed to minimize any adverse work incentives that might arise.

We determined that despite some shortcomings, the only practical alternative to calculate losses is to compare the earnings of an individual injured before their injury to their earnings after their injury. We further determined that eligibility criteria based on actual earnings should focus on the earnings in the post-injury period for a sufficient period of time after the date of injury to allow for the effects of the injury to be realized. We utilized the fourth year after the date of injury in our analysis because the typical benefits case is resolved two to three years after injury. Averaging over this time period, when workers are receiving benefits, could be more subject to manipulation in the sense that workers could take additional time off work to increase their potential award. It is possible that if claimants know the fourth year will be utilized to assess these benefits, some might take additional time off during that year to increase their benefits.

Based on these findings, we make the following recommendations:

- Base program eligibility on the failure of an employer to provide a qualified offer of return to work.
- Determine the amount for the supplemental payment according to the difference between actual earnings loss and expected earnings loss, which could help address an inequity wherein replacement of lost earnings is lowest for workers with the lowest disability ratings.
- California should monitor the likely take-up of the supplemental benefit as the pool of potentially eligible workers is better understood, and to adjust the eligibility requirement and benefit levels accordingly to ensure program solvency, because of the study's unavoidable limitations in attempting to project the likely number of eligible beneficiaries.

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Abbreviations

AMA Guides	American Medical Association's *Guides to the Evaluation of Permanent Impairment*
CHSWC	Commission on Health and Safety and Workers' Compensation
DEU	Disability Evaluation Unit
DIR	Department of Industrial Relations
EDD	Employment Development Department
FEC	future earnings capacity
PD	permanent disability
PPD	permanent partial disability
SJDB	supplemental job displacement benefit
TTD	temporary total disability
WCIRB	Workers' Compensation Insurance Rating Bureau

1. Introduction

In the early 2000s, California workers' compensation insurance premiums were skyrocketing and the system was in crisis. Plagued by high costs and inefficiency, this prompted a sweeping reform bill in April 2004 that, among other things, dramatically changed the way individuals with permanent partial disability (PPD) claims were compensated. In particular, the 2004 reform bill (California Senate Bill 899, 2004) required disability ratings to be based on the fifth edition of the American Medical Association's *Guides to the Evaluation of Permanent Impairment* (Cocchiarella and Andersson, 2001). The AMA Guides are measures of functional impairment based on "objective" clinical evidence, and are thought to be less subjective than the old California system. In addition to adopting the AMA Guides, SB 899 also required the use of empirical data on earnings losses to determine benefit levels. The purpose of these adjustments was to correct for inconsistencies that were found between disability ratings and earnings loss estimates across different types of injuries (Reville et al., 2005). The earnings loss estimates were applied to the disability ratings through what are called future earnings capacity (FEC) adjustments. These FEC adjustments were multipliers from 1.1 to 1.4, depending on the type of injury. For a period, costs fell and the system appeared to be stabilizing.

Then, in the late 2000s, there were two developments that increased pressure for further reform. The first was that premiums began to rise once more, largely driven by rising costs associated with the provision of medical care for injured workers. The second was a growing body of evidence that the 2004 reforms had led to a dramatic cut in PPD benefits for disabled workers. Even after the FEC adjustments, disability ratings (and thus disability benefit levels) were significantly less on average than the ratings under the old schedule, and replacement rates of lost income fell by 26 percent after the reforms (Seabury et al., 2011). Given past evidence showing that California already had questionable benefit adequacy under the old benefit levels (Peterson et al., 1998), there was concern that the effort to cut costs had imposed considerable burden on injured and disabled workers.

In September 2012, California adopted SB 863, which was an attempt to contain medical costs for injured workers while restoring some of the PPD benefits that had been reduced. The bill made many changes to permanent disability (PD) benefits, including: the elimination of the FEC variable; prohibited compensation based on certain controversial types of injuries (e.g., sexual dysfunction or sleep disorder); and various adjustments to administrative aspects of the system, such as the timing of PD advances. Importantly, the reform also created a "return-to-work program" to be funded at $120 million per year that would provide supplemental payments to injured workers whose PD benefits are disproportionately low in comparison to their earnings. The bill provided the director of the Department of Industrial Relations (DIR) wide leeway in the design and implementation of the program. In addition, the bill required the DIR director and the

California Commission on Health and Safety and Workers' Compensation (CHSWC) to determine eligibility and the amount of payments to be made based on a study.

Designing a program to implement these provisions has some inherent challenges. How does one define the term disproportionate? How does one identify the workers who should be eligible for the benefit? How does one identify, compare, and calculate pre- injury and post-injury earnings? How does one calculate the amount of the payment? Can the program be designed to minimize any adverse work incentives that might arise? The purpose of this report, which was funded by the CHSWC, is to consider some of these issues and offer some recommendations about the design of the program. Additionally, some very preliminary empirical estimates are offered about the potential number of beneficiaries and program costs under alternative scenarios. Note that our focus here is primarily the design of eligibility criteria and the implications for costs given a fixed benefit level. The actual level of benefits is an important, but separate, policy question, and we do not directly address it here.

In the next chapter, we describe some of the policy challenges that arise with the program design and offer our recommendations about how they might be addressed. Chapter 3 provides some simple empirical analysis to try to predict the number of beneficiaries and program costs under different possible eligibility rules. The report concludes with some final remarks, including a discussion of the limitations of the analysis.

2. Policy Challenges in Designing the Return to Work Program Benefit

SB 863 (2012) introduced a number of provisions that were designed to increase benefits for injured workers, including an increase in the amount of wages that can be considered for benefits, and fixing the variable earnings component at a higher rate. Still, there was concern that some workers were not being adequately compensated by the PD benefit because they had earnings losses that deviated significantly from what was expected. To address this potential inequity, the bill also created a new program to provide additional payments to workers whose losses exceed what would have been expected given the nature of their injuries.

SB 863 added Section 139.48 to the California Labor Code, which reads as follows:

> (a) There is in the department a return-to-work program administered by the director, funded by one hundred twenty million dollars ($120,000,000) annually derived from non-General Funds of the Workers' Compensation Administration Revolving Fund, for the purpose of making supplemental payments to workers whose permanent disability benefits are disproportionately low in comparison to their earnings loss. Moneys shall remain available for use by the return-to-work program without respect to the fiscal year.
>
> (b) Eligibility for payments and the amount of payments shall be determined by regulations adopted by the director, based on findings from studies conducted by the director in consultation with the Commission on Health and Safety and Workers' Compensation. Determinations of the director shall be subject to review at the trial level of the appeals board upon the same grounds as prescribed for petitions for reconsideration.
>
> (c) This section shall apply only to injuries sustained on or after January 1, 2013.

As written, the law provides considerable leeway to DIR to design and implement the program. However, it does require that the program be designed based on empirical evidence about the earnings losses of injured workers. Specifically, both the eligibility for the supplemental payments and the amount of the payments are to be grounded in data.

In general, a system for compensating injured and disabled workers should be designed to be as adequate, equitable, and efficient as possible, while still maintaining affordability. These terms are defined and discussed in more detail in past work (Berkowitz and Burton, 1987; Reville et al., 2005). The appropriate level of adequacy is difficult to define in this context, as the legislature offered little guidance about the level of benefit for any particular beneficiary, simply defining an aggregate spending level. For that reason, we focus on the eligibility criteria, and their implications for program equity and efficiency.

Broadly speaking, in the context of this policy, it seems an equitable benefit should provide the most compensation to workers whose losses exceed the benefit amounts by the largest

margin. That said, the benefit should also be designed to minimize the potential for an adverse effect on work incentives. In this section, we outline several issues that need to be addressed to implement this benefit according to these principles.

We discuss five distinct policy challenges and/or issues that we feel directly pertain to the benefit design:

- Determining the basis for calculating earnings losses
- Identifying the time period over which to evaluate losses
- Tying benefits to a return to work
- Relating the new benefits to the disability rating system
- Monitoring and updating the benefit system as new information becomes available.

Determining the Basis for Calculating Actual Earnings Losses

In its current form, the California workers' compensation system assigns PPD benefits according to disability ratings, which incorporate clinical and other considerations and assess the likely impact of a disabling condition on labor market outcomes. In this sense, California attempts to assess the expected losses of an individual and assign benefits accordingly.

The term "earnings loss," as it has been used in prior RAND research, refers to the difference between what someone would have earned in the absence of an injury and their actual, post-injury earnings. The term "potential earnings" has often been used to refer to the earnings an injured worker would have made had no injury occurred. However, as has been stressed many times in past work, potential earnings represent a hypothetical concept that cannot be directly measured, it must be estimated. Past RAND work has estimated potential earnings using the measured earnings of uninjured, matched "control" workers, and subtracted the injured workers' measured post-injury earnings to estimate earnings loss. However, this approach is only valid statistically when applied to large samples of injured workers—there is no practical method to estimate true earnings losses for any individual person. From a design standpoint, this is an inherent challenge that cannot be easily overcome, for the actual earnings losses of an individual due to disability are intrinsically impossible to measure.

Thus, the only practical alternative is to compare the earnings of an individual injured before their injury to their earnings after their injury.[1] There are two problems with measuring earnings losses in this way. One is that it attributes all differences in earnings before and after the injury to the injury itself. However, earnings are not static—people's earnings rise and fall for many reasons: They get promoted, retire, cut back on hours, earn a bonus, and so on. On average,

[1] The focus on comparing pre-injury and post-injury is based on the DIR's interpretation of Section 139.48 as intending that supplemental compensation be directed to workers whose actual earnings losses exceed the expected earnings losses associated with their PD ratings. Our understanding based on discussions with DIR is that the actual experience of individual workers requires some form of retrospective evaluation, or pre-post comparison, and precludes other adjustments based on expected losses.

comparing the earnings of a randomly selected person who is working today to their earnings several years later will show they have higher earnings today (because factors such as retirement, unemployment, or dropping out of the labor force tend to dominate on average). RAND has shown this many times in discussions of the data used to construct earnings loss estimates (see, for example, Peterson et al., 1998). Thus, we expect that comparing pre-injury and post-injury earnings will tend to overestimate earnings losses on average.

The second problem with this approach is that it promotes adverse work incentives. Earnings losses are not purely independent of individual behavior—an injured worker could mechanically drive their own earnings losses up by remaining out of work and earning no wages. An advantage of the prospective system California employs with the PD rating system is to avoid this incentive to stay out of work (the kind of incentive that is inherent to "wage loss" benefit systems). The extent to which tying benefit levels to an injured worker's actual experience may influence behavior will depend on many factors, including the size of the benefit. However, in general, the system will be more efficient whenever the design is better able to offset or minimize this kind of negative incentive.

Identify the Period Over Which to Observe the Actual Loss Experience of Injured Workers

While expected losses are "forward looking"—meaning, they project losses that will occur—a person's actual losses can only be measured after they have been realized. That is, we can only compare pre-injury and post-injury earnings after an individual has actually accumulated their post-injury earnings; thus, we cannot know that an individual's losses exceed what is expected until those losses are actually realized.

This implies that eligibility criteria based on actual earnings needs to focus on the earnings in the post-injury period for a sufficient period of time after the date of injury to allow for the effects of the injury to be realized. Past RAND work suggests it takes three to five years after the date of injury for earnings losses to stabilize (Reville et al., 2005). Given this time frame, this suggests that an eligibility determination based on actual earnings losses would likely need to focus on earnings that occur several years after the date of injury (or the date at which the injury is determined to have become permanent).

An obvious consequence of this requirement is that if eligibility can only be determined several years after an injury, then compensation can only be paid out several years after an injury. One possible advantage of this is that focusing on a period several years after the date of injury could help alleviate some of the adverse work incentives of the program. That is, if eligibility is determined over a lengthy and/or uncertain period of time after the date of injury, it will be less likely to influence an individual's behavior in the moment. That said, one could certainly imagine scenarios—e.g., an older worker who is approaching normal retirement age in the post-injury period—that could be particularly sensitive to the incentives posed by the benefit.

Tying Benefit Levels to Offers of Return to Work

Past work by RAND and others has demonstrated that early and sustained return to the at-injury employer is among the best available predictors of whose earnings losses exceed the expected amount (Reville et al., 2005). This suggests that an individual's return to work, or lack thereof, would be a natural factor to consider in the eligibility for a benefit. However, basing eligibility on whether a worker actually returns to work with their at-injury employer provides significant adverse incentives for injured workers, in the sense that it gives workers the incentives to refuse return-to-work offers. While most workers would probably prefer to return to their job even if it meant lower disability benefits, some workers on the margin might be affected by the adverse work incentives inherent in such a system.

One way to avoid such adverse work incentives is to base eligibility on the failure of an employer to provide a qualified offer of return to work. This approach, which is often used in workers' compensation (for example, in two-tier PPD benefit systems), has the value of capturing the signal of poor outcomes without giving workers perverse incentives. This helps both the adequacy and efficiency of the system. Given this, a useful benefit eligibility requirement might be to peg eligibility to the offer of return to work by the at-injury employer, as is done with the supplemental job displacement benefit (SJDB).

We utilize the fourth year after the date of injury in our analysis because the typical benefits case is resolved two to three years after injury. Averaging over this time period, when workers are receiving benefits, could be more subject to manipulation in the sense that workers could take additional time off work to increase their potential award. It is possible that if claimants know that the fourth year will be utilized to assess these benefits, some might take additional time off during that year to increase their benefits. In general, any system that bases awards on the actual labor market experience of claimants could be subject to some manipulation.

Relationship to Disability Ratings

An obvious question that arises is whether and how the supplemental payments should relate to PD ratings that workers receive. For example, should workers with very low ratings, or no rating at all, be eligible for the benefit? Certainly a worker with a disability rating of 0—or a very low disability rating of, say, 1 to 5—who is not working several years after an injury has higher-than-expected earnings losses. It is certainly possible that there could be factors related to an injury that are difficult to incorporate into the disability rating and could lead to significant earnings losses even with relatively few clinical signs of physical impairment. On the other hand, in such

cases it is often difficult to verify the causality of the injury and its effect on outcomes, and this could make such cases susceptible to abuse.[2]

Another question is whether the amount of the benefits should be related to the level of the disability rating. Prior RAND research has consistently shown that replacement of lost earnings in California is lowest for workers with the lowest disability ratings (Peterson et al., 1998; Reville, 1999; Reville et al., 2001). Determining the amount for the supplemental payment according to the difference between actual earnings loss and expected earnings loss could help address this inequity. That is, it will systematically assign the highest payments to those with the largest disproportion between actual losses compared to their expected losses and reduce the payments to those whose earnings losses are more nearly replaced by compensation benefits.[3] This would suggest that the size of the supplemental payment would, on average, be inversely proportional to the disability rating.

The Eligibility Criteria and Benefit Design Should Be Monitored and Updated as New Information Is Received

Perhaps the biggest challenge in designing a system is that many of the elements that will ultimately determine participation, and thus program cost, are uncertain. Even with well-defined eligibility criteria, current data allow for relatively rough estimates of the potential take-up. And the behavioral responses to these eligibility requirements—i.e., the labor-supply response to a new benefit—are unknown and unknowable. Thus, there is a difficult balancing act to determine eligibility requirements and benefit levels that meet the goal of improving benefit adequacy without putting an undue stress on system costs.

However, one of the advantages in the way the program is being designed is that payments will not be made until a sufficient time has passed to monitor lost earnings, implying there is time to collect new information and project potential benefit take-up. Given the limitations with attempting to prospectively estimate the likely number of eligible beneficiaries, an exercise that is inherently uncertain and subject to error, it would be preferable for California to monitor the likely take-up of the supplemental benefit as the pool of potentially eligible workers is better understood, and to adjust the eligibility requirement and benefit levels accordingly to ensure

[2] Past RAND work has shown that a nontrivial fraction of workers with even low-rated claims fail to return to work and have high earnings losses (see, for example, Seabury, Neuhauser, and Nuckols, 2013). In principle, the process of matching injured workers to noninjured workers is designed to capture unobserved differences unrelated to the actual injury that could be generating these losses. Nevertheless, as with any empirical estimator, one cannot rule out with certainty the possibility that some other factor (such as sample selection among injured workers or data limitations) actually generated those estimated losses.

[3] We accomplish the reduction of payments replaced by workers' compensation benefit by examining within disability ratings in our analysis, since the benefits should be fairly comparable, on average, within ratings.

program solvency. For example, suppose benefit eligibility was tied to SJDB take-up.[4] Monitoring SJDB receipt as the eligibility period nears could improve eligibility estimates and potentially allow for updating the regulations as needed to ensure that the aggregate payment amounts do not significantly exceed or undercut the targeted levels.

[4] The SJDB is a voucher that funds worker efforts at vocational rehabilitation. To be eligible, the worker must: (1) have an injury that resulted in PD, (2) be unable to return to work within 60 days after the last payment of temporary disability, and (3) not be offered modified or alternative work by the employer of injury. Not everyone eligible for the SJDB necessarily receives it.

3. Empirical Analysis

There are two key empirical items that we address in this report to offer some preliminary estimates of potential program eligibility and cost. The goal of the program, as described by statute, is to provide supplemental payments to workers whose PD benefits are disproportionately low in comparison to their earnings loss. That means that to determine eligibility, there needs to be some empirical estimate of expected losses that are contemplated by the PD award, and some determination of what exceeds the expected amount by a sufficient level to merit a supplemental payment. Additionally, the statute provides a set budget that is available for the supplemental payments. Thus, some estimate of the frequency of expected take-up is required to be able to determine benefit levels that result in aggregate payment amounts consistent with the legislation.

To assist in the design of the program, this study pursues the following empirical goals:

1. Estimate the expected decline in actual earnings of permanently disabled workers after an injury.
2. Estimate the expected number of workers who would be eligible for payments in the new program—based on assumptions about program design—and the payment levels and aggregate expenditures under different scenarios.

Estimate the Post-Injury Decline in Earnings

We first estimate the observed decline in earnings after an injury for PPD recipients in the California workers' compensation system.

Data

This study used data on workers' compensation PPD claims from the California Disability Evaluation Unit (DEU) database, a repository of all PPD claims in California that receive a disability rating from the DEU. Earnings data come from the California Employment Development Department (EDD), which maintains quarterly earnings records for the state unemployment insurance system. We include all workers matched between the two databases who received a PD rating under the California rating system adopted on January 1, 2005, and who had earnings information for four years after the date of injury as of the time of data extraction. These data have been used in prior studies about the economic outcomes of disabled workers in California in the 2000s, and are described in more detail there (Seabury et al., 2011; Seabury and McLaren, 2010; Seabury et al., 2013). It is important to note here that a disadvantage of using the earnings data from EDD is that it does not include all earnings from an individual over time. Importantly, wages would appear to be zero if, for example, an individual

retired or moved out of state, even though, in reality, this would not be the case. As such, we will overestimate the losses of individuals in our data.

We kept working-age individuals from 18 to 64 who had a positive (greater than zero) final rating in the data extraction. By "final rating," we mean the rating that included all adjustments for statutory provisions, including age, occupation, and apportionment for nonoccupational disability. We did not include the now-defunct FEC adjustments that were made under SB899.

While the bulk of our analysis uses the DEU data, we also run some analyses with information on earnings linked to data from the Workers' Compensation Insurance Rating Bureau (WCIRB), a nonprofit organization that collects data from licensed workers' compensation insurance carriers in California and uses the information to compute recommended premium rates for the California Department of Insurance. The data we use comes from the Uniform Statistical Reporting Plan, which includes information on the date of the injury that led to the claim, the indemnity benefits, defense costs, and medical costs (paid and incurred), as well as detailed information about the nature and severity of the injury that led to a claim. In particular, the WCIRB data include claim-level information on all PD claims and all temporary disability claims with costs of $2,000 or more (small temporary claims and medical-only claims are reported as a group). We use the DEU data for our primary analysis because the inclusion of self-insured firms makes it more representative of the California labor market. However, the WCIRB has information on some temporary disability claims with no PD, which we will use to compare the differences in pre-injury and post-injury differences in earnings for cases that don't involve PD.

Methods

For the purposes of this study, we take disproportionately low benefits relative to losses to indicate that a worker has higher-than-expected losses for a given disability rating. To apply this and implement an eligibility threshold could mean requiring that the observed decline in earnings be higher than the expected value, or it could mean that the observed decline must exceed the expected value by some preset level.

In principle, people's pre-injury earnings should not be affected by their injury. However, in some cases, there will be correlation between injury severity as measured by ratings and pre-injury earnings (e.g., workers in lower paying jobs might have more severe injuries on average). To eliminate confounding differences between ratings and pre-injury and post-injury earnings that are unrelated to injury severity, we adjusted for confounding variables (including age, occupation, employer size, industry, region of the state, age at injury, body part injured, and whether the injury involved multiple body parts) using multivariate regression. Conceptually, we can think of this as adjusting earnings so that we can compare the people across disability ratings. The appendix of this report provides a more detailed discussion of these regressions.

All dollar values are reported in 2011 dollars that were normalized using the Consumer Price Index published by the U.S. Bureau of Labor Statistics. Because the actual earnings losses are

calculated over a wide range of time, it is important that the pre-injury earnings amounts be normalized to current dollar values at the time the benefits are being calculated, otherwise the calculation would understate the eligibility levels (by a potentially significant amount, depending on the rate of inflation).

There is an important conceptual difference between the difference in pre-injury and post-injury earnings and past RAND estimates of earnings loss (Bhattacharya et al., 2009; Peterson et al., 1998; Reville et al., 1999; Reville et al., 2001; Seabury et al., 2011). Using matched sets of uninjured control-group workers can, under the right assumptions, identify the change in earnings that was *caused by the injury*. Simply comparing pre-injury and post-injury earnings cannot do this, even averaged across large samples of people, because the pre-injury and post-injury difference includes many confounding factors that can lead to changes in earnings (e.g., retirement, leaving the state). Thus, estimates of the change in earnings that are reported here are very different than the earnings loss estimates in past studies.

Results

Table 1 describes the sample sizes in our data by disability rating. As mentioned, we examine within disability ratings, as the benefits that an individual receives should be fairly consistent within the ratings groups. This allows us to examine these losses in absolute, rather than examine the exact benefits that each worker receives. The majority of cases in our sample have relatively low ratings, with 9,525 cases (48 percent) having a rating of less than 15. The second and third columns report the number and percent of cases, respectively, in which the disabled worker was not employed by the at-injury employer in the ninth quarter after the date of injury. A majority of workers (57 percent) are not employed by the third year after the date of injury. While much of this is likely due to factors other than injury—for example, 23 percent of the matched control-group uninjured workers are not with the at-injury employer after three years—this does indicate the potentially large pool of workers that could be eligible for the benefit.

Table 1. Sample Sizes by Disability Rating

Disability Rating	Number of Records	Not at the At-Injury Employer in Quarter 9 After Injury		Workers Receiving the SJDB (%)
		Number	%	
1 to 4	2,313	1,005	43.5	5.9
5 to 9	3,788	1,862	49.2	13.6
10 to 14	3,424	1,792	52.3	13.2
15 to 19	2,672	1,536	57.5	21.3
20 to 24	1,893	1,173	62.0	29.2
25 to 29	1,412	914	64.7	35.7
30 to 34	1,033	694	67.2	29.7
35 to 39	824	582	70.6	33.8
40 to 44	668	488	73.1	38.0
45 to 49	508	358	70.5	38.6
50 to 54	336	247	73.5	41.7
55 to 59	242	188	77.7	29.0
60 to 64	194	153	78.9	44.0
65 to 69	118	82	69.5	45.5
70 to 74	87	72	82.8	33.3
75 to 79	75	56	74.7	50.0
80 to 84	49	36	73.5	50.0
85 to 89	37	30	81.1	0.0
90 to 94	19	17	89.5	50.0
95 to 99	17	11	64.7	0.0
All workers	19,709	11,296	57.3	20.2

Note: This table reports the number of records in the DEU sample by disability rating, overall, and for workers who are not observed with any earnings from the at-injury employer in the ninth quarter after injury. The percent of workers receiving the SJDB is based on information provided by the WCIRB, and does not come directly from the DEU data.

The fourth column of **Table 1** reports the fraction of individuals receiving the SJDB as reported by the WCIRB. Approximately 20 percent of PPD claimants in California receive the SJDB.[5] Not surprisingly, this rate is lower for workers with lower ratings and better return-to-work outcomes, and increases to 40–50 percent for workers with severe ratings.

If the SJDB is used to determine benefit eligibility, with additional criteria added on, this might suggest that 20 percent would be the maximum number of workers we would expect to be eligible for this program. However, this assumes that there are no workers who could receive the SJDB if they were more motivated to pursue it. Anecdotally, there is a perception that the SJDB is widely underutilized as a benefit. For example, the old California vocational rehabilitation program that was repealed in the early 2000s had similar eligibility requirements—in terms of a requirement of not returning to work—but was considered more generous in the sense that it offered cash benefits, and it had approximately double the utilization rate (40 percent). Given the relatively low rate of SJDB receipt but the relatively high rate of workers who are not with the

[5] The WCIRB data only cover workers at insured firms. Self-insured firms tend to be associated with improved return-to-work outcomes for injured and disabled workers, so applying the WCIRB receipt rates likely overestimates the total SJDB receipt.

at-injury employer for those with low ratings (Table 1), it seems there is considerable potential for benefit receipt to exceed the SJDB utilization. In the models of cost we present below, we will consider up to twice the SJDB utilization to account for this possibility.

The estimated relationship between pre-injury and post-injury earnings is presented in **Table 2**. The first column provides the expected post-injury earnings in the fourth year after the date of injury by disability rating. We utilize the fourth year after the date of injury as it currently has the least possibility for manipulation, but as the program progresses it should consider using an average over the four years post-injury. Post-injury earnings are lower for people with higher ratings because they are less likely to work—and, if working, tend to have lower-paying jobs. The second column is the average earnings in the pre-injury period. This is constant across groups because pre-injury earnings are not affected by the injury based upon the assumptions in our model.[6]

Table 2. Average Difference in Pre-Injury and Post-Injury Earnings by Disability Rating

Disability Rating	Post-Injury Earnings ($)	Pre-Injury Earnings ($)	Average Decline in Post-Injury Earnings* (%)
1 to 4	31,673	45,853	30.9
5 to 9	30,366	45,853	33.8
10 to 14	28,927	45,853	36.9
15 to 19	27,412	45,853	40.2
20 to 24	25,893	45,853	43.5
25 to 29	24,395	45,853	46.8
30 to 34	22,878	45,853	50.1
35 to 39	21,336	45,853	53.5
40 to 44	19,834	45,853	56.7
45 to 49	18,363	45,853	60.0
50 to 54	16,798	45,853	63.4
55 to 59	15,301	45,853	66.6
60 to 64	13,837	45,853	69.8
65 to 69	12,265	45,853	73.3
70 to 74	10,812	45,853	76.4
75 to 79	9,306	45,853	79.7
80 to 84	7,789	45,853	83.0
85 to 89	6,112	45,853	86.7
90 to 94	4,835	45,853	89.5
95 to 99	2,937	45,853	93.6
All workers	26,536	45,853	42.1

NOTE: The pre-injury earnings are calculated over the year prior to injury. The post-injury earnings are calculated for the fourth year after injury.

* For comparison, a sample of injured workers with no PD has shown 33.5-percent decline, and two samples of uninjured workers have shown declines of 15.0 percent and 16.4 percent. See Table 3.

[6] We have done some tests comparing pre-injury wages to injury severity and found a volatile but nonsystematic relationship. Using a single average helps smooth some of this variability across ratings groups (which we think are driven more by sample size than real differences in earnings).

The proportional losses are defined as the percent decline in post-injury earnings compared to pre-injury earnings.[7] For example, consider workers with ratings from 1–4 (the first row). These workers earned about $31,673 in the fourth year after the date of injury. Workers had average earnings of $45,853 in the year prior to injury. So the expected earnings loss for workers with a rating of 1–4 is about 31 percent, calculated as 100*(1-[post-injury earnings/pre-injury earnings]).

These estimates were based on the difference between full pre-injury and post-injury earnings. Workers' compensation benefits are typically set as a fraction of earnings subject to a cap. An alternative approach to that explored here would be to only include earnings below the level that reached some cap, either the temporary total disability (TTD) or PPD caps. The TTD cap for 2012 corresponds to annual earnings of $78,820 ($1,516 per week), and only affects a small share of workers. Thus, applying this cap has little impact on estimates of the difference between pre- injury and post-injury earnings on average. However, the PPD cap for 2012 corresponds to annual earnings of just $22,620 ($435 per week) and affects a large share of workers. Therefore, applying the PPD cap would significantly lower the difference in pre-injury and post-injury earnings, because all individuals except the most severely injured would be affected in the pre-injury and post-injury periods. While we do not explicitly examine the implications of applying these caps on program eligibility or cost, intuitively, it would restrict the number of eligible beneficiaries, particularly among higher-income workers.

The observed change in pre-injury and post-injury losses is quite large, much more so than found in prior work using these same data (Seabury et al., 2011; Seabury et al., 2013). Even for comparatively minor cases with disability ratings of 1–4, the estimated decline in earnings exceeds 30 percent. To better understand the extent to which losses are inflated by the use of actual earnings, as opposed to estimating earnings losses with the more rigorous methods used in prior work, **Table 3** compares pre-injury and post-injury earnings according to different levels of injury severity. The top panel reports the findings for the DEU sample. The first and second rows report pre-injury, post-injury, and the percent difference for all disabled workers, and for disabled workers with a disability rating of 1–4, respectively, as reported in **Table 2**. The third row reports pre-injury and post-injury earnings for uninjured control-group workers.[8] We can see that even for uninjured workers, the post-injury earnings are lower by a significant margin (15 percent). This is due primarily to attrition of workers from the EDD database over time (e.g., because of retirement, exiting the labor force, moving).

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[7] We adopt a proportional earnings method of analysis because, in principal, the absolute measure is regressive and less equitable, in the sense that workers with higher earnings by definition tend to have higher earnings losses.

[8] Obviously, uninjured workers have no actual date of injury to compare earnings across. However, the uninjured workers we consider are all matched to injured workers, so the date we use for the injury is based on the injury dates for their matched, injured workers.

Table 3. Difference in Pre-Injury and Post-Injury Earnings by Severity of Injury

	Post-Injury Earnings ($)	Pre-Injury Earnings ($)	Average Decline in Post-Injury Earnings (%)
		DEU Sample	
All permanently disabled workers	26,536	45,853	42.1
Workers with 1 to 4 disability ratings	31,673	45,853	30.9
Matched uninjured controls	38,650	45,454	15.0
		WCIRB Sample	
All permanently disabled workers	16,591	32,612	49.1
Workers with temporary injuries but no PD	25,065	37,674	33.5
Matched uninjured controls	28,209	33,731	16.4

NOTE: The table reports the average pre-injury and post-injury earnings in the DEU and WCIRB samples. The shaded rows represent the control groups. See text for more details on the differences between the two samples.

The bottom part of **Table 3** uses data from the WCIRB linked to the EDD, which (as already noted) contains information on workers with temporary disabilities. The three rows in this panel report information on the pre-injury and post-injury earnings differences for all permanently disabled workers in the WCIRB data, all workers with temporary disability but no PD, and matched control-group uninjured workers. The PD claimants in the WCIRB sample experience a decline of 49.1 percent in earnings in the post-injury period.[9] Workers with temporary disability but no PD experience losses of 33.5 percent, which is higher even than the low-rated claims in the DEU sample. Finally, for the uninjured workers matched to the WCIRB sample, the average decline is 16.4 percent. The fact that even workers without significant PD all display a significant decline in post-injury earnings shows that this method overestimates the effect of permanent disabilities on earnings, on average. Given the focus of the statute on actual earnings losses, this is, to our mind, the most practical choice to implement the return-to-work supplement. Nevertheless, the values of estimated losses obtained from this method should be interpreted with care, because much of the estimated decline appears to be due to factors other than the individuals' disability.[10]

Despite these limitations, the estimates in **Table 2** could be used to determine eligibility based on whether an individual's post-injury decline equaled or exceeded the threshold. Using this standard, a worker with a rating of 1–4 would need to be earning at least 31 percent less in the fourth year post-injury than they were earning before the injury to be able to receive any payment.

[9] The WCIRB data only include workers at insured firms, which are smaller on average and exclude public sector employees. This explains why these workers have lower pre-injury earnings and higher losses (Reville et al., 2001; Seabury et al., 2011).

[10] Additionally, the matching approach or some other, similarly rigorous, approach remains the preferred method for assessing the adequacy of workers' compensation benefits.

The extent to which this limits eligibility depends in part on how many individuals exceed the threshold. **Table 4** reports the percent of workers not with the at-injury employer in the ninth quarter whose post-injury decline in earnings exceeds the expected amount. We limit the sample to workers not with the at-injury employer because these workers are more likely to receive the SJDB and be eligible for benefits. Note that the vast majority of workers (about 85 percent) exceed the expected earnings threshold. Given the relatively low rate of return to the at-injury employer, it is probably not surprising that a significant share of individuals exceed the threshold level. These workers also experience very high losses. The second column shows that, conditional on exceeding the threshold, the post-injury decline in earnings is about 92 percent.

Table 4. Outcomes for Workers with Greater than Average Decline in Earnings

	Sample: Workers Not with the At-Injury Employer in the Ninth Quarter After Injury	
Disability Rating	Percent of Workers Not with the At-Injury Employer Whose Losses Exceed the Overall Average Losses (%)	Average Decline in Earnings for Workers Not with the At-Injury Employer Whose Losses Exceed the Average (%)
1 to 4	77.6	86.8
5 to 9	82.2	87.9
10 to 14	83.7	89.3
15 to 19	84.2	91.4
20 to 24	85.5	92.6
25 to 29	87.9	93.8
30 to 34	88.1	94.6
35 to 39	87.7	95.6
40 to 44	88.0	96.8
45 to 49	88.8	96.7
50 to 54	89.2	97.9
55 to 59	91.8	98.3
60 to 64	92.2	99.0
65 to 69	87.8	99.2
70 to 74	94.5	98.5
75 to 79	94.5	99.2
80 to 84	89.0	99.8
85 to 89	86.2	99.5
90 to 94	83.3	99.8
95 to 99	89.1	100.0
All Workers	84.9	91.9

Note: The table reports the fraction of workers and the average losses for workers whose losses exceed the overall average losses and who are not with the at-injury employer in the ninth quarter after injury. Note that the overall average losses are defined using both workers who do and do not return to the at-injury employer.

An alternative approach to limiting eligibility for this subsample would be to set some higher threshold—say, based on the 75th percentile of earnings. However, this approach is limited because so many workers who do not return to the at-injury employer have a post-injury decline in earnings of close to 100 percent. In the sample, 54 percent of individuals who are not with the at-injury employer in the ninth quarter after injury have 0 earnings in the EDD database in the fourth year after injury—so they would have 100-percent post-injury decline in earnings. Even

for workers with comparatively low ratings of 1–4, 38 percent have no earnings in the fourth year after injury. This offers little variation in earnings losses above the average to set a higher threshold.[11]

Estimates of Program Cost Under Alternative Benefit Scenarios

To model program eligibility and cost, we need to make a few assumptions. These include:

- A fixed annual program budget of $120 million as described in the statute
- All $120 million of the remaining amount would be spent
- 60,000 PPD cases per year.

Changing any of these parameters will alter the estimates. For example, if the number of PPD cases were to expand, it would increase the number of beneficiaries and decrease the amount available per beneficiary (given a fixed budget). Also, the estimate reported here focuses only on the direct cost of benefit payment amounts, and ignores any administrative costs or other costs that might be associated with the program.

Table 5 provides the expected number of payment recipients and average supplemental payment amount under four hypothetical scenarios. There are two alternative eligibility criteria considered: (1) that it is based solely on receipt of the SJDB, or (2) that it is based on receipt of the SJDB and a post-injury decline in earnings that equals or exceeds the levels reported in Table 2, given the disability rating.[12] Both of these are combined with an alternative assumption about SJDB receipt: (1) that it is equal to its current level, or (2) that the rate of receipt doubles because of increased take-up to gain access to the supplemental payment (roughly corresponding to take-up of the vocational rehabilitation benefit).

Table 5. Estimated Number of Beneficiaries and Average Payment Amount Under Different Eligibility Criteria

Eligible Population	SJDB Utilization	Number of Beneficiaries	Average Supplemental Payment
All workers who receive the SJDB	Current Levels	12,120	$9,901
	Vocational Rehabilitation Levels	24,240	$4,950
Workers who receive the SJDB with above-average decline in earnings	Current Levels	10,290	$11,662
	Vocational Rehabilitation Levels	20,580	$5,831

[11] In alternative specifications, we predicted the 75th and 67th percentile decline in earnings, meaning the declines that exceeded those of 75 percent and 67 percent of the sample, respectively. The 75th percentile was essentially a 100-percent decline, while the 67th percentile was an 87.3-percent decline.

[12] This assumes that the two probabilities are independent; that is, the percentage of those who have above-average earnings losses is the same for SJDB recipients as for all injured workers.

For each scenario, the table reports an estimate of the number of beneficiaries and the average payment that yields $120 million in total payments. For example, the first row of Table 5 assumes a 20-percent SJDB take-up rate, as reported in Table 1. Next, we multiply the 20-percent rate by the potential 60,000 PPD assumed earlier, yielding approximately 12,120 cases eligible for the fund. If we then assume that 100 percent of the $120 million is paid during the year, then each worker will receive $120 million/12,120 workers, which equals $9,901. Given the fixed budget, there is an obvious tradeoff between more-generous eligibility criteria that provides benefits to more people, or more-restrictive eligibility criteria that leads to higher benefits per person. In the table, the number of expected recipients ranges from 10,290 to 24,240, while the average payment ranges from $4,950 to $11,662.

4. Conclusion

With this report, we have outlined one potential method of identifying workers whose PD benefits are disproportionately low in comparison to their earnings loss We have proposed to define those workers as workers whose earnings losses are disproportionately high relative to what would be expected based on their disability ratings. In particular, we focused on workers who are not observed working for their at-injury employer and who experience greater-than-average losses given a disability rating. Using a series of assumptions, we attempt to forecast the number of workers eligible for the benefit and the average dollar amount each worker could receive while still maintaining aggregate benefit levels within the amount specified in legislation. Ultimately, the more restrictive the eligibility criteria for the payments, the fewer beneficiaries there are, thus providing larger average payments per beneficiary (e.g., comparing the first and second rows in Table 5 with the third and fourth rows). There is an inherent trade-off between the number of recipients and the size of the benefit, as long as the benefit program is to maintain solvency and not lead to an increase in workers' compensation costs.

It is important to stress that the work here was subject to a number of limitations. In particular, the estimates of benefit levels and the number of beneficiaries are uncertain and should be viewed as preliminary. Given the uncertainty in the program design, it is difficult to provide more precise estimates. Even with the program design fixed, however, there are several sources of uncertainty that prevent more refined estimates. One is a lack of post-injury income other than earnings reported to the EDD. An individual's actual post-injury income will include many sources that are not reported to the EDD (e.g., retirement or disability benefits). Because these are ignored in this work, it is likely that the estimates here overstate the post-injury decline in earnings and overstate the number of potential beneficiaries. This source of uncertainty could be addressed by obtaining better documentation of earnings (e.g., individual tax returns) when the program is implemented. Otherwise, all analyses would suffer from relying solely on EDD data. Another source of uncertainty is the potential behavioral response by workers as a result of the new payment. We used a very wide range of potential beneficiaries—double—to capture this effect, but it could be improved over time as the use of the SJDB is monitored. Finally, while the aggregate benefit level is fixed in the statute ($120 million), key factors such as the number of injured workers and economic conditions vary over time. Without knowing how many injuries there will be, and how many of those injuries will be significant enough to lead to economic losses large enough to make someone eligible for this program, it is impossible to predict exactly what the aggregate program cost will be.

Appendix

To eliminate potential confounders, we use multivariate regression to adjust both pre-injury and post-injury wages. Specifically, we regress cumulative discounted pre-injury earnings over the four quarters prior to injury on:

- age at the time of injury
- occupation
- the size of the at-injury employer
- industry, two-digit Standard Industrial Classifications
- region of the state
- body part injured
- whether an injury involved multiple body parts.

To adjust the cumulative discounted earnings over the four quarters in the fourth year of injury, we use the covariates mentioned, as well as rating category and cumulative discounted pre-injury wages.

After running these regressions, we predict the earnings for each worker based on the regression model with all covariates held equal to their mean values for injured workers. Finally, we calculate the relative earnings by taking 100*(1-[post-injury earnings/pre-injury earnings]).

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