Disability Management, Employee Health and Fringe Benefits, and Long-Term-Disability Claims for Mental Disorders: An Empirical Exploration

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THE BENEFIT COSTS OF LONG-TERM-DISABILITY insurance claims for mental disorders have been a major concern in recent years in both the public and private sectors. In the public sector, beneficiaries with mental disorders (excluding retardation) increased from 22.7 percent to 26.4 percent of all Social Security Disability Insurance (DI) disabled worker beneficiaries over the period 1989 to 1997 (U.S. Social Security Administration 1990; 1998). In the private sector, a recent survey of insurers indicated that 9.0 percent of all claims for group long-term-disability (LTD) insurance and 13.1 percent of the dollar cost of all claims were the result of mental disorders (Health Insurance Association of America 1995).

On a per claim basis, mental disorder claims for LTD are reported to be more costly than claims for other disorders. Serious mental disorders tend to have earlier ages of onset and are more persistent than many disabling conditions; thus, they tend to result in longer periods

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of disability (Rupp and Scott 1995). Moreover, return from disability status to work may be more difficult for persons with mental disorders. In a recent survey of large private-sector employers, 53 percent of respondents reported that obstacles to returning to work were in fact greater for these employees; the employers most frequently cited employee reluctance to return (74 percent) and their own uncertainty about how to create a supportive work environment (30 percent) (Mercer 1998).

Recent studies of disability costs in the private sector have emphasized the importance of recognizing the full range of costs associated with disabilities (including productivity losses, sick pay, and disability benefits) and the potential for reducing these costs through disability management activities (Owens 1997). As a consequence of this broader view of disability costs, employers are looking more closely at disability management strategies, particularly at ways to integrate disability management programs. For example, among the large employers surveyed by the Washington Business Group on Health, the percent reporting integrated disability management increased from 26 to 42 in a single year (Watson Wyatt–Washington Business Group on Health 1999). Recent reports from several large employer-based programs suggest that disability management programs can play an important role in controlling the costs of disabilities that are attributable to mental disorders (Austin 1996; *PR Newswire* 1998).

Although individual case reports can demonstrate promising management strategies, available literature does not provide broad-based empirical evidence on the relative importance of the many factors that affect employers' LTD claims experience: local economic conditions; LTD policy provisions; disability management practices; and the fringe benefits package provided by the employer. The purpose of this study is to begin an empirical exploration. We report the results of an exploratory investigation of the factors that influence employers' LTD claims experience for mental disorders. We focus on two components of LTD claims experience: (1) the incidence of paid claims; and (2) the LTD benefit payments per paid claim. Our analysis of claims incidence uses employer-level data on the characteristics of all employees covered by the LTD policy. Our analysis of payments per claim uses data on the characteristics of the individual claimant and his or her disability as reported in individual claims.

Methods

Conceptual Framework: Determinants of Paid Claims Rates

We conceptualize the outcome of a paid LTD claim for a mental disorder as the result of six different sets of factors:

1. social and demographic characteristics of the employee, including characteristics of his or her job
2. the physical and financial accessibility of mental health and health services and benefits
3. the provisions of the LTD policy that covers the employee
4. other available fringe benefits and disability compensation sources
5. the disability management policies and practices of the employer
6. the characteristics of the employee's workplace and community

The specific variables contained in each set are listed in table 1.

A schematic view of the process that generates a paid claim is shown in figure 1. The first steps are the occurrence of a mental disorder (box A) and the recognition of this disorder by the employee (box B). Data on the epidemiology of mental disorders show that the risk of occurrence depends upon the employee's sociodemographic characteristics (Robins and Regier 1991). The literature also indicates that many mental health disorders remain unrecognized and untreated by health care professionals and that mental health services continue to be an "unmet need" (Robins and Regier 1991; Kessler, McGonagle, Zhao, et al. 1994). The probability that a disorder will be recognized depends on physical and financial access to treatment. We expect that employees with more complete insurance coverage or closer proximity to mental health specialty care are more likely to have their mental disorders recognized.

The consequences of a mental disorder depend upon its severity (fig. 1, box C). Because our focus is on *long-term* disability claims, which involve waiting (elimination) periods from disability onset to benefits of about 140 days on average (see table 1), it is important to consider *both* severity at initial onset *and* severity following early treatment (prior to the end of the waiting period). Severity at initial onset may be related to the same sociodemographic risk factors that influence relative risk of occurrence

TABLE 1
Variable Definitions and Summary Statistics

Variable	Description	Firm data (n = 473) Mean	Firm data (n = 473) SD	Claims data (n = 407) Mean	Claims data (n = 407) SD
	Number of psychiatric disability claims	0.5285	1.1788	—	—
	Paid claims amount	—	—	29,793.46	72,606.48
	Log of paid claims amount	—	—	9.3512	1.4373
Social and demographic characteristics					
FEMALE	Fraction of covered employees who are female	0.5196	0.2109	—	—
MALE	Claimant is male	—	—	0.2924	0.4554
AGE $\leq$ 35	Fraction of covered employees age 35 years or younger	0.3632	0.1294	—	—
AGE > 50	Fraction of covered employees age over 50 years	0.1840	0.0861	—	—
AGE	Age of claimant at date of disability	—	—	41.99	10.00
AVSAL	Average salary of covered employees	29,801.34	11,398.77	—	—
LSALARY	Log salary	—	—	7.8534	0.5325
OCCWC	Fraction of covered white-collar employees	0.8186	0.1988	—	—
OCCBL	Fraction of covered skilled blue-collar employees	0.0570	0.1086	—	—

OCCU	Fraction of covered unskilled blue-collar employees	0.0420	0.0663	—	—
INJRATE	Rate of occupational injuries per 100 full-time employees by industry type	5.9499	4.2916	5.2127	4.3079
Availability of mental health/health services and benefits					
PSYPOP	Psychiatrists per 1,000 in MSA/county	0.0550	0.0685	0.0699	0.0804
EAP	Firm has an employee assistance plan (EAP)[a]	0.7167	0.4511	0.8747	0.3315
ECONMD	EAP staffed by outside contractor as part of medical or mental health benefits contract[a]	0.1099	0.3131	0.1327	0.3396
HIMHDED	Fraction of health plans offered with high mental health deductible or individual deductible (>$600)[a]	0.0443	0.1517	0.0606	0.1709
GHCOV	Fraction of total (inpatient and outpatient) general health expenditures covered[a,b]	0.8066	0.1079	0.8363	0.1049
MHCOV	Fraction of total (inpatient and outpatient) mental health expenditures covered[a,b]	0.6220	0.1357	0.6364	0.1363
MHGHRAT	Fraction of total mental health expenditures covered divided by fraction of total general health expenditures covered[a,b]	0.8143	0.1919	0.8041	0.1829

(*continued*)

TABLE 1 *continued*

Variable	Description	Firm data (n = 473) Mean	Firm data (n = 473) SD	Claims data (n = 407) Mean	Claims data (n = 407) SD
Availability of mental health/health services and benefits (continued)					
MHCARVE	Fraction of health plans offered with mental health carveout[a]	0.1910	0.3585	0.1980	0.3228
HMO	Fraction of health plans offered that are HMOs[a]	0.2900	0.3497	0.3785	0.3591
FFS	Fraction of health plans offered that are fee-for-service plans[a]	0.3179	0.3899	0.2821	0.3666
MPREEX	Waiting period (mos.) for health plan coverage of preexisting conditions[a,b]	6.7886	5.6652	5.6978	5.2938
LTD policy characteristics					
LT	Policies with long-term own occupation definition	0.2918	0.4551	0.1769	0.3821
ELMPRD	Elimination period, in days	139.30	49.59	133.79	56.62
CONTRIB	Policies where employee pays part of premium	0.3476	0.4504	0.3243	0.4687
LE24LMT	Policies with benefit time limit for psychiatric claims ≤ 24 months	0.9239	0.2655	—	—
MAXDUR	Maximum duration of plan benefits, in months	—	—	60.98	103.71

MAXBEN	Maximum monthly benefit amount (per 1,000)	8.2593	4.9571	—	—
LBASBFT	Log of monthly basic benefit amount paid to claimant	—	—	6.2613	2.6561
MISSBFT	Monthly basic benefit amount information not reported	—	—	0.1474	0.3550
Other benefits/compensation					
MAXWC	Maximum weekly Workers' Compensation benefit in state	464.79	102.94	419.53	81.50
STD	Firm offers formal short-term disability benefits[a]	0.7082	0.4551	0.8452	0.3622
RET	Firm contributes to retirement plan for employees[a]	0.8943	0.3078	0.9459	0.2264
INFSTD	Firm offers informal STD but no formal STD benefit[a]	0.0592	0.2362	0.0442	0.2059
DIAWPC	Average annual (1988–92) psychiatric SSDI awards per population in state (1,000s)[c]	0.1487	0.0524	0.1399	0.0439
DIAW	Average annual (1988–92) psychiatric SSDI awards per applicant in state[c]	0.7083	0.0669	0.7117	0.0602
LTDMED	Firm offers continuing group medical coverage for employees on LTD[a]	0.5814	0.4939	0.7518	0.4325
WCSUP	Firm supplements Workers' Compensation with other benefits[a]	0.4376	0.4966	0.6143	0.4874

(*continued*)

TABLE 1 *continued*

Variable	Description	Firm data (n = 473) Mean	Firm data (n = 473) SD	Claims data (n = 407) Mean	Claims data (n = 407) SD
Disability management					
DMANMBEN	Office that manages disability benefits also manages medical benefits[a]	0.7611	0.4269	0.6732	0.4696
DCONMBEN	Outside disability-management contract includes medical benefits or mental health benefits[a]	0.0761	0.2655	0.1646	0.3713
DCONEAP	Outside disability-management contract includes EAP[a]	0.0444	0.2062	0.1327	0.3396
DCONWC	Outside disability-management contract includes Workers' Compensation claims review[a]	0.1332	0.3401	0.1597	0.3668
MGFL	Front-line manager responsible for disability management[a]	0.1543	0.3617	0.1081	0.3109
CHGBK	Disability costs are charged back to individual departments[a]	0.1416	0.3491	0.0958	0.2947
MGCHGBK	Front-line manager responsible for disability management and the claims are charged back to individual department[a]	0.0359	0.1863	0.0369	0.1886

MWP	Firm has transitional/modified work program for employees on Workers' Compensation or LTD[a]	0.5708	0.4955	0.6216	0.4856
JOBACLIV	No. of different types of job accommodations in last 5 years per covered lives[a]	0.0043	0.0108	0.0019	0.0024
JOBCHG	Firm has policy of offering different jobs to employees on disability leave if they are unable to resume previous job[a]	0.3784	0.4855	0.3563	0.4795
SUPSTD	Employee's manager reviews STD claims and/or return-to work plans[a]	0.2220	0.4160	0.1646	0.3713
Workplace/community characteristics					
SUNEMPL	State unemployment rate	5.79	1.23	6.42	1.58
FGRIEV	Firm has formal grievance procedure[a]	0.6279	0.4839	0.7199	0.4496
SUNION	Union coverage for salaried employees[a]	0.0634	0.2440	0.0737	0.2616
EXPAND	No. of employees increased >15% because of expansions in past 5 years[a]	0.2326	0.4229	0.1720	0.3778
LAYOFF	No. of employees decreased >15% because of layoff or 5% because of mergers in past 5 years[a]	0.1860	0.3896	0.2015	0.4016

(*continued*)

TABLE 1 *continued*

Variable	Description	Firm data (n = 473) Mean	Firm data (n = 473) SD	Claims data (n = 407) Mean	Claims data (n = 407) SD
Workplace/community characteristics (*continued*)					
MIDWEST	Midwest region	0.3192	0.4667	0.1646	0.3713
SOUTH	Southern region	0.2960	0.4570	0.3366	0.4731
WEST	Western region	0.1586	0.3657	0.3243	0.4687
DENSITY	Ratio of Census population per land area in the county	3,616.67	10,236.92	2,568.53	7,385.99
LIVES	Covered lives, in thousands	0.67975[d]	—	3.9422	3.5914
Disability characteristics					
D296	ICD 296–affective psychosis	—	—	0.3907	0.4885
D300	ICD 300–neurotic disorders	—	—	0.3759	0.4850
D308	ICD 308–acute reaction to stress	—	—	0.0467	0.2112
D309	ICD 309–adjustment reaction	—	—	0.0663	0.2492
D310	ICD 310–specific nonpsychotic disorders caused by organic brain damage	—	—	0.0270	0.1624
WKREL	Work-related disability	—	—	0.1450	0.3525

[a]Variable from the employer survey.
[b]Averaged over all health plans offered by the employer.
[c]Excludes combined SSDI/SSI awards and applications.
[d]Median covered lives per thousand.

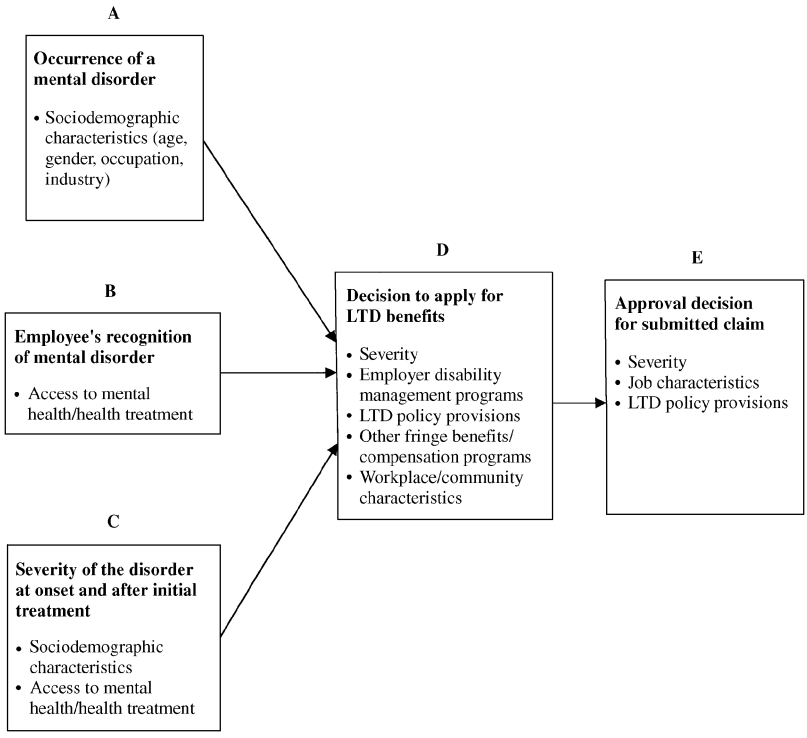

FIG. 1. Conceptual framework for determinants of paid claims rates.

in the epidemiologic literature. However, in view of strong evidence for the effectiveness of appropriate treatment (National Advisory Mental Health Council 1999), employees with greater access to specialty mental health care are expected to experience lower severity levels after initial treatment.

Once the employee experiences and recognizes a mental disorder and its associated level of severity, he or she decides whether or not to file an LTD claim for this disorder (fig. 1, box D). Following Rupp and Stapleton (1998), we assume that this decision is based on three factors:

1. the relative benefits (both financial and nonfinancial) of working versus not working
2. the costs of applying for benefits and the probability of receiving them
3. the availability of other benefit payments that either substitute for or complement LTD benefits

The benefits of working depend upon several factors: severity (which affects the employee's productivity at work and ability to tolerate the stress of the workplace); the employer's disability management practices (which can promote on-the-job productivity through appropriate accommodations); workplace characteristics that affect the quality of "natural" supports for employees with disabling conditions; and labor-market conditions in the community that affect job security. The benefits of not working depend upon the LTD policy's benefit and waiting-period provisions and the availability and generosity of other compensation sources.

Finally, approval of a submitted claim depends largely on three considerations: severity of the disorder; the employee's job characteristics (which, in combination with severity, determine the extent of *occupational* disability); and the provisions of the LTD policy (e.g., exclusions for waiting periods, definitions of disability) (fig. 1, box E). Empirically, the number of unpaid claims is relatively small, and the large majority of reported reasons for nonpayment correspond either to administrative factors (such as contractual exclusions or determinations that disabilities are not occupation related) or to amelioration of the disorder before the end of the elimination period.

Conceptual Framework: Determinants of LTD Benefit Payments per Claim

The benefit payments made for an individual claim can be viewed as the product of the duration of the claim in months multiplied by the average payment per month. Like the initial decision to file a claim, duration is influenced by the relative benefits of returning to work versus remaining on LTD leave. This leads us to hypothesize that the determinants of duration will be the explanatory factors in box D of figure 1. In general, we expect these factors to have the same direction of influence on duration as they exert on the claims rate. For example, more generous benefit provisions or greater availability of supplementary compensation should increase duration. Similarly, greater severity implies a reduced probability of improvement in the disorder or return to work, and thus longer duration.

Of course, other explanatory variables, noted in figure 1, may also predict the course of the disorder and thus affect duration. For example, greater access to mental health specialty treatment may promote earlier recovery and return to work, and thus, shorter duration and lower claim

costs. Occupation and industry characteristics that render a job more difficult for an employee with a mental disorder may also complicate the employer's ability to accommodate the employee's early return to work. Other potentially important factors influence the probability of returning to work: (1) the quality and appropriateness of the initial treatment received for the disorder; and (2) the extent to which stigma is associated with mental disorder in the eyes of coworkers (Link 1982).

The average LTD benefit payment per month will depend upon the LTD policy provisions, the employee's salary, and the existence of offsetting sources of compensation, such as DI.

Empirical Approach

Although our conceptual framework focuses on the decisions of individual employees and the claims they file, our empirical examination of factors affecting claims *rates* will be conducted at the level of the employee group. Data on sociodemographic characteristics and access to mental health/health treatment were only available to us as group averages, rather than as characteristics of individual covered employees. In our analysis of payments per claim, however, data on the employee receiving benefits, his or her disability, and other relevant factors in our model are available at the individual level; thus, we conduct this analysis based on individual claims data rather than on employer averages.

Constraints on our data also do not allow us to attempt a structural model of each element of our conceptual framework. One central concept (severity) is not directly observable in our data, and suitable proxies for severity are not available. Instead, we adopt a "reduced form" approach, in which our outcome variables are specified as general functions of all the explanatory factors listed in figure 1, with the exception of severity. In effect, we replace severity in our structural model with its determinants, which are listed in figure 1, box C. (In our analysis of payments per claim, an additional set of explanatory factors pertaining to the characteristics of the employee's disability is also included; these are, at best, imperfect proxies for severity.)

Note that our reduced-form approach complicates the interpretation of results. Explanatory factors listed in box C, which are potential determinants of severity, will have measured impacts on our dependent variables that are the sum of (1) their *direct* effects (holding severity constant) and (2) their *indirect* effects, operating through their impact on severity.

It is also noteworthy that, in our analysis of payments per claim, we only observe data on disabilities for which claims have in fact been filed and paid. Thus, in this analysis, we are dealing with a selected set of disabilities. This tends to create a correlation between unobserved severity and any explanatory factor that affects the claims rate. For example, if higher LTD benefits increase claims rates by encouraging employees to file claims for relatively less serious disabilities, it implies a negative correlation between LTD benefits and (unobserved) severity in our payment per claim analysis. (Empirical support for this correlation in Workers' Compensation claims is provided by Ruser [1998].) Then the estimated impact of the LTD benefit level in our model of payment per claim will be the sum of a direct (presumably positive) impact on payment per claim and an indirect (presumably negative) impact operating through a negative correlation with unobserved severity. (Results based on a statistical strategy to control for these indirect effects due to correlation with unobserved severity are also discussed below.)

Study Population and Data

Employers in this study met the following inclusion criteria: (1) an LTD policy in effect during the period 1993 through 1995 with UNUM Corporation, a major provider of LTD insurance coverage; and (2) at least 300 employees covered under this policy at some time during that three-year period. A total of 1,441 employers was identified as meeting these criteria. During the period from July, 1996, to January, 1997, we mailed to 1,433 of these employers a survey regarding their disability management practices and employee benefit plans; we followed up the mailing with several rounds of telephone requests. (A few multiemployer benefit trusts or groups that met the above criteria were excluded from the survey because their representatives did not have direct knowledge of employer disability-management practices.) A total of 278 responses was received; of these, 250 respondents provided detailed information on employee health benefits.

In addition to survey data, UNUM records supplied us with information at the employer level on the characteristics of the LTD plan in effect, on basic employer characteristics (e.g., location, type of industry), and on the occupational and demographic characteristics of employees covered under the LTD policy. Employers with missing data on LTD policy characteristics were dropped from the analysis.

Data on 244 employers are included in the analysis of claims incidence; for 229 of these employers, data are available for both 1994 and 1995. For the remaining 15 employers, only data for 1995 are available, so our total study sample consists of 473 employer-years of data. One or more claims were reported in 28 percent of these cases.

Descriptive statistics for all explanatory variables for the 473 employer-year data points in our study are presented in table 1. (Additional information on the construction of variables and data sources is provided in Appendix B.) The data indicate that the median number of employees covered was 680 and that covered employees were predominantly white-collar workers, under the age of 50, and evenly divided by gender. An additional job characteristic is our measure of industry type: the annual rate of occupational injuries per 100 employees as reported by the U.S. Bureau of Labor Statistics (BLS). This rate could be viewed as a proxy for the extent to which an industry is blue collar versus white collar; it ranges from a low of 0.6 for financial services to a high of 21.9 for some subsectors of manufacturing. Location characteristics were measured by dummies for U.S. Census regions, and by population density in the county as an indicator of urbanization. Substantial numbers of employers in our analysis were represented in each of the four Census regions.

Complete data for our analysis of individual claims were available for 407 individual claims, drawn from 118 employers, for disabilities that began in calendar years 1993 through 1995. Descriptive statistics on these claims, including employee, employer, LTD policy, and community characteristics, are presented in the last two columns of table 1. International Classification of Diseases (ICD) diagnostic information on the claims indicate that 39.07 percent were for ICD code 296—affective psychoses (which includes major depression)—and 37.59 per cent were for ICD code 300—neurotic disorders (which includes anxiety and phobic disorders). Relatively few claims were coded for drug or alcohol dependence (less than 3 percent) or for schizophrenic disorders (less than 1 percent). Because of the higher incidence rate of mental disorder claims among women, only 29.2 per cent of claimants in our data set are male.

Dependent Variables

The dependent variable in our analysis of claims incidence at the employer level is the number of claims for disabilities beginning in a calendar year that have actually been paid or approved for payment. In our

analysis of payments per claim, the dependent variable is the amount of LTD benefits actually paid plus any amount reserved for future payments of claims that were still open at the time of our data extraction (July, 1997). Note that payments from other sources, such as Workers' Compensation or DI, are "offsets" to LTD claims payments and are not included in our dependent variable. The mean dollar payment for the 407 claims in our analysis is $29,793.

Regression Models

We estimate claims incidence models based on maximum-likelihood Poisson regression. We assume that the expected number of claims is proportional to the number of covered employees under the employer's LTD contract for that year. In the payments models for individual claims, the dependent variable is entered in logarithmic form, and ordinary least-squares regression is employed. In all models, robust standard error estimates (Rogers 1993) are presented, which account for within-employer clustering because each of our analyses contains multiple observations for many employers.

Survey data are only available for one year; thus, the estimated relations between employer-level explanatory variables based on these data and our dependent variables are essentially cross-sectional in nature. If these explanatory variables are themselves influenced by the LTD mental disorder claims incidence rate, our estimated coefficients may contain simultaneity bias. The most likely source of such bias concerns the mental health benefits variables. If firms with higher LTD claims incidence for mental disorders tend to provide more generous mental health benefits because they perceive a greater need for mental health services, coefficient estimates for variables that indicate more (less) generous mental health coverage will tend to be biased in a positive (negative) direction in our incidence regressions. It is also possible that higher claims incidence encourages adoption of disability management programs; this implies that the corresponding coefficient estimates for these programs will tend to be biased in a positive direction. It is important to be cognizant of the possible biases in these estimates in interpreting our results; we will return to this point in our conclusion. (Note, however, that our dependent variable does not include any short-term-disability [STD] claims or the 90 percent of LTD claims that are not for mental disorders. Because a very large portion of overall disability costs is *not* directly related to our

dependent variable, we expect that the simultaneity bias in our estimates is small. This comment also applies to other employer-level variables in our analysis that are not mental health specific, such as the STD and retirement variables.)

Results

Claims Incidence

Results for the Poisson regressions on numbers of paid claims are shown in table 2. Analogous results for a negative binomial model were virtually identical to our Poisson results, so we only report the Poisson results. Note that the number of covered employees (LIVES) is included as a proportional factor in the model, so the estimated coefficients for the remaining variables can be interpreted in terms of their effects on incidence *rates* of paid claims.

We report the estimated proportionate effect of a one-unit change in each explanatory variable on the incidence rate in the columns labeled "IRR." Table 2 reports results for three different models: model 1 (in which all variables are included); model 2 (in which the variables with coefficient p-values ≥ 0.5 in model 1 are deleted); and model 3 (in which there is stepwise deletion from model 1). Although some instability in results is expected, because model 1 with 53 explanatory variables is estimated on 473 data points, most of the significant coefficient estimates are fairly stable across the three models.

Sociodemographic Risk Factors. Several risk-factor variables in our model are significant predictors of LTD claims rates. Although age effects are usually not significant, the incidence rate for female employees (controlling for other factors) is roughly three times larger than that for males. Employees who work in industries with high injury rates are significantly less likely to report that LTD paid claims for mental disorders. Among occupational groups, all other employees have lower claims rates than semiskilled employees (the omitted category), and there is some evidence that higher salaries are negatively related to claims rates.

Availability of Mental Health Services/Health Benefits. The two measures of geographic availability of mental health services in our models, the psychiatrist–population ratio (PSYPOP) and a 0–1 dummy for services within employee assistance plans (EAP), yielded differing results; the former had a significantly positive coefficient, and the latter

TABLE 2
Incidence-Rate Models

	Model 1			Model 2			Model 3		
Variable	Coefficient	IRR	$p > \|z\|$	Coefficient	IRR	$p > \|z\|$	Coefficient	IRR	$p > \|z\|$
Social and demographic characteristics									
FEMALE	1.10287	3.01279	0.035	1.23289	3.43114	0.010	0.95678	2.60330	0.035
AGE ≤ 35	0.76592	2.15097	0.701	—	—	—	—	—	—
AGE > 50	−1.23218	0.29166	0.677	—	—	—	−2.11264	0.12092	0.099
AVSAL	−6.69E-06	0.999993	0.541	—	—	—	−1.27E-05	0.999987	0.072
OCCWC	−1.88901	0.15122	0.027	−1.97263	0.13909	0.013	−1.95239	0.14193	0.007
OCCBL	−1.90456	0.14889	0.180	−2.31831	0.09844	0.113	−2.16321	0.11496	0.114
OCCU	−2.84745	0.05799	0.074	−2.85748	0.05741	0.022	−3.50598	0.03002	0.001
INJRATE	−0.03530	0.96532	0.060	−0.04541	0.95561	0.038	−0.04401	0.95694	0.013
Availability of mental health/health services and benefits									
PSYPOP	3.17385	23.89928	0.001	3.68500	39.84506	<0.001	3.46837	32.08452	<0.001
EAP	0.25208	1.28670	0.290	0.12432	1.13238	0.541	—	—	—
ECONMD	0.45208	1.57157	0.077	0.36998	1.44771	0.116	0.57980	1.78568	0.009
HIMHDED	1.53893	4.65960	0.003	1.55772	4.74797	0.001	1.60939	4.99974	<0.001
GHCOV	−1.64807	0.19242	0.647						
MHCOV	3.20486	24.65209	0.437	2.06684	7.89978	0.092	1.88329	6.57508	0.116
MHGHRAT	−2.40632	0.09015	0.481	−1.51087	0.22072	0.065	−1.43211	0.23880	0.068
MHCARVE	−0.54495	0.57987	0.032	−0.51176	0.59944	0.050	−0.58090	0.55939	0.017
HMO	0.03458	1.03519	0.916	—	—	—	—	—	—

FFS	−0.04622	0.95483	0.874	—	—	—	—	—	—
MPREEX	−0.03001	0.97044	0.091	−0.02222	0.97803	0.132	−0.03153	0.96896	0.025
LTD policy characteristics									
LT	−0.15994	0.85219	0.490	−0.14987	0.86082	0.482			
ELMPRD	−0.00226	0.99775	0.249	−0.00218	0.99783	0.195	−0.00337	0.99663	0.042
CONTRIB	0.35579	1.42731	0.066	0.35131	1.42093	0.029	0.31855	1.37514	0.040
LE24LMT	0.36667	1.44292	0.343	0.58696	1.79851	0.048	0.48688	1.62723	0.105
MAXBEN	−0.00752	0.99251	0.734	—	—	—	—	—	—
Other benefits/compensation									
MAXWC	0.00063	1.00063	0.419	0.00070	1.00070	0.305	—	—	—
STD	0.38596	1.47103	0.089	0.34039	1.40549	0.105	0.34272	1.40878	0.081
RET	0.55046	1.73404	0.067	0.46315	1.58907	0.102	0.57238	1.77249	0.032
INFSTD	0.37417	1.45378	0.387	0.37770	1.45893	0.331	—	—	—
DIAWPC	6.43144	621.0703	0.040	5.64950	284.14950	0.018	4.17437	64.99870	0.026
DIAW	−1.86513	0.15488	0.404	−1.21577	0.29648	0.463	—	—	—
LTDMED	0.39528	1.48480	0.053	0.27153	1.31197	0.106	0.34488	1.41182	0.046
WCSUP	0.05535	1.05691	0.757	—	—	—	—	—	—
Disability management									
DMANMBEN	−0.32424	0.72308	0.073	−0.26149	0.76991	0.118	−0.26625	0.76625	0.108
DCONMBEN	0.53399	1.70572	0.071	0.48957	1.63162	0.057	0.47883	1.61418	0.067
DCONEAP	−0.49772	0.60791	0.196	−0.77516	0.46063	0.006	−0.60097	0.54828	0.051
DCONWC	−0.14882	0.86172	0.603	—	—	—	—	—	—
MGFL	−0.45920	0.63179	0.109	−0.52473	0.59172	0.042	−0.54784	0.57819	0.031
CHGBK	0.34108	1.40647	0.174	0.21955	1.24551	0.409	—	—	—
MGCHGBK	−0.38046	0.68355	0.662	—	—	—	—	—	—
MWP	−0.03646	0.96420	0.815	—	—	—	—	—	—
JOBACLIV	8.30280	4035.13400	0.774	—	—	—	—	—	—

(*continued*)

TABLE 2 *continued*

	Model 1			Model 2			Model 3		
Variable	Coefficient	IRR	$p > \|z\|$	Coefficient	IRR	$p > \|z\|$	Coefficient	IRR	$p > \|z\|$
Disability management (*continued*)									
JOBCHG	−0.33893	0.71253	0.053	−0.30261	0.73889	0.043	−0.33489	0.71541	0.040
SUPSTD	−0.66655	0.51347	0.004	−0.66376	0.51491	0.004	−0.57775	0.56116	0.006
Workplace/community characteristics									
SUNEMPL	−0.01181	0.98826	0.893	—	—	—	—	—	—
FGRIEV	−0.12064	0.88636	0.563	—	—	—	—	—	—
SUNION	0.75354	2.12450	0.021	0.54209	1.71960	0.014	0.74339	2.10306	0.001
EXPAND	−0.08163	0.92161	0.686	—	—	—	—	—	—
LAYOFF	−0.01878	0.98139	0.928	—	—	—	—	—	—
MIDWEST	−0.12464	0.88282	0.699	—	—	—	—	—	—
SOUTH	0.08644	1.09029	0.779	—	—	—	—	—	—
WEST	0.36692	1.44328	0.241	0.29592	1.34436	0.151	—	—	—
DENSITY	1.95E-06	1.000002	0.833	—	—	—	—	—	—
LIVES	−0.00516	0.99486	0.900	—	—	—	—	—	—
CONSTANT	−5.84908	—	0.140	−7.88658	—	<0.001	−6.94077	—	<0.001
Chi-squared	271.54			198.53			186.73		

showed no effect. Note, however, that the result for PSYPOP could be more than a pure availability effect. Because psychiatrists' location decisions reflect market demand conditions, and cultural factors are strong determinants of the demand for mental health services, a high value of PSYPOP may merely be a proxy for areas where demand is high and residents are more likely to report and recognize mental disorders (Frank 1985). An additional dummy variable for firms that provided EAP services through an outside medical or mental health benefits contract (ECONMD) was significantly positive. Because the overall EAP dummy is not significant and only a small minority of firms report ECONMD = 1, it is conceivable that this result can be attributed to a selection effect; that is, a tendency of employers to contract EAP services with outside health providers when they face an elevated risk of mental disorders among employees.

Three of the six health plan variables are significant in the full model (model 1). The fraction of health plans with high deductibles for mental health services (HIMHDED) has a significantly positive coefficient, whereas the fraction of plans with mental health carveouts (MHCARVE) and the average preexisting-condition exclusion period (MPREEX) is significantly negative. Because case studies of mental-health carveout plans suggest that they increase access to specialty outpatient care, and other studies suggest that the demand for outpatient mental health care is responsive to financial incentives, the results for HIMHDED and MHCARVE suggest that greater access to outpatient specialty care tends to reduce the incidence of claims. An alternative interpretation is needed for the negative coefficient on MPREEX; one possibility is that its coefficient is picking up unmeasured selection effects (i.e., high-risk employees are attracted to employers with low values of MPREEX).

When a large number of insignificant variables is dropped from the regression (in models 2 and 3), two other health plan measures become significant: MHCOV and MHGHRAT. The negative sign on MHGHRAT implies that increasing general health coverage while holding mental health coverage constant tends to increase claims incidence. The effect of increases in MHCOV is described by its own coefficient plus the coefficient of MHGHRAT divided by the value of GHCOV. The magnitudes of the two coefficients imply that increasing mental health coverage reduces the claims rate for employers with less generous health coverage (GHCOV < 0.75), whereas for employers offering more generous health coverage, increases in MHCOV imply increases in claims rates.

LTD Policy Provisions. The strongest result for the LTD policy variables is the positive coefficient on contributory plans, which is consistent with our expectation that claims rates are higher when enrollment is optional. The elimination period has a small negative effect on claims; one additional day reduces claims rates by about 0.3 percent. Results for the limit variable (LE24LMT) are unstable but suggest higher rates for policies with strict duration limits. This result is also consistent with a selection effect.

Other Benefits/Compensation. The relation of LTD claims to other employee benefits is complex. Some results indicate that other benefits reinforce employees' economic incentives to go on LTD leave. Examples are the significantly positive coefficients for STD, retirement benefits (RETBEN), and LTD medical benefits (LTDMED). The strong positive coefficients for DI awards per capita in the state is of particular interest. The "availability" of DI benefits may vary from state to state for several reasons. Administration of the federal DI program by the states, including disability determination practices, is highly variable (U.S. Social Security Advisory Board 1998, ch. 3). Cultural attitudes about going on DI benefits may also vary across states. Our results are consistent with the view that when DI benefits are more readily available—because the disability determination process is less strict and/or being on DI benefits is more culturally acceptable—employees who are on short-term disability have a greater incentive to file an LTD claim and remain on disability while applying for DI benefits. (The importance of DI benefit availability is also supported by the fact that approximately one-third of all the claims in our analysis show subsequent receipt of DI benefits.)

Disability Management. Table 2 provides strong evidence that involvement of front-line managers in disability management tends to reduce claims incidence. Two of the three variables pointing to this factor (MGFL and SUPSTD) have significant, or nearly significant, negative coefficients in all models. The coefficient for one return-to-work policy dummy, which applies to employers who offer alternative jobs to employees on disability leave (DDJOBCHG), also is significantly negative. The organization of disability management responsibilities within the firm is also important in our results. Firms in which disability management is the responsibility of the same internal office that manages health benefits (DMANMBEN = 1) and firms that contract with outside disability managers that also provide employee assistance services

(DCONEAP = 1) had significantly lower claims rates. The opposite was true for firms that contracted with outside health and/or mental health plans to provide disability management services (DCONMBEN = 1). A possible explanation for the latter result is that such contractors may concentrate on managing health and mental health benefits, which are much larger in dollar terms than LTD benefits.

Workplace/Community Characteristics. Indicators of location, population density, and labor-market conditions were not significant. Among the workplace-characteristics variables, the only significant effect obtained is the positive coefficient for the salaried workers' union dummy.

Benefit Payments for Individual Claims

Results for our least-squares regressions on the logarithm of benefit payments for individual claims are presented in table 3. In comparison with our incidence-rate regressions, the number of highly significant explanatory variables is small. Several beneficiary characteristics (gender, age, and salary level) are significant predictors of payments, as are several of the LTD policy provisions (benefit levels and duration limits).

Results for our mental health/health services availability and benefits variables, and for our workplace/community-characteristics variables, show virtually no evidence of significant effects. The only exceptions are that payments are (1) higher for employers that offer HMO health plans to their employees and claim costs and (2) substantially lower in the West. Among the disability-characteristics variables, the indicator for work-related disabilities is strongly negative, presumably because the Workers' Compensation benefit offsets reduce LTD payments for these claims. Only one diagnostic group, acute reaction to stress (D308 = 1), is characterized by significantly less costly claims; as this is the only diagnosis in our study that is by definition acute (i.e., short-term), the negative cost coefficient is to be expected.

Results for the disability-management variables in table 3 are somewhat unstable and not highly significant. There are several major exceptions. We do observe fairly strong negative coefficients for firms with an outside disability-management contractor who also provides EAP services (DCONEAP = 1), and for employers that offer alternative jobs to employees on disability leave (JOBCHG = 1). Estimated coefficients for firms whose supervisors are involved in developing return-to-work plans or reviewing claims for STD (SUPSTD = 1) are strongly positive.

TABLE 3
Benefit Payments Regressions

	Model 1		Model 2		Model 3	
Variable	Coefficient	$p > \|t\|$	Coefficient	$p > \|t\|$	Coefficient	$p > \|t\|$
Social and demographic characteristics						
MALE	−0.62581	<0.001	−0.62905	<0.001	−0.60839	<0.001
AGE	0.01456	0.060	0.01681	0.031	0.01823	0.011
LSALARY	0.81702	0.023	0.77004	0.018	0.72194	0.032
INJRATE	0.00295	0.865	—	—	—	—
Availability of mental health/health services benefits						
PSYPOP	0.39849	0.642	—	—	—	—
EAP	0.20873	0.350	0.27934	0.127	—	—
ECONMD	0.22590	0.287	0.23134	0.170	—	—
HIMHDED	0.02811	0.948	—	—	—	—
GHCOV	0.41336	0.895	—	—	—	—
MHCOV	−0.48952	0.896	—	—	—	—
MHGHRAT	1.13918	0.696	—	—	—	—
MHCARVE	−0.10591	0.729	—	—	—	—
HMO	0.39493	0.132	0.30298	0.090	0.41947	0.009
FFS	0.00212	0.992	—	—	—	—
MPREEX	0.00028	0.984	—	—	—	—
LTD policy characteristics						
LT	0.02696	0.901	—	—	—	—
ELMPRD	0.00080	0.508	—	—	—	—
CONTRIB	0.18611	0.239	0.15674	0.252	—	—
MAXDUR	0.00147	0.061	0.00150	0.016	0.00113	0.043
LBASBFT	0.53687	0.149	0.60840	0.081	0.71391	0.049
MISSBFT	3.54339	0.204	4.10342	0.114	4.87872	0.070
Other benefits/compensation						
MAXWC	−0.00052	0.573	—	—	—	—
STD	0.41149	0.116	0.37692	0.049	0.47076	0.007
RET	0.17985	0.559	—	—	—	—
INFSTD	0.60664	0.056	0.42915	0.101	0.54606	0.019
DIAWPC	−2.21540	0.328	−0.79242	0.586	—	—
DIAW	0.87080	0.570	—	—	—	—
LTDMED	−0.12701	0.515	—	—	—	—
WCSUP	−0.34179	0.022	−0.31940	0.008	−0.22437	0.057
Disability management						
DMANMBEN	0.24617	0.229	0.27278	0.086	—	—
DCONMBEN	0.28309	0.413	0.24507	0.448	—	—
DCONEAP	−0.62504	0.229	−0.73013	0.041	−0.49305	0.022

(*continued*)

TABLE 3 *continued*

	Model 1		Model 2		Model 3	
Variable	Coefficient	$p > \|t\|$	Coefficient	$p > \|t\|$	Coefficient	$p > \|t\|$
Disability management (*continued*)						
DCONWC	−0.03696	0.914	—	—	—	—
MGFL	0.16348	0.485	0.15325	0.484	—	—
CHGBK	−0.42204	0.169	−0.38537	0.119	—	—
MGCHGBK	0.69693	0.196	0.69317	0.104	0.41442	0.139
MWP	0.01836	0.908	—	—	—	—
JOBACLIV	20.35737	0.490	13.85297	0.572		
JOBCHG	−0.17970	0.376	−0.20269	0.141	−0.23403	0.029
SUPSTD	0.53285	0.009	0.48441	0.003	0.42183	0.004
Disability characteristics						
D296	−0.01081	0.952	—	—	—	—
D300	0.12454	0.478	0.11803	0.289		
D308	−0.73141	0.111	−0.69235	0.126	−0.72083	0.088
D309	0.11816	0.727	—	—	—	—
D310	0.30260	0.531	—	—	—	—
WKREL	−0.32443	0.066	−0.34565	0.038	−0.34392	0.037
Workplace/community characteristics						
SUNEMPL	0.03882	0.482	0.04871	0.304	—	—
FGRIEV	−0.16188	0.335	−0.19595	0.158	—	—
SUNION	0.04601	0.892	—	—	—	—
EXPAND	−0.17708	0.287	−0.07417	0.537	—	—
LAYOFF	−0.22319	0.236	−0.17597	0.282	—	—
MIDWEST	0.25414	0.214	0.15554	0.371	—	—
SOUTH	0.03026	0.891	—	—	—	—
WEST	−0.86398	<0.001	−0.80812	<0.001	−0.70709	<0.001
DENSITY	8.67E-06	0.264	5.83E-06	0.309	—	—
LIVES	−0.01167	0.709	—	—	—	—
CONSTANT	−3.29539	0.229	−2.22497	0.020	−2.23076	0.008
R-squared	0.4045		0.4009		0.3889	

Because this variable was strongly negative in the incidence regressions, its positive effect on claim cost may be due to the unmeasured severity correlation discussed above.

Finally, several of the other benefits variables have fairly stable and significant coefficients. The indicators of formal and informal short-term disability (STD) benefits (STD and INFSTD) are strongly positive. The

dummy for supplementing Workers' Compensation benefits (WCSUP) is strongly negative, which could be the result of supplements providing additional offsets to LTD benefits.

An additional version of model 2 in table 3 was estimated with the predicted incidence rate, based on model 1 of table 2, as an explanatory variable. We included it in order to control for the potential selection bias arising from correlation of unmeasured severity of paid claims with our explanatory variables. (Because the incidence rate could be viewed as the "selection" probability for each observed paid claim, our analysis is equivalent to the selectivity correction method suggested by Barnow, Cain, and Goldberger [1980] and Olsen [1980].) Results of this regression were almost identical to those in model 2 of table 3, with a negative (as expected) but clearly insignificant coefficient for the predicted incidence rate. This could be viewed as suggestive evidence that the selection bias problem is small in our data.

Discussion

Overview of Results

A principal objective of this study was to explore the relation between employers' LTD claims experience for psychiatric disabilities and two sets of factors: (1) employee benefits and compensation programs; and (2) employer disability-management activities. Therefore, we focus our overview of results on these relations. Our findings on access to mental-health services are mixed. Access, as indicated by *geographic* availability of specialty mental-health providers (PSYPOP), shows a strongly positive relation to claims incidence, but this can probably be attributed to correlation of PSYPOP with omitted cultural, demand-side factors that increase awareness and recognition of psychiatric disorders.

Regarding financial access, our results imply that plans with the highest financial access barriers (very high first-dollar costs for mental health services and/or very high average coinsurance rates for health *and* mental health services) have higher psychiatric claim incidence rates. There is a rough parallel between this finding and recent data reported by Rosenheck, Druss, Stolar, et al. (1999), which showed that when one large corporation reduced its mental health benefits, the fraction of employees using outpatient mental health services per year declined by 11.3 percent over a two-year period and the fraction using inpatient mental

health services increased by 18.2 per cent. (Note, however, that this shift in use patterns was not statistically significant.)

It should also be noted that our financial access result is opposite to what we would expect based on the likely direction of simultaneity bias for these variables. Thus, an even stronger positive effect of financial access barriers on claims might be observed if we could control statistically for this simultaneity. (The large number of employer-level explanatory variables in our analysis that are potentially endogenous means that the use of two-stage methods to control for simultaneity is not a practical option, as it would clearly result in severe collinearity problems.) We also view the result for MHCARVE as evidence that greater *organizational* access to specialty mental health services reduced claims incidence. Apart from a positive effect on payments per HMO claim, we find little evidence that either geographic access or insurance coverage is related to the level of benefit payments for individual claims.

For the most part, results for other fringe benefits offered by employers indicate that these benefits tend to increase claims incidence. STD coverage obviously reduces the ultimate cost to the employee of going onto LTD benefits by providing compensation during the period before the elimination period is satisfied. A similar incentive effect results from offering continuing group medical coverage to LTD claimants. Retirement plans, particularly those with early retirement provisions, also tend to increase the attractiveness of taking LTD leave because they provide an additional source of benefits, and they tend to offset the disincentive effects of the strict benefit duration limits that often apply to LTD psychiatric claims. Our findings, shown in table 2 for STD, LTDMED, and RET, are all consistent with these observations. On the other hand, one might expect that these same variables would have a negative impact on payments per claim because of three factors:

1. correlation with unobserved severity
2. correlation with early disability management or ongoing medical interventions that promote return to work
3. incentives to make the transition from LTD to retirement

In fact, we find no evidence of negative payments per claim effects for these variables, and we actually find evidence of a positive effect for STD.

Regarding interactions between other compensation programs (DI and Workers' Compensation) and LTD, we noted strong evidence of a

positive effect of DI award rates on incidence. The only significant evidence of Workers' Compensation effects appears in our payments regressions, where factors that presumably increase the use of Workers' Compensation offsets, such as the work-relatedness of disabilities (WKREL) and the employer's provision of benefits supplemental to Workers' Compensation (WCSUP), result in lower payments.

Finally, our findings pertaining to the disability-management variables provide evidence that although front-line manager involvement reduces claims incidence, it possibly leads to offsetting positive effects on payments per claim. Among our three indicators of employee accommodation and return-to-work efforts (MWP, JOBACLIV, JOBCHG), only JOBCHG has negative and significant effects; these occur in both the claims incidence and payments regressions. We noted that simultaneity bias could tend to bias coefficients for disability management variables in a positive direction in our incidence models if disability management programs are adopted in response to higher claims rates. This possibility may help to explain the relatively small number of significantly negative disability management coefficients in our incidence results.

Limitations and Directions for Future Research

This study is an initial attempt to bring together and analyze a broad range of data items concerning LTD claims experience for psychiatric disorders, employer characteristics, disability-management efforts, employee benefits, characteristics of other compensation programs, and other state and community factors. The results of our analysis support the basic premise of this study that there are important relations among these many factors. The important limitations in our data set, however, clearly imply that our analysis is more exploratory than definitive and indicate that our results should be viewed as preliminary.

The essentially cross-sectional nature of our data set is an important limitation because many of our explanatory variables, such as the disability-management efforts and the fringe-benefit offerings of the employers, are chosen by the employers and thus are potentially correlated with other omitted employer or firm-level characteristics. Fixed-effects estimates of the impact of these factors on LTD claims experience that were obtained via analysis of a longer, pooled data set would clearly be less susceptible to omitted-variable bias. Further research to explore the possible impact of simultaneity bias would also be desirable. Estimation

of two-stage models, however, will require efforts to develop useful first-stage models of employers' decisions to adopt disability management programs and offer particular benefit packages. At present, the empirical literature containing these models is sparse (Salkever, Shinogle, and Purushothaman 1999).

A further limitation is the small size of our sample of respondents in relation to the number of potentially relevant explanatory variables. This limitation is a greater concern in the present context, where the outcomes we are studying (i.e., LTD psychiatric claims) are relatively infrequent and, as a result, many employers do not experience claims in at least one of our study years. The small size of our study sample is also a result of a low survey response rate, which is typical of employer mail surveys (Jensen and Gabel 1992). Although we do not find evidence of response bias, it remains a potential concern, which future studies must address by increasing the response rate through additional telephone and in-person follow-up contacts.

We have noted that the lack of precise data pertaining to severity of mental disorders restricts our modeling to "reduced-form" relations and precludes the estimation of structural models that explicitly account for variations in severity. This limitation has the strongest impact on our regression models of payments for individual claims and probably underlies the general sparseness of statistically significant results in these regressions. Of course, the problem of adequately controlling for severity or costliness of psychiatric diagnoses has often been noted in the mental-health services research literature. (For a discussion and references on the limitations of diagnosis related groups [DRGs] and other case-mix classifications for psychiatric disorders, see Horgan and Jencks [1987].) The limited explanatory power of diagnostic variables in our regressions parallels these earlier findings from the literature.

Finally, we stress that our analysis relates directly to only one component of the full costs of disability due to mental disorders, namely, the costs of the LTD claims experience. Owens's (1997) emphasis on the interrelatedness of multiple components of disability costs and our own findings that other fringe benefit and compensation programs affect the LTD claims experience clearly imply that future modeling efforts should expand their view of the costs of mental-disorder disabilities and evaluate a broad range of employer strategies for managing these costs.

In conclusion, we believe the findings of this exploratory study have generated some potentially important hypotheses about the relations

between LTD claims experience for mental disorders and a number of employer-level and community-level explanatory factors. More thorough analyses of these hypotheses, based on larger-panel data sets and more detailed information about employees' disabilities, will help both to confirm these relations and to calibrate them more accurately. Examination of a broader range of cost-related dependent variables will allow us to assess these connections in the broader context of the full costs of disability and to understand better the interaction of LTD insurance with other fringe benefit and social insurance compensation programs.

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Appendix A: Tests of Respondent Bias

Because of the low response rate to our employer survey, it is important to assess the possibility that respondents may not be representative of all employers in our survey. We examined this possibility, in both our incidence and claims cost analyses, in two ways: First, we compared descriptive statistics on respondent and nonrespondent employers. These descriptive statistics (which are available on request from the authors) showed virtually no differences in the average values for all explanatory variables derived from sources other than our employer survey. Second, because we had data on the actual claims experience of nonrespondents, we could estimate our claims incidence and cost regressions (model 1) with the following modifications:

- inclusion of data for nonrespondent employers and mental disorder claims filed by their employees
- inclusion of a dummy variable for the respondent employers in our analysis

- exclusion of all explanatory variables derived from the survey (which are missing for nonrespondents)

In both the claims incidence and claims cost regressions, the coefficient of the respondent dummy was clearly insignificant. Thus, we cannot reject the null hypothesis of no respondent bias.

Appendix B: Data Sources and Data Construction Methods

Data on sociodemographic characteristics of groups of covered employees, including age distribution, gender, distribution by occupational categories (white-collar, blue-collar, semiskilled, and unskilled), average salary, industry category (Standard Industrial Classification code), and location of employer were obtained directly from UNUM. UNUM also provided data on LTD policy characteristics, numbers of covered lives (employees), and all LTD mental-disorder claims data. Approximately one-fourth of all employers had one or more items of sociodemographic information missing for 80 percent or more of their covered employees. Typically, these missing data items pertained to gender, age, salary, and/or occupational categories. We used imputed values in these cases based on regressions for all respondent and nonrespondent firms with complete sociodemographic information. Predictor variables included 0–1 dummies for Census regions and the SIC categories of PSYPOP, DENSITY, and LTD policy variables.

Information on annual occupational injury rates by industry classification (SIC) and year were obtained from the Bureau of Labor Statistics Internet site (www.bls.gov), which was matched to the industry category information for each employer provided by UNUM. Where possible, this rate was matched at the four-digit level for employers in our study. In some cases, matching of national BLS data to our employers was only possible at the three-digit or two-digit level.

BLS data on state annual unemployment rates were also obtained from this source and matched to employer and claims records. Population and land-area data used to compute DENSITY were obtained from the Area Resources File (ARF) produced by the U.S. Department of Health and Human Services. Data on numbers of nonfederal psychiatrists were also

obtained from the ARF and divided by population to yield values of PSYPOP.

Data on Workers' Compensation maximum benefits in each state (MAXWC) were obtained from the annual analyses of Workers' Compensation laws published by the U.S. Chamber of Commerce. Unpublished state-level data, for the period of 1988 through 1992, on DI applications and awards for mental disorders were obtained from the U.S. Social Security Administration. An annual average of these five years was computed and converted to a per capita rate based on the state's 1993 population (from the ARF).

The following employer-level and state-level explanatory variables had values that were year specific: INJRATE, DENSITY, PSYPOP, SUNEMPL, LT, ELMPRD, CONTRIB, LE24LMT, MAXBEN, and MAXWC. All other employer-level and state-level explanatory variables were constructed as single values that did not vary over the period of our study (1993 through 1995).

Health plan variables were computed for each plan offered by an employer; then we computed the unweighted average across plans for each variable. (Enrollment data by plan were not available.) Variables describing coverage percentages (GHCOV, MHCOV, MHGHRAT) were computed by applying specific plan provisions (relating to deductibles, coinsurance, copayments, and limits) to 100,000 random draws from a utilization distribution based on the following sources:

1. published mental health utilization data (Goldman, McCulloch, and Sturm 1998; Sturm 1997)
2. tabulations for nonelderly respondents from the 1993 National Health Interview Survey
3. unit price figures for inpatient days and outpatient visits (general health and mental health)

Inpatient prices per day for general health and mental health care, respectively, were drawn from the U.S. Census Bureau (*1997 Statistical Abstract*, table 189) and from Leslie and Rosenheck (1998, table 2). Outpatient price per visit for general health care is taken from the American Medical Association (1997, 83); the corresponding mental health price is derived from a price list of a large behavioral health managed-care provider.

All other variables obtained in the employer survey (except the health plan variables) were coded as 0–1 dummy variables. The only exception is JOBACLIV, which was the number of types of job accommodations reported by employers (to a maximum of seven), divided by the number of employees covered by the LTD policy (to correct for variations in job accommodation experience due solely to differences in employer size).