NBER WORKING PAPER SERIES

FIRMS' DEMAND FOR EMPLOYMENT-BASED MENTAL HEALTH BENEFITS

Judith A. Shinogle
David S. Salkever

Working Paper 11436
http://www.nber.org/papers/w11436

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
June 2005

Financial support from National Institute of Mental Health Grant MH 43703 is gratefully acknowledged. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

Firms' Demand for Employment-Based Mental Health Benefits
Judith A. Shinogle and David S. Salkever
NBER Working Paper No. 11436
June 2005
JEL No. I

ABSTRACT

Employment-based health insurance is the main source of health coverage for the non-elderly. Few previous studies have examined the factors that impact employer decision-making in selecting the coverage to offer to their employees and none have examined generosity of mental health coverage. This paper uses cross-sectional data from a survey of medium to large firms, including information on employee characteristics, to examine the empirical determinants of mental health coverage choices. We find that the firm's demand for mental health coverage is strongly influenced by employee characteristics. We also find that certain state and local policy interventions directed at enhancing access to mental health care have impacts on coverage decisions. Specifically, public provision of mental health lowers mental health coverage generosity and parity legislation increases mental health generosity. Future research with panel data is warranted to examine the causal effects of these policies.

Judith Shingole
Senior Economist
RTI International
1615 M Street NW, Suite 740
Washington, DC 20036-3209
jshinogle@rti.org

David Salkever
Department of Health Policy
Johns Hopkins University
Hampton House, Room 429
624 N Broadway
Baltimore, MD 21205
and NBER
dsalkeve@jhsph.edu

Employment-based health insurance is the main source of health care coverage for the non-elderly. Currently, 61.3 percent of the under 65 population are covered through employer-provided policies (Denaus-Walt et al., 2003). Evidence from data over the past several decades also indicates that this coverage is usually fairly generous. Gabel et al. (2002) examine trends in generosity of health insurance benefits and find little variability in generosity with, on average, employees expecting to pay 25 percent of their expenditures out of pocket. Bundorf (2002) develops plan generosity estimates from the 1993 Robert Wood Johnson foundation employer survey. Within each of four different categories of plans (HMO, POS, PPO and indemnity), she finds that the coefficient of variation of estimated plan value ranged from 0.68 to 0.125. Moreover, her estimated plan value means are very similar across plan types, ranging from $1,133 to $1,220.

The fairly uniform pattern of generous coverage (at least among employers who offer coverage) may not be surprising in light of the strong tax incentives for compensating workers via their health benefits (Sheils and Haught, 2004). Some recent studies, however, suggest that this level of benefit generosity is beginning to trend downward in response to increasing premium cost pressures on employers (Strunk and Ginsburg, 2003).

In the case of coverage specifically for mental health services, comparable national data on levels and trends of benefit generosity have not been produced, but the evidence that is available suggests the possibility that the burden of cost sharing is greater for persons with mental disorders and that increases in this burden may outpace comparable increases for health services in general. Using BLS data, Jensen et al. (1998)

find that 82 percent of firms provided less coverage for mental health inpatient services compared to general health services and that 98 percent provided less coverage for mental health outpatient services compared to general health. In 2002, 74 percent of covered workers were subject to annual outpatient visit limits and 64 percent were subject to an annual inpatient day limit (Barry C et al., 2003). State and Federal governments have responded to these differentials via enactment of so-called mental health "parity" laws, as well as laws mandating mental health benefits, though it is clear that these laws have not eliminated coverage differentials (U.S. General Accounting Office, 2000). Anecdotal evidence suggests that in responding to cost pressures and premium increases, employers may look specifically to reductions in mental health benefits (Rosenheck et al., 1999). At the national level, McKusick et al. (2002) simulate coverage under typical private health insurance plans in 1987 and 1995 and report that the share of mental health spending covered by the typical plan declined from 65.8 to 60.1 percent.

In the current economic climate, with most observers expecting further reductions in mental health coverage generosity, it is important that policy-makers understand the factors that impact on employer decision-making in selecting the coverage packages to offer to their employees. Prior economic research on this question is sparse. Bundorf (2002) is the first to examine what factors may be associated with the overall health benefit generosity of employer sponsored insurance. Supporting the presumption that employers seek to provide compensation packages that are most valued by their employees, she finds evidence of employee characteristics (specifically wage levels and a measure of variation in health risk) affecting the generosity of the health plan for firms

with 100 employees or less; however she finds no significant effect of employee characteristics on generosity for firms with greater than 100 employees.

In this paper, we focus specifically on employer decisions about the generosity of the mental health benefits offered to their employees. Following Bundorf (2002), our dependent variable is a measure of generosity averaged across all plans offered by the employer and explanatory variables include employee characteristics, as well as employer and area characteristics. We also examine impacts of state-level policy measures (benefit mandates and parity laws) on benefit generosity. The next section of the paper presents our conceptual approach to employers' mental health benefit choices. The following sections describe our data sources and variables, and our estimation methods and results. We conclude with a discussion of the implications of our findings and directions for future research.

I. Conceptual Approach

The view that employer-sponsored health insurance should reflect the preferences of the employees has a long history in the health economics literature. (For an early exposition, see Goldstein and Pauly, 1976). Several recent papers (Dowd and Feldman 1987; Bundorf 2002) have formalized this notion by assuming that employers choose the health insurance plans to offer by minimizing their compensation costs subject to a market-determined utility constraint for their workers. We follow the same general approach here in modeling an employer's mental health insurance coverage decision, but we also incorporate an extension suggested by earlier work on job safety (Rea, 1981)

which allows the characteristics of the insurance plan offered to impact on employers' profits both through compensation costs (as in Dowd and Feldman and in Bundorf) and through effects on workers' health.

We model the employer's mental health insurance decision as a short-run profit-maximization problem (with capital inputs fixed) for a competitive firm. The firm simultaneously chooses a quantity of labor to employ (L), a "wage" to pay (w), and a level of generosity of mental health coverage (G) to maximize the profit LaGrangian (H) which is defined as follows:

$$(1) \quad H = pQ\{a(G)L\} - mGL - wL + \lambda\left[\Psi - \{a(G)V(w) + (1 - a(G)U(w,G))\}\right]$$

where

p = price of product

Q(·) = production function for output quantity

a = probability of NO mental illness for the worker

G= generosity of mental health benefit

L= quantity of labor

m= price per unit of generosity of the mental health benefit

w= dollar cost of wages (and other benefits besides mental health coverage)

Ψ = the firm's labor market compensation constraint (in expected worker utility)

V = worker's utility function with no mental illness

U = worker's utility function with mental illness.

For simplicity, we assume (1) that workers are only in one of two possible health states (healthy or mentally ill), (2) that workers with mental illness do not work, and (3) that the employer's workforce is large enough that her/his labor supply will be known with certainty to be aL. (The labor-market constraint assumes that workers are expected utility maximizers.) The employer's first-order conditions for profit maximization are as follows:

$$(2) \quad \frac{\partial \mathrm{H}}{\partial L} = pQ_L a - (mG + w) = 0$$

$$(3) \quad \frac{\partial \mathrm{H}}{\partial G} = pQ_L a_G L - Lm + \lambda\left[-a_G V - U_G + a_G U + aU_G\right] = 0$$

$$(4) \quad \frac{\partial \mathrm{H}}{\partial w} = -L - \lambda\left(aV_w + (1-a)U_w\right) = 0$$

$$(5) \quad \frac{\partial \mathrm{H}}{\partial \lambda} = \Psi - \left(aV + (1-a)U\right) = 0$$

Condition (2) is a direct analog of the standard condition for profit maximization of a competitive firm. Condition (3) indicates that the firm chooses a benefit generosity level such that the marginal cost of an additional increment of generosity (Lm) is just equal to the marginal revenue product of an additional increment of generosity plus the effect of that increment on workers' expected utility multiplied by λ, which is the marginal effect on profit of a change in the expected-utility (market) constraint. Condition (4) shows that wages are set at the point where the marginal cost of an increment to the wage, L, equals the effect of that increment on workers' expected utility

multiplied by λ. Since an increase in wages increases workers' expected utility, λ must be negative; in other words, a one-unit increase in the level of the expected utility (labor market) constraint reduces profit by λ.

Also note that when condition (3) is divided by condition (4), we find that the ratio of marginal expected utility for an extra unit of coverage (G) to that for an extra dollar of wage is equal to $(m - pQ_L a_G)$. In comparison, if w and G were chosen to maximize worker expected utility subject to a budget constraint of $B = w + mG$, the corresponding ratio would be equal to m. Thus, in this model the firm has a stronger incentive to purchase generous coverage to obtain the marginal revenue product of lower disability rates among its workforce.[1]

Several simple extensions of the model provide direct links with some current policy concerns. One is the inclusion of the tax preference for benefits, which would imply changing the wage argument in the workers' utility functions to (1-t)w, where t is the marginal tax rate. A second is inclusion of a parameter, z, representing the influence of G on the adverse selection costs to the employer of attracting a workforce with greater demand for mental health care as G increases. This adverse selection process would imply that the benefit price (m) should be an increasing function of G (with the rate of increase depending on z) and that the influence of G on the probability of disability would also depend upon z. As will be noted later, such adverse selection effects may be

[1] In the polar case where mental health coverage has no effect in reducing the probability of disability, employee expected utility maximization conditions apply and the employer's choice reduces to the cost-minimization framework as in Bundorf (2002). For evidence of coverage effects on disability rates, see Salkever et al. (2000, 2003). Also note that in our model if workers' incomes in the disabled state are reduced to $\Omega \cdot w$ (where $0 \leq \Omega < 1$), the relevant ratio becomes $\{m - [pQ-(1-\Omega)w]a_G\}$.

particularly relevant for understanding the ways in which parity legislation impacts on the employer's choice of G.

The foregoing discussion of the model indicates that the employer's optimal choice of G should depend upon the following exogenous factors: the prevailing market price of her/his product (p), the prevailing compensation constraint for her/his workers (Ψ), tax rates, the price (m) of each unit of G, risk factors that influence the marginal effect of G on the probability of mental illness, and worker characteristics that influence their productivity and their preferences in both the no-mental-illness and mentally-ill states.

II. Data Sources and Study Sample of Employers

The primary data source for this research is a survey of employer practices regarding benefits and disability management that was conducted in 1996 by the Department of Health Policy and Management of The Johns Hopkins University. In cooperation with a private disability insurer, a survey target population of 1,433 employers was identified based on the following criteria: 1) having an active long-term disability policy with this insurer over the past three years and 2) having at least 300 covered lives on the LTD policy at some time during that three-year period.

These employers received a mailed questionnaire as well as up to two follow-up calls to encourage responses and to answer any questions about the survey. Besides the mailed survey, firms were asked to send summary plan descriptions or a detailed plan abstract form (nine firms sent abstract forms) for each health plan offered to their

employees. Data were obtained on 577 health plans offered by 250 employers. (An additional 28 firms responded in the survey that they offered health plans but did not provide the detailed information we requested on these plans.) This health plan data was abstracted and used for our analyses.[2] More detailed descriptions of the survey data are provided in Salkever et al. (1999).

Additional variables, defined for the geographic location of each employer and for their industry (SIC) category, were obtained from public sources noted below. Additional data on employee characteristics for those employees who are covered by the employer's long-term disability (LTD) plan were obtained from the private insurer's administrative data files.[3]

Characteristics of the employers in our study sample (unweighted means averaged across employers) are presented in Table 1. While all regions of the country are represented, the largest numbers of employers are located in the East North Central region (24.8 percent) and the Middle Atlantic region (17.2 percent). Over half (57.2 percent) of the employers have employees located in more than one state and 38.8 percent have locations in four or more states. Most of the employers are in either the services (47.2 percent) or manufacturing (24.8 percent) sectors. Among the 91 percent of

[2] Since the overall response rate was low (17 percent), as is often the case in employer mail surveys (Jensen and Gabel, 1992; Freeman and Kleiner, 2000), we have carefully analyzed administrative data on respondents and nonrespondents for evidence of respondent bias. Our analysis (available from the authors) consistently supports the null hypothesis of no respondent bias.

[3] While some employees are not covered by the LTD benefit, the median for the ratio of the total lives covered under LTD to the total number of employees reported on the survey is 0.90. Thus, the characteristics of LTD covered employees should provide a close approximation to the firm's overall employee characteristics.

employers who report their distribution of employees by salaried versus hourly status, 53.7 percent of employees are salaried. Union employees are present in 26 percent of the firms.

Responding employers are mainly medium-sized or large: the mean number of employees is 1,776 and the median is 773. Given their size, and the fact that all offer LTD benefits to at least some of their employees, it is not surprising that their other benefit offerings are generous. For example, 89.6 percent of employers offer retirement benefits, and the mean total days offered for sick and paid vacation leave is 21.5 days per year. Employment-based health insurance coverage is offered by all of the employers. (This also applies to the 28 employers who responded to our survey but did not provide detailed information on the health benefits available to their employees.) The employers pay, on average, approximately 82 percent of the health insurance premium[4] and 23.6 percent of employers pay the entire health insurance premium.

III. Specification of Variables

Dependent Variables: Our measures of mental health coverage generosity are summary variables that incorporate various specific features of coverage such as copayments, coinsurance, deductibles, and expenditure and utilization limits. Information on the characteristics of each health plan offered by a firm is obtained from the summary plan descriptions or detailed abstraction forms each firm provided.[5] The

[4] Approximately 9 percent of respondents did not respond to this survey question.

[5] Descriptions of the mental health coverage features under these various health insurance plans are reported elsewhere (Salkever et al., 1999). The Salkever et al. (1999) study

generosity measures are first constructed at the health plan level and then averaged over all health plans the firm offers to obtain a firm level measure.

In order to summarize the generosity of health plans offered by the firm, variables representing the dollar amount of benefits covered are constructed by combining plan-specific data with simulated utilization data. Since we do not have actual health plan enrollment or claims history data, we use distributional parameters from the literature to simulate the utilization of a covered population and apply the resulting simulated data to the benefit structure for each health plan offered by the firm. The process simulates the utilization patterns for mental health inpatient days and outpatient visits.[6] A total of 100,000 random draws is simulated.

Prices for each service are added to create our simulated expenditure data. All prices are for the year 1995. The inpatient price per day is obtained from Leslie and Rosenheck (1998, Table 2) and the outpatient price per visit is from a price list of a large managed behavioral health care provider.

Information on health plan coverage provisions obtained from employers is combined with the simulated utilization data and expenditures to determine the amount of out-of-pocket expenditures for each random "person" for each service. The health plan coverage provisions incorporated into the simulation are: deductibles including mental health and/or inpatient specific deductibles, copayment amounts, coinsurance rates, annual limits on mental health inpatient days or outpatient visits, annual benefit limits for

---

reported that in general, the HMO plans in this data are more likely to use day and visit limits than the non-HMO plans.

[6] Distributional parameters are obtained from Goldman et al, 1998 and Sturm 1997. See Shinogle, 2001 for complete details of these calculations.

mental health or a specific mental health service such as outpatient or inpatient, per admission copayments, out-of-pocket expenditure limits, and scope of out-of-pocket expenditure limits (e.g. mental-health specific limits vs. overall limits).

The generosity indicators for each plan are computed as one minus the ratio of the mean simulated out-of-pocket expenditure to the mean simulated total expenditures for each service category (outpatient, inpatient, total). The unweighted averages of plan generosity are then computed among all plans offered by an employer.[7]

The means and standard deviations for the mental health generosity measures are presented in Table 2. The percent of total mental health expenditures covered (MHCOV) range from zero (no coverage) to 100 (complete coverage) with an average of 62.01 percent of total simulated mental health expenditures covered. The average coverage of outpatient mental health expenditures (MHOPCOV) is 62.11 percent and the average coverage of inpatient mental health (MHIPCOV) is 60.92. Table 2 also presents the medians of the mental health generosity measures, which are almost identical to the means.[8] The last two columns of the table report the number of cases with either zero or full coverage for each of the three measures.

---

[7] Note that we assume the same distribution of utilization and expenditures for all plans. Thus we abstract from moral hazard considerations in computing our generosity measures.

[8] Salkever and Shinogle (2000) present information on the generosity of the health plan benefits by health plan type. This study found that preferred provider organization (PPOs) have a higher simulated coverage of total and outpatient mental health coverage than fee-for-service (FFS) plans and a higher simulated inpatient mental health coverage than heath maintenance organizations (HMO) plans. FFS plans in this data have higher simulated inpatient mental health coverage than HMO plans but HMO plans have higher outpatient mental health coverage than FFS plans.

The descriptions and data sources for all explanatory variables used in the analysis are presented in Table 3; the corresponding means and standard deviations are presented in Table 4. Employer characteristics such as dummies for the total number of employees, a 0-1 dummy for the presence of any union employees (UNION), and the percent of employees who are salaried (PCTSAL) are obtained from the employer survey described above. Note that we include dummies for the employer size categories (based on numbers of employees) rather than the exact number of employees since the number of employees is a choice variable in our conceptual model and therefore arguably endogenous. At the same time, we expect that factors such as economies of scale in benefits provision and the feasibility of self-insurance are strongly related to numbers of employees; the employer size dummies are intended to control for these factors while being less susceptible to endogeneity bias.[9] Since detailed information on employees' education levels and specific job types are lacking in our data base but are potentially important predictors of employee preferences with regard to benefits, the percent of salaried employees (PCTSAL) is included to control for these preferences. (Since 25 employers did not provide information on the number of salaried employees, the PCTSAL variable is coded as zero for these employers and a dummy variable (MISS_SAL) is created that is equal to one if salaried employee information is missing.)

Characteristics of employees who are covered under the firm's LTD insurance benefit are obtained from administrative data collected by the insurer. This

[9] Note that seventeen employers failed to report their total number of employees in the survey. To include these respondents in the analysis, information on their number of employees was obtained from 1996 Dunn and Bradstreet Information Services data, from employer web sites, or from regional economic web sites (e.g., the Greater Toledo Regional Growth Partnership, http:\\www.rgp.org).

administrative data is available for all 1,433 firms in the sample universe. As noted above, not all employees are covered by the LTD benefit, but the median for the ratio of the total lives covered under LTD benefit to the total number of employees reported on the survey is 0.90. Thus, the characteristics of LTD covered employees should provide a close approximation to the firm's overall employee characteristics. This administrative data contains employee characteristics such as the percent of employees covered under the firm's LTD benefit that are: 1) female (FEMALE), 2) age 35 years old or younger (AGE ≤35), and 3) age 50 and older (AGE50+). These data also describe the distribution of the firm's employees among four different occupational categories: white collar (OCCWC), skilled blue-collar (OCCBL), unskilled (OCCU), and semi-skilled.[10]

To measure the tightness of the local labor market, data on the 1995 state unemployment rate (UNEMP) is acquired from the Local Area Unemployment Statistics on the U.S Bureau of Labor Statistics (BLS) web site (www.bls.gov). This variable is matched to employers by the address of the main company headquarters.

As a proxy for the market compensation constraint, we construct a measure of total compensation per employee (TOT_COMP) from administrative data on the median salary for LTD covered employees, from survey data on the generosity of health insurance benefits offered by the firm, and from information on retirement benefits offered by the firm. The dollar value of health coverage is computed as the product of 1) the simulated percentage of general plus mental health expenditures covered on average

[10] For firms with incomplete administrative data, missing information on employee characteristics is imputed using data from all employers in the sample universe that reported complete information (See Salkever et al., 2000 for more information on this imputation).

by the plans offered by the employer, 2) the percentage of the health plan cost paid by the employer, and 3) the mean per capita spending for physicians, hospitals, drugs, and other health professionals by persons with active employer-sponsored health insurance as calculated from the 1996 Medical Expenditure Panel Survey.[11] The cost of retirement benefits is computed as the product of 1) a dummy variable for firms offering retirement benefits, 2) the firm's median salary, and 3) the estimated cost (in percentage terms) of retirement benefits. The last term is calculated based on the Standard Industry Classification (SIC)-category-specific percentage of compensation going to retirement benefits as reported in the BLS Employment Cost Index (ECI), and the state-and-SIC-specific percentage of employees reporting the receipt of retirement benefits in the April 1993 CPS.[12]

It is hypothesized (Dowd and Feldman, 1987) that risk of illness should increase the demand for coverage. The only available risk factor that could be used in this study is the percent of employees with heavy alcohol consumption (HEAVY_ALC) in the industry of the employer (Hoffman et al. 1997).

The marginal tax rate (MTR) is calculated using 1994 state and federal rates and tax laws compiled by the Advisory Commission of Intergovernmental Relations (ACIR,

[11] The method for simulating the generosity (i.e., percent coverage) of non-mental health expenditures is analogous to that used for simulating mental health coverage generosity. Further details are available from the authors.

[12] The CPS data are used to adjust for the fact that the compensation cost percentages in the ECI data are for all firms rather than just for firms providing retirement benefits.

1995). The rate is based on the median income for full-time workers in 1994 (www.bls.gov). The rate is calculated assuming a standard deduction.

Local health care and mental health care market characteristics pertain to the health maintenance organizations (HMO) enrollment, expenditures on mental health specialty services, and the area costs to Medicare. The 1995 per capita enrollment in health maintenance organizations (HMO) is obtained from the Area Resource File produced by the U.S. Department of Health and Human Services. This county level measure is summed over the state and divided by state population to obtain state level per capita HMO enrollment. Greater availability of HMO plans in the local market is expected to be positively related to coverage generosity in that HMOs can presumably offer more effective control of moral hazard costs arising from generous benefits relative to PPO or traditional fee-for-service plans. We note, however, that simple descriptive comparisons of plan types do not show that HMOs provide more generous coverage on average and also show that HMOs tend to make more use of various benefit limitations (Salkever and Shinogle, 2000; Salkever et al., 1999).

To measure the importance of publicly funded mental health services in the state, the percent of the mental health specialty expenditures (primarily for clinics and hospitals) accounted for by public facilities is computed (PCTPUBEXP) from the 1994 Inventory of Mental Health Organizations Survey data (Substance Abuse and Mental Health Services Administration, 1995).[13] Since no state level measure of price for mental health treatment is available, the 1996 local costs to Medicare (AAPCC) for health care

[13] The public facilities included state, regional, county, and other public mental health facilities but excluded Veterans Administration or Tribal facilities.

services for the elderly are used. This measure reflects the price of health care services as well as the average level of use of these services by Medicare beneficiaries.

State laws relating to 1) mental health benefits parity, 2) substance abuse treatment and mental health treatment coverage mandates, and 3) premium taxes are obtained from several sources. For each of the three types of laws, two variables are included in the analysis: a 0 -1 dummy variable for firms located in states with the law in effect in 1995 or earlier, and an interaction dummy which equaled one if the firm had less than 1000 employees **and** the firm was located in a state with the specific benefit law in effect. (The interacted variables are labeled with an "_EMP" extension (MAN_EMP, PAR_EMP, and PREM_EMP).) Firm size is included in the interaction variables since state insurance laws are not applicable to firms who self-insure. Our data contain no information on the insured versus self-insured status of the health plan; thus we use firm size as a proxy measure for self-insurance.[14] To determine if the firm is located in a state that had a mental health parity law in effect in 1995 (PARITY), information is obtained from the National Institutes of Mental Health Parity Report (National Institutes of Mental Health, 1998). For this analysis, only states with a full parity law are coded as having parity. Information on states mandating coverage of mental health, alcohol abuse treatment, and/or drug abuse treatment benefits were obtained from the National Conference of State Legislators Health Tracking service (www.ncsl.org) as well as a recent General Accounting Office report (U.S. GAO, 2000). (Laws mandating only the

[14] Uccello (1996) finds that for firms with 1000 or more employees, 75 percent are self-insured; for firms with 500 to 999 employees, 46 percent are self-insured; for firms with 250 to 499 employees, 49 percent are self-insured; for firms with 100 to 249 employees, 27 percent are self insured and for firms with less than 100 employees approximately 10 percent are self-insured.

offer of optional coverage are not considered.) If the firm was in a state that mandated all three benefits (mental health, alcohol abuse, and drug abuse treatment) then the mandate (MANDATE) variable is coded as one. State health insurance premium taxes vary with the type of insurance product (HMO, Blue Cross and Blue Shield, or other private insurance). The information on state health insurance premium taxes is derived from a U.S. General Accounting Office Report (U.S. GAO, 1996). For our premium tax measure, we use the maximum tax rate for any health insurance product within the state (PREMTAX).

IV. Estimation Methods

Since our dependent variables have upper and lower limits (of no coverage and full coverage), we use a two-limit Tobit regression approach. Results are reported for the full model; to assess the stability of our strongest results to inclusion or exclusion of explanatory variables with non-significant coefficients, we also report results obtained when insignificant variables are selectivity removed in a backward selection process with an exclusion criterion of $p > 0.3$. [15]

Since our total compensation constraint measure is based on firm-specific data and uses our dependent variable (MHCOV) as one of the elements in its construction, it is reasonable to consider the possibility that the coefficient for this variable is subject to simultaneity bias.[16] Accordingly, we re-estimate our full models using Amemiya's

---

[15] In addition, we replicated our Tobit results using the GLM approach suggested by Mullahy (2003) and by Papke and Wooldridge (1996). We also estimated linear OLS models. Findings are virtually identical to those reported here.

[16] In relative terms, however, MHCOV accounts for only 0.003 percent of TOT_COMP since mental health spending is only about 4 percent of total health spending.

Generalized Least-Squares method for simultaneous equation Tobit models (Amemiya, 1979; Newey, 1987) and include two additional variables as instruments. These are the population density in the county where the employer is located or headquartered (DENSITY) and a dummy variable for firms that experience a layoff that changed the number of employees by more than 15 percent in the five years preceding the survey (ANYLAYOFF).[17]

V. Results

Results of regressions on the overall (outpatient plus inpatient) generosity measure (MHCOV) are reported in Table 5. Columns 1 through 4 present the results with the occupation group variables included. Since we presume that these variables are strongly correlated with our market compensation constraint variable (TOTCOMP), we estimate our models both with and without these variables. Results obtained when they are excluded are shown in Columns 5 through 8. As a group, variables relating to employee characteristics are found to exert a strong influence on the generosity of mental health benefits. Percent female is a strong positive predictor of generosity and the industry-level risk-factor variable (HEAVYALC) also has a significantly positive coefficient. The fraction of total employees who are salaried is a positive predictor of generosity up to approximately 68 percent, beyond which further increases in percent salaried reduce generosity. If salaried workers generally have higher levels of education, we might expect a positive relationship of PCTSAL to generosity throughout the 0 to 100 percent range based on the empirical literature on demand for mental health services

[17] Analogous linear IV models were also estimated since the numbers of limit dependent variable observations in our data were small. Here again the results were essentially the same as for the Tobit models.

(Newhouse JP, 1993). The reasons for our finding of a more pronounced downturn at higher levels of PCTSAL are unclear.[18] Results for the variables describing the occupational mix of employees are not quite as strong, but there is some support for the expectation that workers in white-collar jobs (OCCWC) and skilled blue-collar jobs (OCCBL) have a stronger demand for generous mental health coverage.

Results for the firm size dummies indicate a positive effect on generosity as the employee pool increases from under 500 to over 500 employees and from under 2000 to over 2000 employees; a positive effect over the range from 500 to 2000 is not observed. The presence of unions per se does not appear to affect generosity while the per capita HMO enrollment rate in the state is a strongly negative predictor of generosity.

A number of the variables typically found in economic models of insurance demand do not have significant coefficients in our regressions. These include the marginal tax rate (MTR), the premium tax rate (PREMTAX), and our proxy for the price per unit of generosity (AAPCC). The tightness of the local labor market, as measured by UNEMP, is also not significant. The market compensation variable (TOT_COMP) is weakly positive; since some previous studies (e.g., Wells et al., 1986; Taube et al. 1986) have reported positive relationships between income and mental health utilization or expenditures, we suspect that the weakness of our result may be at least partly due to measurement errors in this variable.

Finally, several results for variables relating to public policies are of interest. The strongly negative coefficients for PCTPUBEXP indicate a crowding out of private

[18] One might speculate that the strength of adverse selection also is stronger for salaried employees and that this tends to cause a decline in average generosity of coverage as the percent of salaried workers increases, offsetting other positive effects.

coverage by public spending. The magnitude of this effect is fairly small however; a 10 percent increase in PCTPUBEXP predicts a reduction of about 1 percent in mental health coverage. State legislation of benefit mandates does not show any effect on coverage but we do observe a large and strongly positive effect of parity laws on coverage generosity for firms with less than 1,000 employees. A reasonable interpretation of this result is that state parity laws have diminished problems with adverse selection by excluding plans with minimal mental health coverage from the underwritten portion of the market. Self-insured firms, which are typically larger, are not affected directly by these parity laws and our results suggest that there are minimal spill-over indirect effects on their coverage decisions.

Analogous regression results for outpatient coverage generosity (MHOPCOV) are reported in Table 6. For the most part, these results closely parallel the findings for total mental health coverage. Evidence for the crowd-out effect of public expenditures and for the impact of parity on smaller firms is slightly stronger.

In the regression results for inpatient coverage generosity (MHIPCOV) in Table 7, we find that a smaller number of our explanatory variables are significant. Firm size effects do not occur above 500 employees. AAPCC has a strongly positive coefficient but this may be primarily due to inter-area variations in utilization (rather than prices) since areas where general hospitalization use is high may also display greater hospitalization use for mental health treatments. The positive effect of PCTSAL does not diminish at higher values.[19] Apart from the industry-level risk factor (HEAVYALC), employee

[19] If inpatient coverage is less affected by adverse selection, this finding would be consistent with our earlier speculation (in Note 18).

characteristics do not appear to exert a strong influence on observed demand for inpatient coverage. Results for our policy variables are also rather different than in Tables 5 and 6. Coverage mandates appear to have a negative effect for all firms regardless of size and parity laws have a positive effect for all firms. Public-sector spending does not appear to crowd out private coverage for inpatient treatment. Finally, the results for UNEMP do show some evidence of a negative relationship between labor-market slack and inpatient coverage.

Instrumental variable results with total compensation treated as endogenous are reported in Appendix Tables 1-3. The IV estimates are generally quite close to the simple Tobit results but a few differences are noteworthy. First, the positive effect of TOT_COMP on insurance demand is somewhat stronger in the IV results, particularly in the total and outpatient generosity regressions when other non-significant variables are deleted from the models.[20] These coefficient estimates suggest a coverage demand elasticity, evaluated at mean values, of approximately 0.15. Second, the parity effect for smaller firms is somewhat weaker in the IV models when all explanatory variables are included; exclusion of non-significant explanatory variables yields results that are more similar to the simple Tobit estimates. Finally, we test for overidentification by re-estimating our models as standard linear IV regressions and computing Basmann's (1960) test statistic. We generally fail to reject our null hypothesis with p-values ranging from 0.166 to 0.387. The only exception is the inpatient coverage regressions with the occupational variables excluded (Columns 5 and 6).

[20] Note that in the IV regressions with non-significant variables deleted, these variables were retained as instruments.

VI. Discussion

The demand for mental health coverage under employer-sponsored health insurance is strongly driven by employee characteristics. Our results show a strong positive demand effect for the firm-level percent of workers who are female and percent of salaried workers, and the industry-level percent of employees with heavy alcohol consumption. Our results are similar to Bundorf's (2002) small-firm results in that she finds a positive effect for the variation in worker characteristics (measured through a health risk variable that includes demographic information) on choice of plan and plan generosity. Our gender result also accords with the finding of Long and Scott (1982) that the percent of total employment that is female has a significantly positive effect on the percent of compensation received as health insurance.

As in Bundorf's (2002) small-firm results, we also find some support for the hypothesis that the income or total compensation effect is positive. Our results are not, however, very strong. Future research should further examine the effects of area compensation on health plan generosity.

We find other economic factors, such as labor market tightness, premium taxes and marginal income tax rates, to be weak predictors of mental health coverage generosity. These variables have had mixed effects in previous studies. Gruber and Lettau (2004) find significant marginal tax effects on health insurance offering, but their results are also driven by smaller establishment data (<100 employees). Similarly, Leibowitz and Chernew (1992) find tax rates significantly associated with firms offering health insurance but only for firms with less than 50 employees.

State benefit mandates do not appear to lower the fraction of total and outpatient mental health expenditures covered but are negative predictors of the fraction of inpatient mental health expenditures covered. On the other hand, state mental health parity laws significantly increase the fraction of mental health expenditures covered for smaller firms. This supports the concept that the parity laws may lower the potential adverse selection effects. This could lower the marginal benefit costs of more generous coverage. Other direct evidence on this finding is limited; Bao and Sturm (2004) found little effect of parity on employee's perceived quality of health insurance coverage, perceived access or use of specialty services. To the extent that parity simultaneously increases coverage generosity and the use of utilization management mechanisms, the two findings could be consistent.

Finally, the lower coverage of mental health (total and outpatient) expenditures for firms located in states where the public facilities account for a higher percentage of the total mental health specialty expenditures supports the expectation of crowding out of private benefits by public services. This is consistent with a recent finding of crowd-out effects for public hospital facilities on individual's private insurance coverage status reported by Rask and Rask (2000). Other recent crowd-out estimates of public insurance programs (such as Medicaid) on employer offers of health insurance have reported similar results. Marquis and Long (2003) find a substitution between the employer offer of health insurance and pubic coverage of children during the Medicaid expansions. Shore-Shepard et al. (2000) find no effect of the expansion on employer offers of insurance, but they did find a significant decline in coverage generosity measured as

offering family coverage and employees' share of premiums (both single and family coverage).

While we believe that a strength of this study is in its bringing together of employer-level data on mental health benefit offerings and data on employee characteristics, the reader should note several important limitations in these data. First, the cross-sectional nature of the data suggests the need for caution in drawing causal inferences about policy variables. In particular, it is possible that omitted state-specific population characteristics which influence the adoption of mandate and parity laws, or the provision of publicly funded mental health services, may also be related to employees' preferences for insurance coverage. Panel data are clearly needed to control for these omitted state characteristics and to provide more definitive estimates of impacts for these factors.

Second, the generalizability of our results to a broader universe of firms may be problematic. Since only 17 percent of surveyed firms responded to our detailed questionnaire, there is clearly some potential for response bias, though our tests have failed to detect it. (See Salkever et al., 2000 and 2003; additional information is available from the authors.) A more serious concern arises from the fact that our sample of firms was drawn from a list of firm's that offer employees long-term disability insurance coverage. These firms are presumably larger and offer a richer fringe benefit package than a representative sample of all U.S. firms. Comparing our firms to establishments who cover long-term disability insurance from the 1993 National Employer Health Insurance Survey finds a similar geographic distribution and similar firm size.

One other data deficiency, which of course is common to most studies, is gaps in available data on explanatory variables. Given the focus of this analysis, it would clearly be desirable to have more information on employee characteristics such as education that could be expected to influence demand for coverage. Our area total compensation variable is also incomplete; important parts of the compensation package such as short-term and long-term disability insurance, are not valued due to the lack of data while national averages (rather than firm-specific data) are used in several parts of our method for constructing this variable.

VII. Conclusions and Future Directions

ThIs study provides some additional empirical support for the long-standing proposition in the economic literature that demand for employer-provided health insurance is derived from the preferences and characteristics of the covered employees. While the previous empirical support for this proposition has come from results for small firms, our results pertain primarily to medium-size and larger firms. Of course, the support we provide is somewhat qualified in that some of our employee characteristics variables are not significant predictors or displayed unexpected patterns of influence (as in the case of the percent of workers who are salaried). Further testing of this general proposition is certainly warranted, perhaps including a more detailed examination of the differences between small and large firm results reported in previous studies.

One could also view the consistency of our results with earlier studies as supporting the view that demand for mental health coverage generally responds to the

same incentives and factors as demand for general health coverage. We do, however, find that some policy interventions directed at enhancing access to mental health care (specifically public provision and parity legislation) do impact on coverage decisions. As noted above, further testing of these policy impacts with panel data sets is clearly needed.

The comparison of the simple conceptual model that we use to motivate our empirical research with the compensation-cost-minimizing models described in previous studies also raises some interesting questions for future investigation. While the latter model focuses on employee preferences and utility, the recent literatures on the cost of mental disorders in the workplace **to** employers (Goetzel et al. 2003; Goldberg and Steury, 2001; Goetzel et al. 1998; Kessler and Frank, 1997) and the effectiveness of interventions to prevent or treat these disorders (Goetzel et al. 2002); implies that the employers may also have a direct interest in the mental health coverage decision.[21] If empirical indicators that may relate to employer costs can be developed (e.g., amount of firm-specific human capital, the prevalence of team production methods), their inclusion in models of coverage demand would provide an empirical test of the view that both employers and employees have distinct stakes in this decision.

Finally, extension of this research with more recent data should expand its scope by including information about drug coverage. Pharmacotherapies are now a critical element in the treatment of mental disorders, and studies of insurance coverage for the costs of treating these disorders must recognize this fact.

[21] A similar point about employer benefits from employee health coverage has been noted, in a somewhat different context, by Dey and Flinn (2005).

References:

Amemiya, T. 1979. The Estimation of Simultaneous Equation Tobit Models. *International Economic Review.* 20(1):169-181.

Advisory Council on Intergovernmental Relations (ACIR). 1995. Significant Features of Fiscal Federalism, Volume 1. Budget Process and Tax Systems. (September, 1995 M-197).

Bao Y and Sturm R. 2004. The Effects of State Mental Health Parity Legislation on Perceived Quality of Insurance Coverage, Perceived Access to Care, and Use of Mental Health Specialty Care. *Health Services Research*, in press.

Barry CL, Gabel JR, Frank RG, Hawkins S, Whitmore HH, Pickreign, JD. 2003. Design of Mental Health Benefits: Still Unequal After All These Years. *Health Affairs*. 22(5):127-137,

Basmann R.L., 1960. On Finite Sample Distributions of Generalized Classical Linear Identifiability Test Statistics. *Journal of the American Statistical Association* 55(292): 650-59.

Bundorf MK, 2002. Employee Demand for Health Insurance and Employer Health Plan Choices. *Journal of Health Economics*. 21:65-88.

Denaus-Walt C, Procter BD, Mills, RC. 2003. U.S. Census Bureau. Income, Poverty, and Health Insurance Coverage in the U.S., 2003. Current Population Reports p60-226. U.S. Government Printing Office. Washington, DC. 2004

Dey MS and Flinn CJ. 2005. An Equilibrium Model of Health Insurance Provision and Wage Determination. *Econometrica* 73(2):571-627.

Dowd BE. and Feldman R. 1987. Voluntary Reduction in Health Insurance: A Theoretical Analysis. *Eastern Economic Journal*. 13:3; 215-2. (July-September).

Freeman RB. and Kleiner MM. 2000. Who Benefits Most from Employee Involvement: Firms or Workers? In NBER/Sloan Project Report: Industrial Technology and Productivity: Incorporating Learning from Plant Visits and Interviews into Economic Research. Pages 7-13. Presented at the American Economic Association Meeting, January 2000.

Gabel JR, Long SH and Marquis MS. 2002. Employer-sponsored Insurance: How Much Financial Protection Does it Provide? *Medical Care Research and Review*. 59(4):440-454. (December).

Goetzel RZ, Anderson DR, Whitmer WR, Ozminkowski RJ, Dunn RL, Wasserman JL HERO Research Committee. 1998. The Relationship between Modifiable Health Risks

and Health Care Expenditures: An Analysis of the Multi-Employer HERO Health Risk and Cost Database. *Journal of Occupational and Environmental Health.* 40(10):843-854.

Goetzel RZ, Hawikins K, Ozminkowski R, Wang S. 2003. The Health and Productivity Cost Burden of the "Top 10" Physical and Mental Health Conditions Affecting Six Large U.S. Employers in 1999. *Journal of Occupational and Environmental Medicine*. 45(1):5-14.

Goetzel RZ, Ozmnikowski RJ, Sederer LI, Mark TL. 2002. The Business Case for Quality Mental Health Services: Why Employers Should Care About the Mental Health and Well-Being of Their Employees. *Journal of Occupational and Environmental Medicine*. 44(4):320-330.

Goldberg RJ and Steury S. 2001. Depression in the Workplace: Costs and Barriers to Treatment. *Psychiatric Services.* 52(12):1639-1643.

Goldman W, McCulloch J. and R. Sturm. 1998. Costs and Use of Mental Health Services Before and After Managed Care. *Health Affairs.* 17(2): 40-52. March/April.

Goldstein GS and MV Pauly. 1976. Group Health Insurance as a Local Public Good. In Rosett, RN. The Role of Health Insurance in the Health Services Sector. National Bureau of Economic Research. NY. 1976. pp. 73 - 113.

Gruber J and Lettau M. 2004. How Elastic is the Firm's Demand for Health Insurance? *The Journal of Public Economics*. 88:1273-1293.

Hoffman JP, Larison C, Sanderson A. 1997. An Analysis of Worker Drug Use and Workplace Policies and Programs. Office of Applied Studies. Substance Abuse and Mental Health Services Administration. Department of Health and Human Services.

Jensen GA. and JR. Gabel. 1992. State Mandated Benefits and the Small Firm's Decision to Offer Health Insurance. *Journal of Regulatory Economics.* 4:372-404 (1992).

Jensen GA. and MA Morrisey. 1999. Small Group Reform and Insurance Provision by Small Firms, 1989-1995. *Inquiry.* 36:176-187 (Summer 1999).

Jensen GA, Rost K, Burton RP et al. 1998. Mental Health Insurance in the 1990s: Are Employers Offering less to More? *Health Affairs*. 17(3):201-208.

Kessler R and Frank R. 1997. The Impact of Psychiatric Disorders on Work Loss Days. *Psychological Medicine*. 27:861-873.

Leibowitz A. and M. Chernew. 1992. The Firm's Demand for Health Insurance. Health Benefits and the Workforce. Washington DC: USGPO, 1992.

Leslie D. and Rosenheck R. 1998. Shifting from Inpatient to Outpatient Care? Mental Health Utilization and Costs in a Privately Insured Population. Unpublished paper. Connecticut-Massachusetts VA Mental Illness Research, Education and Clinical Center.

Long JE and FA Scott. 1982. The Income Tax and Nonwage Compensation. *The Review of Economics and Statistics*. 64;211-219.

Marquis S and Long S. 2003. Public Insurance Expansions and Crowd Out of Private Coverage. *Medical Care.* 41(3):344-356.

McCulloch J, Ozminkowski RJ, Cuffel B, Dunn R, Goldman W, Kelleher D, Comporato A. 2001. Analysis of Managed Psychiatric Disability Program. *Journal of Occupational and Environmental Medicine.* 43(2):101-109

McKusick DR, Mark TL, King EC, Coffey RM, and Genuardi J. 2002. Trends in Mental Health Insurance Benefits and Out-of-Pocket Spending. *Journal of Mental Health Policy and Economics* 5:71-78.

Mullahy J. 2003. Statistical Models for Health-related Quality of Life and other Bounded Health Outcome Measures. Presentation at the Medical University of South Carolina, Center for Health Economics and Policy, May 1.

National Institute of Mental Health. 1998 Parity in Financing Mental Health Services: Managed Care Effects on Cost, Quality and Access. An Interim Report to Congress by the National Advisory Mental Health Council.
http://www.nimh.nih.gov/publist/984322.htm

Newey WK. 1987. Efficient Estimation of Limited Dependent Variable Models with Endogenous Explanatory Variables. *Journal of Econometrics*. 36:231-250.

Newhouse JP and The Insurance Experiment Group. 1993. Free for All? Lessons from the RAND Health Insurance Experiment. Harvard University Press. Cambridge, MA

Papke LE and Wooldridge JM. 1996. Econometric Methods for Fractional Response Variables with Application to 410(K) Plan Participation Rates. *Journal of Applied Econometrics.* 11:619-632.

Rask KN and Rask KJ. 2000. Public Insurance Substituting For Private Insurance: New Evidence Regarding Public Hospitals, Uncompensated Care Funds, and Medicaid. *Journal of Health Economics* 19(1):1-31.

Rea Jr. SA. 1981. Workmen's Compensation and Occupational Safety under Imperfect Information. *American Economic Review*. 71(1):80-93. (March).

Rosenheck R, Druss B, Stolar M, Leslie D, and Sledge W. 1999. Effect of Declining Mental Health Service Use on Employees of a Large Corporation. *Health Affairs* 18(3):192-203.

Salkever DS, Shinogle JA, and H. Goldman. 1999. Mental Health Benefit Limits and Cost Sharing Under Managed Care: A National Survey of Employers. *Psychiatric Services*. 50(12):1631-1633.

Salkever DS, Goldman H, Purushothaman M, and Shinogle J. 2000. Disability Management, Employee Health and Fringe Benefits, and Long-Term-Disability Claims for Mental Disorders: An Empirical Exploration. *Milbank Quarterly*. 78(1):79-114.

Salkever DS, Goldman H, and Shinogle J. 2003. Return to Work and Claim Duration for Workers with Long-Term Mental Disabilities: Impacts of Mental Health Coverage, Fringe Benefits, and Disability Management. *Mental Health Services Research* 5(3):173-186.

Salkever D. and Shinogle J. 2000. Empirical Evidence on the Demand for Carve-Outs in Employment Group Mental Health Coverage. *Journal of Mental Health Policy and Economics*, 3:83-95.

Sheils J and Haught R. 2004. The Cost of Tax Exempt Health Benefits in 2004. *Health Affairs*. W4-106. www.healthaffairs.org.

Shinogle, JA. 2001. Firms' Demand for Mental Health and Substance Abuse Benefits. Doctoral dissertation, The Johns Hopkins University.

Shore-Sheppard L., Buchmueller TC, and Jensen G. 2000. Medicaid and Crowding Out: A Re-examination Using Firm Level Data. *Journal of Health Economics*. 19:61-91.

Strunk BC and Ginsberg PB. 2003 Tracking Health Care Costs: Trends Stabilize But Remain High in 2002. *Health Affairs*. 22(4):W266-W274. July-August.

Sturm, R. 1997. How Expensive is Unlimited Mental Health Care Coverage Under Managed Care? RAND Working Paper No. 107. January.

Taube CA, Kessler LG, Burns BJ. 1986. Estimating the Probability and Level of Ambulatory Mental Health Service Use. *Health Services Research*. 21(2 Pt 2):321-340.

Uccello C. 1996. Firm's Health Insurance Decisions: The Relative Effects of Firm Characteristics and State Insurance Regulations. The Urban Institute. (July).

U.S. General Accounting Office. 2000. Mental Health Parity Act: Despite New Federal Standards, Mental Health Benefits Remain Limited. Report to Chairman, Committee on Health Education, Labor and Pensions, U.S. Senate. GAO/HEHS-00-95. (May).

U.S. General Accounting Office. 1996. Health Insurance Regulation: Varying State Requirements Affect Cost of Insurance. Report to Senator James M. Jeffords. GAO/HEHS-95-161. (August).

U.S. Public Health Services, Office of the Surgeon General. 1999. Report on Mental Health.

U.S. Substance Abuse and Mental Health Services Administration, 1995, Inventory of Mental Health Organizations Data.

Wells KB, Manning WG Duan N, Newhouse JP, Ware JE Jr. 1986. Sociodemographic Factors and the Use of Outpatient Mental Health Services. *Medical Care*. 24(1):75-85

Table 1: Characteristics of Employers in the Study Sample (N=250)

Region	**Percent**	**Firm Characteristics**	**Percent**
East North Central	24.80%	Percent with union employees	26.00%
East South Central	2.40%	Total employees, mean	1776
Middle Atlantic	17.60%	Total employees, median	773
Mountain	4.80%	**Benefits Characteristics**	
New England	4.00%	Percent of firms that offer retirement benefits	89.60%
Pacific	12.00%	Total leave, mean days	21.5
South Atlantic	17.20%	% of health insurance premium employer pays	81.90%
West North Central	8.40%	% of firms that pay entire health insurance premium	23.60%
West South Central	8.80%	**Employee Characteristics**	
Industry		% of workforce that is salaried	53.70%
Finance, Insurance, Real Estate	14.40%	% with any union employees	26.0%
Manufacturing	24.80%	% workforce in unions for firms with union employees	43.4%
Services	47.20%		
Retail/Wholesale Trade	5.60%		
Other	8.00%		

Table 2: Dependent Variables

Dependent Variable	**Definition**	**Mean**	**Std. Dev.**	**Median**	**# of 0.0 cases**	**# of 1.0 cases**
MHCOV	% simulated total mental health expenditures covered	62.01 %	0.1353	61.63 %	2	1
MHOPCOV	% simulated outpatient mental health expenditures covered	62.11 %	0.1411	61.95 %	2	1
MHIPCOV	% simulated inpatient mental health expenditures covered	60.92 %	0.2167	58.58 %	2	15

Table 3: Explanatory Variable Names, Definitions and Sources

Variable	Definition	Source
PCTSAL	Percent of salaried workers	Survey
SQPCTSAL	Percent of salaried workers – squared	Survey
MISS_SAL	=1 if percent salaried unknown	Survey
HEAVYALC	Percent of employees with heavy alcohol consumption in the firm's industry	SAMHSA Report
EMP 2, EMP3, EMP4	Dummies for > = 500, > = 1000, >=2000 total employees respectively	Survey
UNION	= 1 if firm has union employees	Survey
HMO	HMO enrollment per capita by state, 1995	Area Resource File
MANDATE	= 1 if firm located in a state with alcohol abuse, drug abuse and mental health treatment coverage mandates in 1995	GAO Reports
MAND_EMP	= 1 if MANDATE=1 and EMP3 = 0 (< 1000 employees)	GAO Reports
PARITY	= 1 if firm located in a state with mental health parity law in 1995	GAO Reports
PAR_EMP	= 1 if PARITY =1 and EMP3 = 0	GAO Reports
UNEMP	State unemployment rate, 1995	BLS website
MTR	Marginal tax rate, 1994	ACIR Report
MULT	Firm has employees in four or more states	Survey
PCTPUBEXP	Percent of specialty mental health expenditures in the state that are publicly funded	IMHO Survey
PREMTAX	Maximum state premium tax	GAO Reports
PREM_EMP	= Maximum state premium tax if EMP <1000	GAO Reports
TOT_COMP	Total compensation per employee (median salary + cost of health insurance plus cost of retirement benefits)	Admin. Data, BLS, CPS
FEMALE	Percent of LTD covered workers who are female	Admin. Data
AGE < =35	Percent of LTD covered workers who are age 35 or less	Admin. Data
AGE > 49	Percent of LTD covered workers who are age 50 or greater	Admin. Data
OCCWC	Percent of LTD covered workers who are white-collar	Admin. Data
OCCBL	Percent of LTD covered workers who are skilled blue-collar	Admin. Data
OCCU	Percent of LTD covered workers who are unskilled	Admin. Data
AAPCC	Average Adjusted Per Capita Costs for Medicare elderly by county in 1996	HCFA Website

Table 4: Explanatory Variable Descriptive Statistics

Variable	Mean	Std. Dev	Variable	Mean	Std. Dev
PCTSAL	0.4856	0.3318	MTR	0.2006	0.0284
SQPCTSAL	0.3454	0.3602	MULT	0.3880	0.4883
MISS_SAL	0.0960	0.2952	PCTPUBEXP	0.1933	0.1728
HEAVYALC	5.8928	2.8665	PREMTAX	0.9480	0.2225
EMP2 (>=500)	0.716	0.4518	PREM_EMP	0.5560	0.4979
EMP3 (>=1000)	0.416	0.4939	TOT_COMP	$32,976	$12,297
EMP4 (>=2000)	0.256	0.4373	FEMALE	0.5193	0.2088
UNION	0.2600	0.4395	AGE <=35	0.3586	0.1312
HMO	0.2021	0.1009	AGE > 49	0.1840	0.0860
MANDATE	0.1240	0.3302	OCCWC	0.8116	0.2022
MAND_EMP	0.0720	0.2590	OCCBL	0.0603	0.1142
PARITY	0.0800	0.2718	OCCU	0.0443	0.0684
PAR_EMP	0.0440	0.2055	AAPCC	$392.74	$75.59
UNEMP	5.5244	1.1927			

Table 5: Tobit Regression results for Total Mental Health Coverage (MHCOV)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.372	0.010	0.346	0.013	0.333	0.017	0.336	0.014
SQPCTSAL	-0.275	0.021	-0.246	0.034	-0.247	0.034	-0.247	0.033
MISS_SAL	0.122	0.006	0.125	0.004	0.114	0.008	0.116	0.006
EMP2	0.031	0.147	0.034	0.100	0.035	0.092	0.037	0.070
EMP3	-0.012	0.815			-0.008	0.880		
EMP4	0.042	0.102	0.044	0.055	0.040	0.115	0.041	0.075
HEAVYALC	0.007	0.035	0.007	0.021	0.007	0.037	0.007	0.032
UNION	-0.022	0.273			-0.021	0.283	-0.021	0.286
HMO	-0.208	0.055	-0.254	0.003	-0.207	0.057	-0.207	0.024
MANDATE	0.029	0.555			0.025	0.610		
MAND_EMP	-0.019	0.755			-0.016	0.785		
PARITY	0.023	0.690			0.026	0.643		
PAR_EMP	0.136	0.063	0.172	0.000	0.133	0.070	0.154	0.000
MTR	-0.340	0.301			-0.300	0.360		
PCTPUBEXP	-0.137	0.009	-0.111	0.020	-0.130	0.013	-0.111	0.020
PREMTAX	0.006	0.759			0.003	0.859		
PREM_EMP	0.010	0.693	0.017	0.114	0.015	0.561	0.018	0.098
FEMALE	0.128	0.017	0.123	0.009	0.169	0.000	0.173	0.000
AGE < =35	0.041	0.704			0.042	0.691		
AGE > 49	0.087	0.585			0.085	0.592		
AAPCC	1.81E-04	0.136	1.41E-04	0.201	1.84E-04	0.132	1.87E-04	0.121
TOT_COMP	8.27E-07	0.296			1.07E-06	0.146	9.85E-07	0.174
MULT	-0.017	0.357	-0.020	0.262	-0.016	0.376	-0.019	0.294
UNEMP	-0.007	0.433			-0.008	0.361	-0.010	0.224
OCCWC	0.089	0.287	0.103	0.099				
OCCBL	0.189	0.102	0.198	0.076				
OCCU	0.034	0.844						
CONSTANT	0.363	0.002	0.353	0.000	0.420	0.000	0.432	0.000

Note: P = 0.000 signifies a p-value <0.0005.

Table 6: Tobit Regression Results for Outpatient Mental Health Coverage (MHOPCOV)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.397	0.008	0.378	0.009	0.339	0.019	0.322	0.022
SQPCTSAL	-0.298	0.015	-0.286	0.018	-0.257	0.034	-0.243	0.041
MISS_SAL	0.137	0.003	0.133	0.003	0.123	0.006	0.122	0.005
EMP2	0.028	0.207			0.034	0.124	0.031	0.140
EMP3	-0.013	0.809			-0.009	0.870		
EMP4	0.046	0.080	0.037	0.057	0.044	0.099	0.042	0.084
HEAVYALC	0.007	0.042	0.007	0.044	0.007	0.043	0.007	0.043
UNION	-0.025	0.225	-0.029	0.158	-0.023	0.271	-0.025	0.221
HMO	-0.222	0.049	-0.242	0.016	-0.224	0.047	-0.259	0.010
MANDATE	0.047	0.356	0.039	0.185	0.042	0.408	0.038	0.202
MAND_EMP	-0.032	0.604			-0.028	0.649		
PARITY	0.003	0.955			0.010	0.873		
PAR_EMP	0.159	0.036	0.159	0.001	0.154	0.043	0.160	0.001
MTR	-0.430	0.206	-0.479	0.154	-0.368	0.280	-0.403	0.230
PCTPUBEXP	-0.146	0.007	-0.134	0.008	-0.137	0.012	-0.129	0.010
PREMTAX	0.003	0.889			0.000	0.993		
PREM_EMP	0.008	0.750			0.014	0.596	0.014	0.200
FEMALE	0.141	0.011	0.140	0.008	0.192	0.000	0.193	0.000
AGE < =35	0.041	0.719			0.035	0.752		
AGE > 49	0.059	0.722			0.052	0.751		
AAPCC	1.63E-04	0.196	1.33E-04	0.253	1.70E-04	0.181	1.30E-04	0.269
TOT_COMP	8.76E-07	0.284	8.85E-07	0.265	1.10E-06	0.154	1.00E-06	0.182
MULT	-0.015	0.420			-0.015	0.425		
UNEMP	-0.006	0.553			-0.007	0.454		
OCCWC	0.105	0.224	0.093	0.170				
OCCBL	0.239	0.046	0.254	0.029				
OCCU	0.082	0.643						
CONSTANT	0.358	0.003	0.407	0.000	0.435	0.000	0.436	0.000

Note: P = 0.000 signifies a p-value <0.0005.

Table 7: Tobit Regression Results for Inpatient Mental Health Coverage (MHIPCOV)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.101	0.682	0.096	0.042	0.268	0.271	0.112	0.013
SQPCTSAL	-0.021	0.919			-0.132	0.521		
MISS_SAL	-0.043	0.567	0.368	0.033	0.007	0.920		
EMP2	0.065	0.079	0.063	0.079	0.055	0.135	0.057	0.117
EMP3	0.004	0.968			0.010	0.915		
EMP4	-0.010	0.816			4.68E-06	1.000		
HEAVYALC	0.007	0.214	0.009	0.090	0.007	0.249		
UNION	0.012	0.730			-0.007	0.832		
HMO	-0.081	0.668			-0.038	0.842		
MANDATE	-0.165	0.051	-0.097	0.071	-0.162	0.060	-0.102	0.063
MAND_EMP	0.118	0.257			0.103	0.330		
PARITY	0.238	0.017	0.167	0.008	0.216	0.033	0.171	0.007
PAR_EMP	-0.093	0.466			-0.073	0.573		
MTR	0.707	0.218	0.691	0.183	0.502	0.386	0.551	0.294
PCTPUBEXP	-0.041	0.647			-0.052	0.570		
PREMTAX	0.039	0.259	0.035	0.152	0.041	0.233	0.041	0.100
PREM_EMP	0.030	0.501	0.034	0.041	0.026	0.568	0.026	0.136
FEMALE	-0.013	0.889			-0.078	0.335	-0.113	0.096
AGE < =35	0.063	0.741			0.131	0.487		
AGE > 49	0.431	0.122			0.470	0.094	0.283	0.092
AAPCC	4.07E-04	0.057	4.19E-04	0.047	3.67E-04	0.091	3.92E-04	0.068
TOT_COMP	5.23E-07	0.705			1.07E-06	0.416		
MULT	-0.039	0.224	-0.036	0.246	-0.034	0.308		
UNEMP	-0.026	0.108	-0.028	0.050	-0.024	0.147	-0.023	0.106
OCCWC	-0.101	0.484						
OCCBL	-0.345	0.086	-0.266	0.053				
OCCU	-0.522	0.078	-0.330	0.142				
CONSTANT	0.402	0.049	0.295	0.010	0.235	0.204	0.365	0.001

Appendix Table 1: IV Tobit Results for Total Mental Health Coverage (MHCOV)

	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.405	0.010	0.335	0.016	0.323	0.017
SQPCTSAL	-0.337	0.017	-0.269	0.023	-0.255	0.026
MISS_SAL	0.116	0.015	0.104	0.016	0.103	0.014
EMP2	0.020	0.430	0.028	0.205	0.032	0.131
EMP3	-0.025	0.668	-0.017	0.754	-0.032	0.195
EMP4	0.031	0.297	0.035	0.173	0.040	0.114
HEAVYALC	0.009	0.027	0.008	0.021	0.008	0.019
UNION	-0.030	0.195	-0.022	0.272	-0.023	0.239
HMO	-0.197	0.094	-0.212	0.051	-0.217	0.018
MANDATE	0.016	0.768	0.020	0.685		
MAND_EMP	-0.002	0.976	-0.007	0.905		
PARITY	0.025	0.690	0.031	0.595		
PAR_EMP	0.108	0.192	0.117	0.119	0.148	0.000
MTR	-0.617	0.166	-0.414	0.227		
PCTPUBEXP	-0.177	0.010	-0.150	0.006	-0.111	0.021
PREMTAX	0.012	0.593	0.007	0.721		
PREM_EMP	-0.004	0.903	0.007	0.792		
FEMALE	0.242	0.053	0.203	0.000	0.199	0.000
AGE < =35	0.191	0.307	0.091	0.427		
AGE > 49	0.215	0.313	0.127	0.437		
AAPCC	1.34E-04	0.335	1.68E-04	0.174	1.65E-04	0.167
TOT_COMP	5.89E-06	0.237	3.16E-06	0.087	2.54E-06	0.109
MULT	-0.018	0.363	-0.019	0.317	-0.019	0.274
UNEMP	-0.014	0.241	-0.011	0.244	-0.011	0.188
OCCWC	-0.063	0.714				
OCCBL	0.055	0.761				
OCCU	0.041	0.826				
CONSTANT	0.310	0.024	0.368	0.001	0.427	0.000
Bassman P		0.1663		0.3867		

Notes: P = 0.000 signifies a p-value <0.0005. Bassman statistic based on linear IV model.

Appendix Table 2: IV Tobit Results for Outpatient Mental Health Coverage (MHOPCOV)

	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.430	0.008	0.340	0.018	0.315	0.025
SQPCTSAL	-0.359	0.014	-0.278	0.023	-0.260	0.029
MISS_SAL	0.131	0.007	0.114	0.011	0.106	0.015
EMP2	0.017	0.512	0.027	0.241		
EMP3	-0.025	0.669	-0.017	0.757		
EMP4	0.035	0.244	0.039	0.144	0.032	0.101
HEAVYALC	0.009	0.032	0.008	0.025	0.008	0.019
UNION	-0.033	0.164	-0.023	0.259	-0.029	0.143
HMO	-0.210	0.082	-0.229	0.042	-0.237	0.014
MANDATE	0.034	0.541	0.038	0.461	0.036	0.212
MAND_EMP	-0.016	0.819	-0.020	0.752		
PARITY	0.005	0.935	0.013	0.822		
PAR_EMP	0.132	0.122	0.139	0.071	0.154	0.001
MTR	-0.703	0.125	-0.473	0.181	-0.544	0.108
PCTPUBEXP	-0.185	0.008	-0.155	0.006	-0.137	0.007
PREMTAX	0.008	0.708	0.003	0.877		
PREM_EMP	-0.005	0.869	0.007	0.804		
FEMALE	0.253	0.048	0.224	0.000	0.227	0.000
AGE < =35	0.187	0.329	0.080	0.500		
AGE > 49	0.184	0.399	0.091	0.589		
AAPCC	1.17E-04	0.415	1.55E-04	0.225		
TOT_COMP	5.86E-06	0.252	3.02E-06	0.113	3.13E-06	0.048
MULT	-0.017	0.420	-0.018	0.366		
UNEMP	-0.012	0.316	-0.010	0.328		
OCCWC	-0.045	0.801				
OCCBL	0.106	0.566				
OCCU	0.089	0.640				
CONSTANT	0.306	0.030	0.387	0.001	0.455	0.000
Bassman P		0.2027		0.2696		

Notes: P = 0.000 signifies a p-value <0.0005. Bassman statistic based on linear IV model.

Appendix Table 3: IV Tobit Results for Inpatient Mental Health Coverage (MHIPCOV)

	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
PCTSAL	0.142	0.590	0.270	0.266		
SQPCTSAL	-0.096	0.684	-0.171	0.408	0.074	0.203
MISS_SAL	-0.050	0.526	-0.010	0.899	-0.035	0.539
EMP2	0.052	0.218	0.042	0.273	0.042	0.244
EMP3	-0.012	0.902	-0.006	0.945		
EMP4	-0.024	0.632	-0.008	0.852		
HEAVYALC	0.009	0.161	0.009	0.155	0.007	0.167
UNION	0.002	0.949	-0.009	0.800		
HMO	-0.066	0.738	-0.047	0.805		
MANDATE	-0.181	0.045	-0.170	0.047	-0.092	0.070
MAND_EMP	0.138	0.214	0.120	0.258		
PARITY	0.240	0.020	0.223	0.026	0.164	0.010
PAR_EMP	-0.127	0.365	-0.104	0.430		
MTR	0.369	0.620	0.296	0.621		
PCTPUBEXP	-0.090	0.430	-0.087	0.362		
PREMTAX	0.045	0.214	0.048	0.169	0.037	0.124
PREM_EMP	0.013	0.801	0.011	0.803	0.024	0.158
FEMALE	0.126	0.546	-0.017	0.852		
AGE < =35	0.244	0.435	0.216	0.278		
AGE > 49	0.587	0.100	0.544	0.056	0.307	0.071
AAPCC	3.49E-04	0.135	3.38E-04	0.119	3.29E-04	0.119
TOT_COMP	6.67E-06	0.423	4.77E-06	0.139	3.62E-06	0.105
MULT	-0.041	0.227	-0.037	0.257		
UNEMP	-0.034	0.088	-0.028	0.088	-0.023	0.096
OCCWC	-0.285	0.322				
OCCBL	-0.508	0.091				
OCCU	-0.514	0.095				
CONSTANT	0.338	0.138	0.143	0.471	0.236	0.041
Bassman P		0.1715		0.0478		

Note: Bassman statistic based on linear IV model.