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THE FEDERAL IMD EXEMPTION AND COST-SHIFTING: AN ECONOMIC ANALYSIS

A Capstone Experience/Thesis Project

Presented in Partial Fulfillment of the Requirements for

The Degree Bachelor of Sciences with

Honors College Graduate Distinction at Western Kentucky University

By

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* * * * *

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2011

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2011

ABSTRACT

Anecdotal evidence suggests that the Federal IMD exclusion has resulted in states opting to shift costs to the government by enacting inefficient Medicaid programs in order to gain federal reimbursement. The claim of "cost-shifting" relies on the assumption that state programs are inefficient – that is, that their Medicaid programs are less effective at reducing incarceration rates (as a metric for failure to properly treat) than their psychiatric hospitals. Literature in the Public Health, Psychiatric, and Criminal Justice fields was surveyed in order to determine relevant factors to be included in the model. Model variables include factors which contribute to mental illness, criminal data, and relevant state expenditures. Availability of data drove inevitable bias in selection of time frame and variables in multiple regressions using data from 2000 to 2010 across the fifty states. Upon analysis, the data do not support the claims made by the Treatment Advocacy Center that the IMD exemption has compromised the welfare of the Mentally Ill. However, the bias created by data selection is substantial enough to limit a conclusion of full support for the null; ultimately this study confirms the need for a more cross-sectional data on the subject.

Keywords: IMD, state, health, cost, mental, regression

Dedicated to William Nicolay, Sabrina Weiner, and Chadwick Meadows

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immense aid to me. My extended family has continued not only to remain in contact, but extremely supportive as well. Finally, I would like to thank my wife, Sarah Rainey, for her valued input and monumental patience when this project took my time away from her.

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CHAPTER 1

INTRODUCTION

The United States federal government's Medicaid program is a public insurance program which provides medical care for individuals with low incomes and disabilities. Though its coverage extends to mental health services, it has the notable exemption of coverage for inpatient psychiatric hospitalization at an Institute for Mental Disease. This distinction has drawn the ire of mental health advocates who claim that it creates a perverse incentive for states to expand community-based mental health coverage at the expense of medically necessary inpatient care (Jaffe & Zdanowicz, 1999). Advocacy groups such as the Treatment Advocacy Center have produced data which states that there are currently more mentally ill individuals in America's prisons than there are in its mental hospitals (Fellner, 2006).

Mental illness accounts for a substantial portion of human services expenses for the federal and state governments of the United States. By crude estimates, mental illness and associated conditions use some 15 percent of Medicaid dollars by way of skilled nursing facilities, intermediate care facilities, state hospitals and general hospital psychiatric facilities (Taube, Goldman, & Salkever, 1990). In addition to the high Medicaid costs of mental illness, prisons certainly are carrying a growing number of mentally ill inmates (Diamond, Wang, Holzer, Thomas, & Cruser, 2001). Human rights advocates blame the ineffective provision of mental health services for this trend, positing that the trans-institutionalization of the mentally ill is the

expression of a faulty system (Fellner, 2006). A survey of academic literature suggests that on the macroeconomic level no study has directly examined the factors which affect the proportion of mentally ill inmates. This study takes the approach of holding the null hypothesis that no trans-institutionalization has taken place. By examining data which act as proxies to system failures such as violence, homelessness, and incarceration rates, this study will attempt to uncover the extent to which the federal IMD exemption affects the state decision-making process.

CHAPTER 2

LITERATURE REVIEW

The first factor to be analyzed is the nature of the mentally ill population itself. In a broad study by Wells et al., psychiatric disorder was defined as a case of major depression, dysthyma, or generalized anxiety disorder, probable panic disorder, or probable severe mental illness (as assessed by a positive score on the composite international diagnostic interview stem item for lifetime mania or from a report of ever having had an overnight hospital stay for psychotic symptoms or of having received a diagnosis of schizophrenia from a physician) (Wells, Klap, Koike, & Sherbourne, 2001). This metric is not perfect for an economic analysis because the diagnostic measures used for non-serious mental illnesses have a high variance from state to state. Race may be specifically collinear to access to or quality of care, since Wells et al. found that racial differences affected access and quality, although the significance of race diminished (but did not disappear) when income, marital status and private insurances status were controlled. This study's definition is difficult to quantify across fifty states with differing standards for diagnosis, and its focus on ethnic differences in care can be addressed in a macro-level study by grouping various study populations by race. However, the diminished prominence of race when accounting for varied factors, the difficulty of tracking racial expression when studying the fifty states at a distance, and limited data from state providers make the metric one worth notice but not use in this paper.

As an alternative to state government-implemented screenings, psychiatric diagnostic standards present a more uniform measure of mental illness. For example, Wang et al. conducted a nationwide study which surveyed households and classified mental illness according to the standards of the DSM-IV. They found that the severity of an individual's mental disorder was a significant factor in determining what type of mental health service was used (such as specialty mental health providers, general medical health, or talk therapy with a psychiatrist). The study found that the type of care being utilized by individuals has shifted over time, implying that the year could substantially affect the structure of care. (Wang, Demler, Olfson, Pincus, Wells, & Kessler, 2006). Wang et al. excluded the institutionalized and the homeless from their survey, which represents a problem for use in a study of trans-institutionalization given the high prevalence of mental illness among the non-surveyed population. Moreover, their emphasis on individual care-seeking patterns did little to address the incentive structure that drives state systems of care. A broader analysis can circumvent these problems by taking into account rates of homelessness across states. This not only serves as a means of capturing access to that population but can also test the relationship between homelessness, crime, and mental illness. A linear relationship between the prevalence of mental illness and the homeless population is asserted by Wells, et al. and establishes a dependent variable with which data from 2006 may be analyzed (Wells, Klap, Koike, & Sherbourne, 2001).

McAlpine & Mechanic confirm that the severely mentally ill population is skewed by race, marital status, sex, education level, and family income, and that 3/5ths of its population received no specialty care. They also find that the severely mentally ill have a comparatively low

degree of insurance coverage and that 37 percent of the seriously ill population received Medicaid or Medicare, which increased the likelihood of reception of specialty care by a factor of six (McAlpine & Mechanic, 2000). The researchers used the Healthcare for Communities survey, which is a national study that tracks alcohol, drug and mental health services utilization by conducting a telephone survey in 60 communities across the United States. This source of data seems to be of great value to many researchers in the literature, but has limited cross-state comparison. Moreover, the survey data has a high cost as it is private, and the affordability of data is a premium in this study. However, it does bring to bear an attack on the notion of a perverse incentive; even if community-based mental health services are sub-par to mental hospitals, their greater affordability and wider coverage may be an effective means of allocation by the metric of reducing homelessness or incarceration, because they allow individuals to maintain Medicaid coverage at relatively low cost to the state.

Medicaid is especially prevalent in the provision of services to the indigent mentally ill, but estimates of federal expenditures are fairly crude (Taube, Goldman, & Salkever, 1990). Taube et al. use the size of the enrolled population and break down Medicaid-using population into heavy, episodic, and persistent users when analyzing data. The services utilized by each population tended to vary, so while this study cannot track the type of user, it can include a variable for the budget and availability of specialty services. These services could be divided between state institutions and community institutions. The former do not receive Medicaid reimbursements from patients; the latter do.

A commonly occurring standard for designating an individual as having a serious mental illness was a diagnosis of schizophrenia or Major Affective Disorder along with at least one inpatient or two outpatient treatment contacts for such diagnosis was used to count serious mental illness. In one stuch study, utilization rates for Medicaid and line-item cost of care were used to determine the financial impact of serious mental illness (Rothbard, Metraux, & Blank, 2003).

In another study by Soumeral et al., Medicaid enrollment files were controlled for age, race, sex, and monthly category of enrollment. Medicaid drug claims and psychiatric admissions of patients with schizophrenia were available for use in the study and represent a clear path to the utilization of Medicaid services in the United States. Because Medicaid does not cover inpatient psychiatric hospitals with more than 16 beds, medical records were used to track individual admission to hospitals (Soumerai, McLaughlin, Ross-Degnan, Casteris, & Bollini, 1994). The study may have been skewed by a medication cap in place in New Hampshire at the time, suggesting that data should use medical caps as a variable. Because this study does not aim to track individual patients but rather the larger structures that affect broader trends, hospital utilization rates, which are available for state-operated institutions but do not offer individual data, should suffice as a metric for estimating access to inpatient care. Utilization rates were limited in comparison to cross-sectional data, but later assumptions demonstrate the use of state expenditures as a proxy.

Wells et al. found that publicly insured minorities were reported as more likely to make use of available mental health services than their non-Hispanic white counterparts (Wells, Klap,

Koike, & Sherbourne, 2001), further confirming the need for racial data by state. Census data tracks race in a way that provides a solid baseline but is so limited in its application that race becomes a question of estimate rather than certainty for a study between 2000 and 2009.

Substance abuse is another factor which has substantial interaction with the mentally ill (Drake, et al., 2001), so availability of substance abuse counseling and the per capita allocation for substance abuse rehabilitation should be controlled. For impacts helpful and harmful, states include substance abuse treatment in expenditure lists for mental illness. The collinear relationship between the two factors makes it difficult to disentangle one from the other, but may not be a problem, considering how much the two have in common.

An analysis of the interplay between mental health services and incarceration rates must control for environmental factors that affect behavior. Mental illness is generally associated with low socio-economic status, which in itself may be a causal factor for contact with the criminal justice system. A study by Draine et al., which focused on the role poverty played alongside mental illness and criminal justice interaction, found that when status is put into the criminal activity regression, the significance of mental illness is reduced. Despite seeming to decrease the importance of mental health, Draine et al. focused primarily on tracking individuals rather than the structural factors that exist on the macroeconomic level (Draine, Salzer, Culhane, & Hadley, 2002). The relationship between social status, mental illness, and crime is an important one but by no means does it delegitimize the importance of examining the relationship between generosity of the state mental health services program and incarceration rates, especially given

the resistance of severe mental illnesses to treatment and the widespread secondary impacts of effective care. Gross State Product, Food Stamp Programs, and employment are all valid measures for mental illness. The Food Stamp Program seems most appropriate as it measures levels of low poverty without bias from high-income individuals.

The hypothesis that the size and scope of a mental health program affect incarceration rates should be compared to the assertions of Draine et al. by adding income level to the equation. Ideally this could be done by listing the mean and median incomes of the incarcerated mentally ill and general population and by listing the mean and median incomes of the control population and mentally ill population outside of prison. However, income data is typically gained from a survey and the mentally ill population is disproportionately indigent; this data could be extremely difficult to gather in certain states depending on how much effort goes into surveying the homeless and transient populations as well as the threshold for privacy. Privacy concerns, while justified, make patient tracking extremely difficult, so this study ought to focus on broader trends in income level on the state-by-state level.

Access to medication is a significant component of the effectiveness of the Medicaid program. Soumeral et al. found that a cap on the amount of medication covered by Medicaid had a profound impact on incarceration and homelessness rates, and that lifting the cap brought those rates back to baseline (Soumerai, McLaughlin, Ross-Degnan, Casteris, & Bollini, 1994). Soumeral et al. focused specifically on individual medication need and were able to make use of medicine claims. Once again Medicaid data can be helpful in obtaining this information,

although this study will not track individual increase or decrease in medication across time. As of this writing, an adequate measure for medication could not be found, but the importance of medication to a policymaker requires that the search be continued.

Contact with the criminal justice system increases the likelihood of receiving specialty care by a factor of four for the seriously mentally ill (McAlpine & Mechanic, 2000). There are a growing number of individuals with mental illness in prison, but there are confounding factors such as an overall increase in arrest rates and new legislation that increases the time offenders spend in prison (Diamond, Wang, Holzer, Thomas, & Cruser, 2001). Diamond et al. indicated that federal law requires a basic screening for mental illness in all new inmates but that further studies within the population were subject to varying observational biases. Another study found that within prisons, gender affected whether services are provided, to the point that Baskin et al. argue that gender is a stronger predictor for the type or quality of mental health services provided than a prisoner's clinical status (Baskin, Sommers, Tessler, & Steadman, 1989). Gender breakdown within each service system should be utilized to address this bias. Although prison mental health services may not be as ideal as non-prison mental services, their prevalence may make statistical significance difficult to determine. If the dependent variable of a study is imprisonment, one could argue that both a positive and negative relationship between incarceration rates and mental health treatment are possible.

It is clear that the environment surrounding the mentally ill in American society is a fairly complex one. The review in literature suggests that these individuals have a high degree of

contact with government services ranging from healthcare to broader social services to prison. Most studies in the literature focus on tracking individuals in order to focus on quality of care. Those that focused on broader questions attempted to glean from data a particular question such as the true size of the mentally ill prison population. The survey conducted was not inconsistent with anecdotal findings that indicate the need for mental health services and the relationship between treatment and incarceration. This implies a model whereby the dependent variable is an expression of "system failure" such as homelessness or incarceration. Independent variables attempt to capture state-controllable efforts representing the variables that affect the mentally ill individual. State budgets are separately considered as independent variables and include the following: State expenditures within the prison system, state expenditures on mental hospitals, state expenditures on community-based mental health care, the size of the overall state Medicaid and Medicare programs, Other independent variables not directly within state control but significant to the model include Gross State Product, population, and the federal Medicaid match ratio.

CHAPTER 3

DATA AND METHODS

The majority of data for this study was provided by the Kaiser Family Foundation, which collects, aggregates, and publishes data from the fifty states, the District of Colombia, and American territories free to the public (Kaiser Family Foundation, 2011). Data collected included the following: Distribution of population by federal poverty level for the year 2009, the average number of monthly food stamp participants for the years 2002-2010, Distribution of General fund spending for the year 2009, Gross State Product for the years 2002 and 2005-2009, the Adult population in state prisons for the years 1999-2009, total Medicaid spending for the year 2009, Violent crime per 100,000 persons for the year 2009, Homeless population estimates for 2009, expenses per inpatient day for hospitals for the year 2009, per-capita state mental health agency expenditures for the year 2006, and the number of mental health care organizations for the years 1992, 1994, 1998, and 2000. The National Association of State Mental Health Program Directors, which has extensive data specific to mental health care for recent years, provided information on Medicaid beneficiaries and payments for the year 2006, the Federal Medicaid Multiplier for the years 2004-2008, and state expenditures for hospital care and community-based care for the years 2006-2008 (NASMHPD Research Institute, 2007).

Gaps in data led to reductions in regression potential. Multiple studies were run to test the existence of a standing relationship similar to that indicated in literature. Since 2006 and 2009 had the most extensive data, each was subjected to a cross-sectional study of available factors. For the years for which federal Medicaid reimbursement rates were known, a rudimentary panel was used to examine the relationship between federal rates and state provision of mental health services.

The following models were tested:

Mental Health Spending per Capita as a linear function of GSP per capita, the cost of overall hospital inpatient care per day, and the federal Medicaid multiplier for the year 2006

Crime per capita as a linear function of mental health spending per capita, GSP per capita, the natural log of state population, and the federal Medicaid multiplier for the year 2006

Violent crime per 100,000 citizens as a linear function of the per-capita share of the state corrections budget, the proportion of citizens living below the poverty line, per-capita Medicaid spending, and GSP per capita for the year 2009

State expenditure on mental hospitals as a function of state expenditure on community care, the federal Medicaid multiplier, Gross State Product, and hospital care expenses via panel data for years 2006-2008

State expenditure on mental hospitals as a function of the federal Medicaid multiplier, Gross State Product, and the number of food stamp enrollees for the years 2006, 2007, and 2008 separately

Tests were run for heteroskedasticity. Because of the ease with which it can be viewed alongside the standard regression, White's correction for heteroskedasticity was run on each model.

Figure 3.1: Descriptive statistics for 2006, 2007, 2008, and 2009

2006

Variable	Mean	StdDev	Minimum	Maximum
Food Stamps	514152.53	543407.40	24236	2622548.00
GSP	257584.67	320215.89	23651	1800779.00
HospExpens	1545.03	366.4776991	773.5700000	2455.24
FedMedicaidShare	0.6034898	0.0790014	0.5000000	0.7600000
IncarcerationRate	409.0000000	143.2106549	151.0000000	846.0000000
Prisoners	27198.14	35808.58	1363.00	175512.00
StateHospitalCare	167.1020408	208.2102548	15.0000000	1108.00
CommunityCare	425.0816327	670.1380404	21.0000000	3519.00

2007

Variable	Mean	StdDev	Minimum	Maximum
Food Stamps	510407.53	525394.36	22608.00	2422198.00
GSP	273660.43	336751.31	24284.00	1883679.00
HospExpens	1616.05	399.2385988	869.1239350	2489.63
FedMedicaidShare	0.5972857	0.0823439	0.5000000	0.7589000
IncarcerationRate	403.2040816	144.4166397	159.0000000	865.0000000
Prisoners	27031.78	35929.07	174282.00	174282.00
StateHospitalCare	180.3151020	222.2826171	16.9500000	1173.20
CommunityCare	473.1951020	761.1291599	22.2600000	3860.35

2008

Variable	Mean	StdDev	Minimum	Maximum
Food Stamps	546780.69	566171.27	22608.00	2532047.00
GSP	277665.08	344670.96	25225.00	1921493.00
HospExpens	1715.06	398.7669916	928.9800000	2512.19
FedMedicaidShare	0.5986204	0.0809993	0.5000000	0.7629000
IncarcerationRate	412.5102041	147.0225496	151.0000000	853.0000000
Prisoners	27816.43	1452.00	173670.00	173670.00
StateHospitalCare	187.0216327	242.2638610	10.8400000	1207.30
CommunityCare	518.6818367	823.4734073	23.6100000	4267.21

2009

Variable	Mean	Std Dev	Minimum	Maximum
% of Population below 100 % of poverty level	0. 1766857	0.0380818	0.1072203	0.2776364
% of population below 125% of poverty level	0.0734193	0.0116562	0.0474861	0.0991997
% of population receiving food stamps	666776.90	682274.95	26762.00	3003156.00
Medicaid spending (in millions)	2067.26	2646.49	142.0000000	11707.00
Corrections spending (in millions)	944.0200000	1417.22	67.0000000	9316.00
Total spending (in millions)	13134.44	15793.13	1153.00	90940.00
GSP (in millions)	281033.96	337513.93	25438.00	1891363.00
Total medical spending (state and non-state, absolute-dollar)	7296897552	9308572364	526237765	49368510253
Violent crimes per 100,000 civilians	382.0340000	158.5698952	119.8000000	702.2000000
Homelessness (%)	0.2152000	0.1727005	0.0700000	1.0400000
Medicaid spending on Mental Health (%)	0.0350829	0.0327000	0	0.1230674
Federal Medicaid Multiplier	.7000620	.0725347	0.5878000	0.8424000
Population	5554885.14	6223254.09	345064.00	33871648
Medicaid Spending Per-Capita	1466.26	1482.26	692.1049750	11411.23
Corrections Spending Per-Capita (in millions)	0.000187160	0.000192895	0.000070401	0.0014519
GSP Per-Capita (in millions)	0.0575508	0.0568705	0.0337141	0.4456507

CHAPTER 4

ASSUMPTIONS

The literature review served not only to direct data collection but also the assumptions of the model when interpreting that data. From the literature, the following assumptions were made.

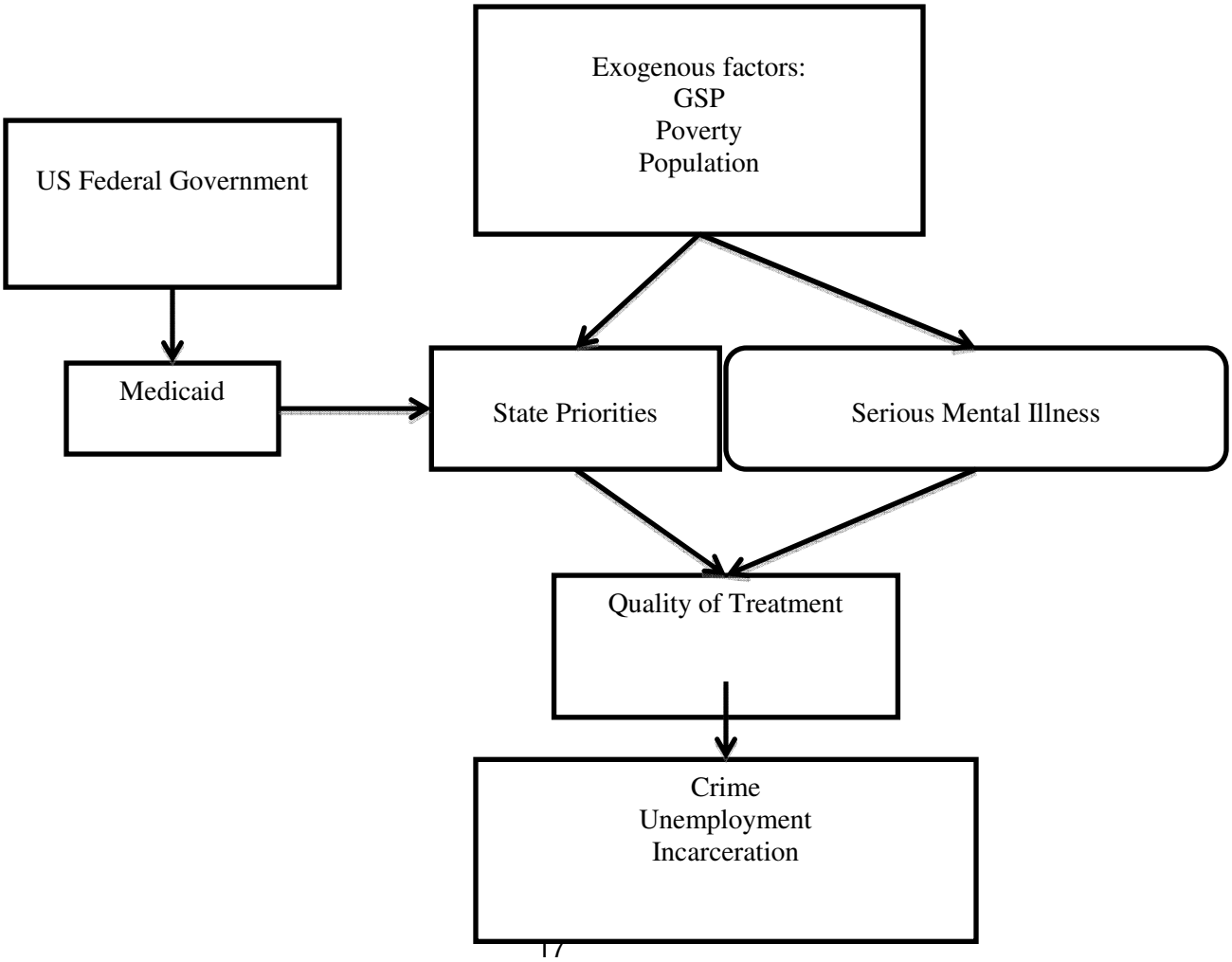
Assumption 1: States will opt for the most efficient cost-benefit ratio possible. Claims of perverse incentives only function insofar as state officers react to those incentives in an attempt to maximize their utility.

Assumption 2: Untreated mental illness will express itself via a "social harm." Note that this assumption is not that all untreated mental illness expresses itself so, but that the rate at which this does so should be constant or with a zero-error term across the states.

Assumption 3: Unmeasured variables not within state control have an error term of zero. This assumption is purely pragmatic and necessary for analysis of the model, but accounts for potential variation in the true mentally ill population of states. The assumption is that the distribution across fifty observations is normal.

Assumption 4: Spending is a sufficient proxy for quality of care by the states. A conversation about healthcare economics with Dr. Zimmer of the WKU economics department indicated that spending is not a perfect measure but is often the best when conducting this type of study.

Figure 4.1: The Underlying Model



CHAPTER 5

FINDINGS

Mental Health Spending per Capita as a linear function of GSP per capita, the cost of overall hospital inpatient care per day, and the federal Medicaid multiplier for the year 2006

This model was run to test the relationship which exists between the state and the size of the treatment budget. While the null was one of no relationship, the theory was that Medicaid would sabotage this relationship and exhibit a negative correlation once other factors were held constant.

Figure 5.1 indicates a study of all 50 states in 2006 which meets the expected directionality of most items. According to the linear model, an increase in GSP per capita is accompanied with a marginal increase in mental health spending per capita, although the amount by which it does so is negligible and below the value of statistical significance. Likewise, the federal Medicaid multiplier has a negative correlation with mental health expenditure per capita, albeit it too is not statistically significant. The variable for inpatient costs in hospitals, designed to measure the effect of hospital costs on state choice, seems to have a positive correlation with mental health spending, going against what we know about the law of demand. To add insult to

injury, it has the largest t value in the entire regression. Critical T for rejection of the null was 2.02; no factor in the model meets this threshold. This last variable can be explained if one assumes that assumption 1 was not entirely correct. Public choice would indicate that states, unlike private entities, set goals in a manner which is insular to the law of demand. In this case, it makes sense that high-cost states spend more on treatment – they are simply absorbing the higher costs directly into their budgets.

The R-square and adjusted R-square values are not surprising in this context.

The Adjusted R-square value of .0684 demonstrates how ineffective the model is at explaining state mental health spending. Omitted variable bias is likely an explanation for the factor on inpatient costs, but even with such a variable, the situation is not as clear-cut as the Treatment Advocacy Center indicates. This tenuous relationship certainly highlights the value of continued observation, but casts doubt on later models which are predicated on the assumption that the Medicaid program's influence is greater than it truly is.

Figure 5.1: Mental Health Agency Spending per capita as a function of GSP per capita, Inpatient Hospital costs, and the federal share of Medicaid spending

Variable	Coefficient	T-value
Intercept	103.82821	0.62
GSP Per-Capita	0.00072789	0.47
Inpatient Treatment Costs	0.02980	1.12
Federal Medicaid Share	-126.33514	-0.76
R-Square = 0.1255; Adjusted R-Square = 0.0684		

Crime per capita as a linear function of mental health spending per capita, GSP per capita, the natural log of state population, and the federal Medicaid multiplier for the year 2006

This model is a test of the treatment programs themselves, and relies on the assumption of expression. Theory posits that untreated mental illness expresses itself via crime, unemployment, and homelessness. Adequate treatment is often defended on the grounds that it keeps the mentally ill out of prison. The regression does not seem to indicate that the mental health system has a significant impact on crime per capita, but findings are nevertheless interesting.

The model seems to be much more explanatory than the previous, with an R-square value of .396 and an adjusted R-square of .342. Critical T remains at 2.02 for rejection of the null with 95 percent confidence. Among the variables, mental health spending per-capita holds a sign consistent with expectations in that a marginal increase in such spending is accompanied with a decrease of -.00000287 violent crimes per 100,000 individuals, or -.287 per capita. However, with a t value of -.84, it is not sufficient to reject the null hypothesis. The value of GSP per-capita has a small but highly significant relationship with crime, yet runs in the opposite direction of prevailing theory that wealth decreases incentives to crime. This measure does not take into account stratification of state wealth, however, and should not be taken on its own as a rejection of common theory on this relationship. For instance, states with high wealth and high poverty (such as New York) may experience greater crime than states with lower overall wealth but far less poverty. The variable for the natural log of population demonstrates that a growth in state

population by one percent is accompanied with an increase in violent crime on the order of .126 incidents per 100,000 people. With a t-value of 2.53, it also exceeds the critical threshold for rejection of the null, and seems to fit the notion that higher-population states have more opportunities to bump shoulders. The federal Medicaid multiplier, which measures the amount of Medicaid costs in the state borne by the federal government, is also statistically significant in its positive relationship with crime. According to the model, a percentage point increase in the federal share is accompanied with an increase of .0196 violent acts per 100,000 citizens. Although such a finding makes this researcher happy, odd directionality in the rest of the model is a call to skepticism. Moreover, the inability of the previous model to demonstrate the federal Medicaid program's ability to sway state decision-making makes it difficult to take this conclusion as causal evidence rather than incidental. More research is needed.

Figure 5.2: Violent crimes per 100,000 citizens as a function of state mental health spending per-capita, GSP per capita, the natural log of the population, and the federal government share of Medicaid spending, 2006

Variable	Coefficient	T-value
Intercept	-0.02337	-3.80
MHA Spending Per-Capita	-0.00000287	-0.84
GSP Per-Capita	0.000000186	4.90
Log(Population)	0.00126	2.53
Federal Share of Medicaid	0.01957	4.73
R-Square = 0.3957; Adjusted R-Square = 0.3419		

Violent crime per 100,000 citizens as a linear function of the per-capita share of the state corrections budget, the proportion of citizens living below the poverty line, per-capita Medicaid spending, and GSP per capita for the year 2009

This model is another expression of the previous, this time using violent crime (a favored statistic, since violent crime is somewhat less rational and a better measure of untreated severe mental illness) as the dependent variable. Poverty data was available for this year and was an input for violent crime to hold external variables constant.

Adjusted R-squared for this model is .29, indicating that statistically significant variables in the model are worth the attention of policymakers. For the model, the impact of Medicaid on crime is dwarfed by that of poverty. The corrections budget has a weak but positive correlation with violent crime rates as one would expect. Since corrections affects violence by working to deter it while violence encourages the state to expand the program, it is not surprising to find that each thousand-dollar increase in per-capita corrections spending is accompanied with an increase of .583 crimes per 100,000 citizens. The t-value is below significance, likely due to a conflicted relationship between the variables. The variable for poverty is absurd, with an indication that an increase in the poverty rate by one percent accounts for an additional 2398 crimes per 100,000 citizens, an unrealistically large number. At 4.32, its t-value is above the rate for rejection of the null. That this is unrealistic number is the most significant variable seems to indicate a flaw in the model more than anything else – all data here should be treated with skepticism. Medicaid spending per capita has a weak but negative relationship on crime. According to the model, an

increase in 1000 medicaid dollars per capita is correlated with a decrease of -.0379 violent crimes per 1,000 people. With a t-value of -.7, it fails to meet our needs for rejection of the null. The marginal thousand-dollar increase in GSP per capita accounts for an increase of .00341 violent crimes per 100,000 citizens. With a t-value of 1.29, it fails to reject the null of the relationship. The implications of this model are that state policymakers are still likely correct to focus their efforts at relieving poverty in order to reduce crime. The rhetoric of the Treatment Advocacy Center, which attempts to use crime studies to bring citizen concern to their interests, could backfire if violence prevention becomes the justification for mental health policy. States have a responsibility to provide adequate care for the severely mentally ill, but their other priorities may necessitate spending more time focusing on the factors that greatly influence crime; a hard lesson for mental illness advocates.

Figure 5.3: Violent crime per 100,000 citizens as a linear function of the per-capita share of the state corrections budget, the proportion of citizens living below the poverty line, per-capita Medicaid spending, and GSP per capita for the year 2009

Variable	Coefficient	T-value
Intercept	-256.83982	-1.49
Corrections Spending Per-Capita	0.58340	1.46
% below poverty line	2398.54290	4.32
Medicaid spending per-capita	-0.03785	-0.70
GSP Per-Capita	0.00341	1.29
R-Square = 0.3512; Adjusted R-Square = 0.2935		

State expenditure on mental hospitals as a function of state expenditure on community care, the federal Medicaid multiplier, Gross State Product, and hospital care expenses via panel data for years 2006-2008

This random effects panel was conducted from 2006 to 2008 across states because of the tumultuous time period that took place during the observations. The bubble in 2006, which burst in 2007, led to the start of a rough economic crisis in 2008. By assuming that state identities and priorities were radically changed during this time, the model held that external factors were at play.

The purpose of this model was to test state responsiveness to federal Medicaid incentives over time. If the literature review is true, an increase in the federal share of Medicaid should encourage states to increase the share of community-based care at the expense of their state-run institutions, which are not Medicaid-eligible. The basic panel regression finds that an m-value of 9.62 is sufficient to reject the null hypothesis for the model at 95 percent confidence. However, while the federal share of Medicaid expenditures has a negative correlation with state hospital expenditures, the t-value is nowhere near the rejection range and cannot be counted on to explain the model. The presence of community care, which is collinear, indicates very simply that large states spend more on both programs, and after examination the decision was made to run a second panel regression which used the ratio of state-to-community care as a dependent variable rather than have a factor which could take significance from other factors. It is nevertheless worth noting that aside from the weak correlation with hospital expenses, gross state product was also a

strong predictor, meaning that states tend to spend on mental health with some consistency to the overall budget.

Figure 5.4: State expenditure on mental hospitals as a function of state expenditure on community care, the federal Medicaid multiplier, Gross State Product, and hospital care expenses via panel data for years 2006-2008. (RanTwo estimation method)

Variable	Coefficient	T-value
Intercept	7.529864	0.07
CMHC spending	0.077502	4.56
Federal Medicaid Share	-80.2261	-0.51
GSP	0.00053	7.49
Hospital Expenses	0.02352	1.07
R-Square = 0.5484		

State expenditure on mental hospitals as a function of the federal Medicaid multiplier, Gross State Product, and the number of food stamp enrollees for the years 2006, 2007, and 2008 separately

In order to better understand the data within the panel, each year was run as a separate regression in addition to the original model. If the IMD exemption truly exhibits a perverse incentive that affects state calculus, the relationship ought to express itself in multiple models.

In the year 2006, Gross State Product remains the most significant predictor of state expenditures on hospital care. With a t-value of 4.3 and a rejection threshold of 2.2, the marginal value of GSP, small as it may be, is strong. The federal government's Medicaid share is once again weak but negative, establishing a pattern in this research of non-rejection yet justifying the call for further study. The t-value of -1.24 does not give sufficient reason to claim that the model's prediction that a percentage point increase in federal share decreases state expenditures on hospital care by 296 dollars. The variable for food stamps, which attempted to get at the measure for poverty, has a t value of 0.04 and is not sufficiently intriguing to warrant discussion. The R-square adjusted value of .729 certainly gives the model some credibility, though it seems to be overshadowed by GSP.

For the year 2007, the R-square of the model drops while the adjusted R-square increases to .755. For the model GSP is once again highly significant, the federal share in Medicaid is weak but negative (this time representing a 254 dollar decrease in state hospital funding for each percentage point rise in federal government Medicaid share), and food stamps remain

insignificant. However, heteroskedasticity is confirmed with a chi-square value of 29.72. With white's correction, conclusions based on t-values do not change, although the federal Medicaid share gains some small bonus to significance with a t-value of -1.39.

For the year 2008, R-square and adjusted R-square valued increase such that adjusted R-square is .794. Data once again confirms GSP as the most significant variable, federal Medicaid share as negative but weak, and food stamps as insignificant.

Per-capita data was not available over the course of the regression. The normal method of utilizing census data and finding an estimate for population was not satisfactory during the time period because of the unpredictability of population movement over the course of the financial crisis. Instead, large factors that exist independent of per-capita data were used. While this reduces bias and the amount of guesswork involved, it also makes it more difficult for models to escape the role of raw population size.

Note the decreasing significance of the Medicaid program over the course of time. This could imply that a former perverse incentive is reaching a plateau – it may have been a major factor in the past, and is only beginning to dwindle. Data used for this paper is unable to comment either way on the potential "plateau effect" but does serve to indicate an area ripe for future research.

Figure 5.5: State expenditure on mental hospitals as a function of the federal Medicaid multiplier, Gross State Product, and the number of food stamp enrollees for the year 2006

Variable	Coefficient	T-value
Intercept	208.83356	1.42
Federal Share of Medicaid	-296.51523	-1.24
GSP	0.00052701	4.30
% of Population on Food Stamps	0.00000284	0.04
R-Square = 0.7462; Adjusted R-Square = 0.7293		

Figure 5.6: State expenditure on mental hospitals as a function of the federal Medicaid multiplier, Gross State Product, and the number of food stamp enrollees for the year 2007 (after White's Correction for Heteroskedasticity (p=.05))

Variable	Coefficient	T-value
Intercept	180.29283	1.78
Federal Share of Medicaid	-254.69513	-1.39
GSP	0.00055408	4.25
% of Population on Food Stamps	0.00000102	0.01
R-Square = 0.7700; Adjusted R-Square = 0.7546		

Figure 5.7: State expenditure on mental hospitals as a function of the federal Medicaid multiplier, Gross State Product, and the number of food stamp enrollees for the year 2008

Variable	Coefficient	T-value
Intercept	143.79093	1.00
Federal Share of Medicaid	-203.69566	-0.86
GSP	0.00066798	5.26
% of Population on Food Stamps	0.000003714	-0.50
R-Square = 0.8064; Adjusted R-Square = 0.7935		

IMD to Community Care Ratio as a function of Federal share of Medicaid costs and Gross State Product, 2006 through 2008

A model that attempts to explain state ratio of IMD spending to community care spending by the federal government's Medicaid share is surprisingly ineffective, giving paucity to anybody assuming that the federal government and not the states are responsible for institutional shifts. Conclusions on the strength of federal share and GSP remain the same as in the prior discussion with the simple alteration that the model no longer enjoys the simple benefit from the relationship between GSP and raw program size.

The motives for the simple model were to examine on the broader level whether or not a basic relationship existed. Of course, other variables greatly affect the output of the model, but the extremely low R-Square values indicate that advocates should focus their time on matters other than the Medicaid exemption, which appears to have little impact in modern times on state expenditures. In fact, from 2006 to 2008, the federal share of Medicaid had a positive relationship on state expenditure on IMDs, contrary to the expectations of the model. Perhaps states do set their agendas independent of the influence of the federal government. Once more one thinks of public choice analysis, whereby the state does not respond to incentives the way a rational market actor would.

Figure 5.8: IMD to Community Care Ratio as a function of Federal share of Medicaid costs and Gross State Product, 2006

Variable	Coefficient	T-value
Intercept	-0.11377	-0.24
Federal Share of Medicaid	1.16442	-1.54
GSP	0.0000000589796	-0.32
R-Square = 0.0663; Adjusted R-Square = 0.0257		

Figure 5.9: IMD to Community Care Ratio as a function of Federal share of Medicaid costs and Gross State Product, 2007

Variable	Coefficient	T-value
Intercept	-0.09247	-0.19
Federal Share of Medicaid	1.08157	1.39
GSP	0.0000000250173	-0.14
R-Square = 0.0496; Adjusted R-Square = 0.0073		

Figure 5.10: IMD to Community Care Ratio as a function of Federal share of Medicaid costs and Gross State Product, 2008

Variable	Coefficient	T-value
Intercept	-0.0228	-0.01
Federal Share of Medicaid	0.87379	1.32
GSP	0.000000004274	-0.03
R-Square = 0.0410; Adjusted R-Square = -0.0007		

CHAPTER 6

CONCLUSION

Conclusions can be difficult to draw even for models that were statistically significant due to bias in data selection. A longer view on the time frame of events may yield greater understanding than the experiment conducted here. Advocates for mental health reform can opt to either take the findings as a sign of the reversal of an old trend or as a call for improved study. This researcher believes the truth to be some combination of the two.

Without statistical significance in any area, the federal government's share in Medicaid does not seem to be the strongest predictor of state actions nor is it predictive of the actions of society at large, where one would expect the mentally ill to express gaps in treatment. Three explanations are possible: No relationship exists, a relationship exists but was obscured by bias in the data, or a relationship exists but was obscured by an assumption which is not true. Perhaps the mentally ill do not gain treatment the same way that one would expect, or perhaps they do not act out in predictable ways when their illness remains untreated. Moreover, perhaps states are now more genuinely concerned with high-quality care than they are with bending to the Medicaid incentives put forth by the federal government. However, one should not be brash to make such a

call one way or another. Instead, future research projects should attempt to better examine the assumptions which are anecdotally common but rare on the macroeconomic level.

Maintenance of the null is also a call to skepticism of those who use claims of a relationship to advocate their legislative agenda. It is entirely understandable why a mental health treatment advocate would claim that the federal IMD exclusion in Medicaid causes problems, yet economists have a duty to examine these claims. At the same time that we approach matters of advocacy with healthy skepticism, the data should not stand in the place of a meaningful discussion on federal policies. That many mentally ill live in our nation's jails is undeniable, and so long as the criminalization of mental illness is widespread, clarification and research are in the best interests of all.

CHAPTER 7

FUTURE WORK

Missing data and inability to accurately break state expenditures into per-capita variables prevent the null confirmation to have a lasting effect. Future work in the area should begin with wider availability of data on the behalf of the states. If the small investment of increasing availability were made, economists and advocates alike would be better-positioned to make rational claims with lasting merit.

Survey methods were the most frequently used by treatment advocates, which has contributed to the lack of working data for this study. Great attention must be given to the macroeconomic variables that affect the state's relationship with mental illness. For instance, accurate data on hospital beds is more available for the decade 1990-2000 than from 2000-2010, but is harder to study due to the lack of readily accessible data for the most recent decade.

Greater emphasis will be given to studying alternative models of expression – for instance, adding to the model which predicts homelessness, as data on the phenomenon is becoming magnitudes more accurate and accessible. This variable should be preferred over violence because it seems to be less immune to the culture of one state, more responsive to law than to culture, and because mental illness accounts for a larger proportion of the homeless population. A robust model of this sort would likely reflect the true nature of the Federal Medicaid incentive structure's authority over state expenditure.

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