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ABSTRACT

Broad claims are frequently made that new medications will offset all or part of their costs by reducing other areas of Medicaid spending. In this paper we examine the net impact on spending for new drugs used to treat schizophrenia. We extend research in this area by taking a new approach to identification of spending impacts of new drugs. We specify and estimate models of spending on treatment of schizophrenia using 7 years of Florida Medicaid data. The estimates indicate that use of the new drugs result in net spending increases. This may be due to increased adherence to treatment.

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Introduction

Most researchers, while recognizing the benefits of medical innovations, regard adoption of new technologies as the primary determinant of increasing health care costs (Cutler 2002). At the same time, promoters of new medical technologies – a drug, device or other treatment -- often claim that the innovation will offset all or part of its costs by reducing other areas of medical spending. Drugs and devices are vetted by regulators for advances in effectiveness. If the innovation also reduces cost, it obviously satisfies any criterion for cost-effectiveness and the innovation merits immediate adoption. Broad claims about cost offsets have recently been made with respect to innovations in prescription drugs. Lichtenberg (2001) concludes that overall, new drugs more than pay for themselves in the form of reduced medical spending elsewhere. If such findings survive scrutiny they cast a very different light on the cost of medical innovation, implying it may reduce, not increase health care costs. In this paper, we focus on a clinical area where cost offsets from a new drug are plausible, treatment for schizophrenia. We test for the link between introduction of new drugs to treat schizophrenia and total costs of treating the disease.

Schizophrenia is a chronic and relapsing illness. It is very expensive to treat and episodes of inpatient care are common. Older anti-psychotic drugs are effective in control of symptoms but produce side effects, such as tardive dyskensia, that are uncomfortable, impairing and stigmatizing. Low adherence inhibited effective treatment regimens (Lehman, 1999, USDHHS, 1999). The new generation of anti-psychotic medications, referred to as atypical anti-psychotic drugs, are also effective in treating symptoms and generally regarded as better tolerated, although they do have side effects of their own

(weight gain and diabetes). The offset hypothesis in this clinical area is that the greater tolerability of the new anti-psychotics will improve adherence to treatment regimens and thereby reduce relapses, which in turn will result in declines in the use of hospital and emergence room services.

To test for this effect, we use data on a sample of people with schizophrenia enrolled in Florida's Medicaid program. We make use of the timing of FDA approval for three atypical antipsychotic agents (Olanzapine, Serquel and Geodon) along with geographic variation in take-up of these new agents to identify the effect of the use of atypical antipsychotic on total mental health spending for people with schizophrenia. Our findings confirm results found in another context by Duggan (2005): the evidence does not support the presence of a cost offset.

The paper is organized into four additional sections. In section I we provide some background on treatment of schizophrenia and clinical research on office effects stemming from use of new drugs. Section II sets out our approach to modeling the cost offset using Medicaid data. Section III reports results form several empirical models. The final section discusses some implications and conclusions drawn from the results.

Background

Schizophrenia is severe, persistent and disabling. Most people with schizophrenia qualify for public disability program such as Supplemental Security Income (SSI) and Social Security Disability Insurance (SSDI) making Medicaid the largest single purchaser of anti-psychotic drugs in the nation (accounting for about 75% of all sales (Frank, Conti and Goldman, 2005). Schizophrenia is also very expensive to treat. In 2001, Florida Medicaid spent an average of approximately $9600 per year for the mental health care of

Medicaid enrollees with schizophrenia. Approximately 30% of Medicaid enrollees with schizophrenia are hospitalized each year and 13% have two or more hospital admissions each year. The average payment by Medicaid for an inpatient stay for schizophrenia is about $4,700. Hospitalization can occur if patients stop taking their medications and their symptoms worsen (US DHHS, 1999, p 282). If the atypical drugs lead to higher levels of treatment adherence, hospitalizations and emergency room visits that occur in connection to acute flare ups of symptoms might be reduced.

Clozapine, introduced in 1990, was the first atypical anti-psychotic drug, followed by Risperidone in 1994, Olanzapine in 1996 and Seroquel in 1997. Clozapine poses the risk of agranularcytosis, a life threatening condition that affects white blood cell levels. Clozapine users must be monitored very closely, making administration of the drug costly and cumbersome, and limiting the use of this drug.

A number of studies in the clinical literature have examined the offset hypothesis for the atypical anti-psychotic drugs, with inconsistent methods and findings. We discuss several key papers here (see Busch et al 2006, for a review of this literature). Schiller, Shumway and Hargreaves (1999) compared 56 schizophrenic patients treated with Risperidone to a matched group of 56 patients treated with conventional antipsychotic medication (eg. haloperidol) and followed them for 12 months. The study also collected data on the 12 months prior to the initiation of Risperidone for both groups. There was no significant difference in spending between people taking Risperidone and those taking conventional antipsychotic drugs except for the prescription drug category, which was higher for the Risperidone group. Schiller et al (1999) compared expenses for Risperidone and conventional drug users for the experimental year. It is possible, using

the per-year data reported in the paper, to conduct a crude differences-in-differences estimate for total mental health spending and inpatient spending. These estimates would lead to different results if the baseline spending of the experimental and control were different. In fact, in the "before" period the Risperidone group spent about twice as much on average as the control population ($8,800 vs. $4,450). The results obtained from the difference in difference calculations are somewhat different from those reported in the paper. Total spending attributable to the new drug was $1051 higher compared to the cross section estimate of $370. Inpatient spending attributable to the new drug was $-1571 compared to $129 reported in the paper. Nevertheless, there was no overall offset observed in either case.

Nightengale and colleagues (1998) used medical records and administrative data to study the experience of a matched cohort of schizophrenic patients that were taking one older anti-psychotic medication (Haloperidol) or a newer atypical agent (Risperidone). The study compared the two groups for 17-months with a covariance model to estimate the spending differences attributable to the use of the newer anti-psychotic agent. Statistically significant inpatient offsets of $424 were found for Risperidone, but overall savings of (including the higher costs of the newer medication) $123 were not significantly different from zero.

Duggan (2005) used nine years of Medicaid claims data from California to study the experience of people with schizophrenia. He used three approaches to identify estimates of the impact of atypical antipsychotic medication on total spending. First, he used discontinuities in the use of atypical antipsychotic medications during the 1990s to examine changes in spending patterns for people treated for schizophrenia. The second

approach used differential rates of diffusion in the use of atypical antipsychotic medications across geographic areas (zipcodes) to examine differential spending changes for treatment of schizophrenia. A third approach made use of differential rates of prescribing atypical antipsychotics across psychiatrists (after controlling for patient mix) as an instrument to examine spending patterns for patients treated with the newer antipsychotic medications. For all methods, Duggan estimated a *positive* and significant impact of the new drugs on spending for the treatment of schizophrenia, thereby rejecting the net offset hypothesis.

In this paper we extend the literature by taking a different approach to identifying the "offset effect" and by using data from another large state with different local mental health delivery arrangements.

Modeling Cost Offsets

If a new more effective treatment technology is introduced into practice, it may substitute for other treatment inputs (e.g. antidepressants may substitute for psychotherapy achieving comparable or superior outcomes) or the new treatment may contribute to improved health to such a degree that the use of downstream health services might be prevented (e.g. hospitalizations). Both of these mechanisms might produce cost offsets for a new treatment. Of course new treatment may be effective and worthwhile without any offset. If a new treatment is complementary to other health care inputs, the new treatment would both increase cost and improve outcome.

We build on Duggan's approach and use Medicaid data from two urban communities (Jacksonville and Orlando) Florida for the years 1994-2001 and estimate models of person – year mental health care spending for individuals with schizophrenia enrolled in

Florida's Medicaid program. We regard treatment with an atypical antipsychotic drug as endogeneous to spending. That is, we recognize that factors that we do not measure (e.g. illness severity) likely affect both the choice of drug to be prescribed and the level of mental health spending. We use an instrumental variables approach to estimating the effect of atypical antipsychotics. Like Duggan, we use differences across geographic areas to help identify the impact of the new medications on spending levels. However, we also use a set of clearly exogenous shocks to drug availability, the timing of FDA approval of specific agents for marketing. We interact time related shocks with geography to help in identification. We estimate offset effects for both the class of atypical antipsychotic agents as well as for individual agents that were introduced into the market between July 1994 and July 2001.

A. Identification:

The U.S. health care system has long been characterized by clear but hard to explain variation in clinical practice across geographic areas (Wennberg and Gittleson, 1973). Physician practice patterns lie behind the geographic irregularities and one recent paper (Perry 2006) uses treating physicians as an instrument for whether a mother is likely to be treated for depression. Variations in diffusion of new health technologies have frequently been shown to be driven in important respects by factors that are not directly related to total spending on treatment. Recent research on diffusion of prescription drugs shows that prescribing patterns are explained by local conditions not associated with the severity of patient illnesses across regions (Coscelli and Shum 2004; Block and Kollinger 2006). This suggests that the interaction of an indicator of the launch of a new product and a geographic region would capture exogenous differences in response to new product

introductions. We choose two areas of Florida that are geographically separate, have similar mental health supply conditions and similar trends in the use of new antipsychotic drugs during the initial introduction of the new agents 1994-1997. The diffusion paths for atypical antipsychotic agents (Seroquel and Geodon) differ starting in 1997. We make use of this variation to identify the impact of the new drugs on total mental health care spending.

During the period from July 1994 to July 2001 there were three new drugs (Olanzapine, Seroquel and Geodon) approved by the FDA. The decision by the FDA is clearly independent of mental health spending levels in geographic regions of Florida. This time-related variation is one of our instruments. In sum, our instruments measure the time of introduction of specific new products and the interaction of approval timing with the geographic area.

We measure the supply shocks from FDA decisions in two ways. In the first approach, we specify a set of dummy variables that take a value of one if a specific drug was approved for sale during a fiscal year and zero otherwise (three indicators during the observed time period). The second approach specifies a count of the number of agents in the class available for sale in each year. The interaction of these variables with an indicator for geographic region are additional instruments in the model. Figure 1 shows the differential rates of take-up of the new drug class across the two geographic regions. Note that the lines clearly separate beginning in the latter half of 1997, after the third drug in the class (Seroquel) was launched.

In the models reported below we use both sets of specifications of the instrumental variables. We test the power of the instruments (Staiger and Stock 1999) and

examine the effect of the instruments by comparing the estimated coefficients from an ordinary least squares model to the instrumental variables estimates.

B. Data:

Schizophrenia is defined by ICD-9 codes in diagnostic category 295. A person is regarded as having schizophrenia and is included in the data if there are claims for two 2 face-to-face outpatient visits with a diagnosis of schizophrenia or one inpatient admission with a primary diagnosis of schizophrenia. The unit of analysis is the person fiscal year over a span of 7 years (1994-1995 through 2000-01). Inclusion required enrollment in Florida Medicaid for at least 10 months in a fiscal year. The resulting sample consisted of between 1764 and 2103 people per year. The analysis file used for estimation consisted of 13, 449 person-years of data.

Enrollment files report basic demographic information such as age, gender, race/ethnicity and reason for eligibility (e.g. Temporary Assistance for Needy Families (TANF) or Supplemental Security Income (SSI)). Claims were used to identify diagnoses (schizophrenia and co-morbid substance abuse), mental health care spending levels, and type of psychotropic drugs being used. Spending was calculated by summing all the payments made for services with a mental health diagnosis, a mental health procedure (e.g. psychotherapy) or a psychotropic drug that is primarily used for mental health treatment (antidepressants, antipsychotics, and mood stabilizers).[1] Table 1 reports descriptive statistics for the sample used in the analysis.

[1] Benzodiazepines like lorazepam were excluded because of the significant use for conditions other than mental disorders.

C. Estimation

The instrumental variables model consists of two equations.[2] The first-stage equation explains whether or not a Medicaid patient with schizophrenia was treated with an atypical antipsychotic drug, a qualitative outcome.[3] In the second stage we estimate an equation for per year spending on all mental health care by a Medicaid patient with schizophrenia. Most but not all people in the data appear in multiple years.

The key outcome in this analysis is the level of mental health spending. Since mental health spending is skewed right we use a logarithmic transformation to achieve approximate normality. This transformation implies that the response to the introduction of new technology is proportional to spending not a constant amount independent of spending level, a plausible specification in this context.

We use a dichotomous indicator to measure whether someone was treated with an atypical antipsychotic drug, an endogenous regressor. The instrumental variables model can be specified as either as a structural shift (Heckman, 1976) or as a latent index (Lee, 1982). The structural shift approach, our choice, implies that changes in the underlying propensity to use atypical antipsychotic agents have no impact on spending unless the change moves the patient above a threshold where they actually fill a prescription and take the drug. The latent index model, in contrast, assumes that an incremental change in the latent index will continuously effect spending levels on treatment of schizophrenia. Since one either takes or does not take a particular type of antipsychotic drug the structural shift approach was more natural. The method of moments estimator is used to

[2] We also conduct sensitivity analysis where we estimate a model with three endogenous indicators, one for each atypical antipsychotic drug that entered the market between 1994 and 2001.

[3] Some have suggested using class of antipsychotic agent and appropriate level of dosing (Lehman, 1999). We investigated this and found that the levels of dosing for both the newer and older drugs were similar at about 70% and constant overtime. Thus there was little informative variance in dosing levels.

implement the structural shift IV model.[4] We account for repeated measures using White's correction.

The exogenous right hand side variables used in the model are listed in Table 1. As noted above we use two sets of instruments. In one model we specify dummy variables for each of the three atypical antipsychotic agents that were approved by the FDA for marketing during the study period and their interaction with the geographical area indicator (six instruments). The second model included a count of the number of atypical antipsychotic drugs on the market and the interaction of that variable with the geographic region (two instruments).

Results

Figure 2 shows mental health spending per person year for the sample of people with schizophrenia in the Orlando and Jacksonville regions for 1994-1995 through 2000-01. The Orlando region had both a higher take up rate of atypical antipsychotic drugs (figure 1) and greater growth in mental health spending than the Jacksonville region (figure 2).

A. First Stage Results and Implications for Diffusion

Table 2 presents the first stage estimates for the structural shift model. There are several notable findings regarding patterns of diffusion for atypical anti-psychotic drugs. Blacks are about 12.2% less likely to receive an atypical anti-psychotic drug than whites. This is particularly important since blacks have been found to be more susceptible to side effects from conventional anti-psychotic drugs than area whites (Glazer Morgenstern and Doucette 1994). Thus one would expect that based on clinical criteria alone rates of use of atypical anti-psychotics would be higher for blacks (USDHHS, 1999). Schizophrenic

[4] We estimated both two stage least squares and method of moments estimators and obtained nearly identical results.

patients with co-occurring substance abuse conditions are more likely to be treated with an atypical anti-psychotic medication. Prescribing drugs with fewer neurological side effects may be viewed as strategy for bolstering adherence for this group with low adherence rates. As the number of atypical anti-psychotic drugs approved for marketing increases by one drug the overall impact is to increase sales of the class of drugs by about 3.2% ($p<0.05$ joint t test). Most of the effect of drug entry occurs through the increased levels of use in Orlando. Finally, the baseline rate of growth for the class of atypical anti-psychotic agents was about 7.1% per year during the late 1990s.

B. Simple Regression Results

Column 1 in Table 3 reports results from a least squares regression of the log of mental health spending assuming that use of an atypical antipsychotic agent is exogenous. These results are a baseline against which the instrumental variables results can be assessed. The model represents a reasonably good fit to the data as evidenced by the R^2 of 0.15. The main coefficient of interest is the indicator of use of an atypical antipsychotic agent (apsy-at). Holding constant other variables in the model, Medicaid patients with schizophrenia that are treated with the atypical antipsychotic agents incur mental health spending levels that are significantly higher than otherwise similar schizophrenic patients. Our OLS estimate implies that the spending impact of the new atypicals on total spending on care for schizophrenia when evaluated at the mean of spending was about $5410 which is very close to the estimate of $5244 reported by Duggan (2005). The average difference between annual spending on atypical versus traditional agents in Florida Medicaid was between $1200 and $1500. Hence the net impact of the new agents from the OLS results was about $4,000.

C. Instrumental Variables Results

The second and third columns of Table 3 report results from instrumental variables models using the generalized method of moments (GMM) estimator. The second column results are based on a model where the instruments are the count of different atypical antipsychotic agents approved by the FDA for sale and the interaction of that count with the geographic region indicator (Orlando). In this model the coefficient estimate for being treated with an atypical antipsychotic agent (apsy-at) is positive and significantly different from zero at conventional levels ($p<0.05$). The magnitude of the estimate is larger than in the simple regression reported in column 1 of Table 3, although the difference between the two estimates is not significant. Other estimates in the model are consistent with prior research. Blacks and other racial and ethnic minorities with schizophrenia incur lower levels of spending for mental health care than do whites (20%). People with schizophrenia who are also treated for substance abuse problems incur mental health care spending levels that are roughly 56% more than otherwise similar people who do not get treated for substance abuse problems. Finally, Medicaid spent about 24% less on people with schizophrenia in the Orlando area compared to those in Jacksonville. The F test (25.83) indicates our instruments are not "weak" according to the criterion of Staiger and Stock (1997).

The third column of Table 3 reports GMM estimates using instruments that include indicators of entry by the individual atypical antipsychotic agents and the interaction of those indicators with the geographic region (6 instruments). The impact of the use of atypical antipsychotic agents was estimated to be positive but the estimate was imprecise. The coefficient estimate of 0.63 is neither significantly different from zero at

conventional levels nor different from either the OLS or the other GMM estimate reported in column 2. By and large the other coefficient estimates are robust to the differences in the first stage specification.

The magnitude of the estimates evaluated at the mean level of spending suggest gross increases in spending of between $5413 and $11256. Subtracting the high estimate of the difference in payments for new drugs of $1500 yield net increases in spending of $3010 and $9756. The F test for the instruments was 10.23, just above Staiger Stock value for the test for weak instruments.

D. Sensitivity Analysis

We also examined an instrumental variables model where we specified three endogenous regressors in our mental health spending models. In this model whether or not a schizophrenic patient used a specific atypical antipsychotic agent (Olanzapine, Seroquel, Geodon) were the endogenous indicators of use of new drugs. The instruments were the indicators of individual product approval for sales and the interaction of those indicators with geographic region. Table 4 reports the estimated coefficients and the test for weak instruments. Only the use of Seroquel in the Instrumental Variables models had an estimated impact that was significantly different from zero, and the estimated effect on spending of using the new drug was positive. Use of the other two drugs had no significant effect on spending. The F-tests suggest that the instruments used were not weak.

We also considered models within a geographic area (Orlando and Jacksonville) where we allowed for a differential rate take up of new psychotropic medications by racial groups. Blacks have lower take up rates after accounting for other factors. We

specified a model in the second stage (mental health spending) including an interaction was included between the indicator for being an African American and the endogenous regressor measuring use of an atypical antipsychotic agent. The coefficient estimates were always positive however some were significantly different from zero and others not.[5]

II. Implications and Conclusions

Writing in 1999, the Surgeon General of the United States noted that atypical antipsychotic agents offer some important therapeutic advantages over their older counterparts. He stated, "The newer medications…appear in preliminary studies to be more effective against negative symptoms, display fewer side effects, and show promise for treating people for whom the older medications were ineffective" (USDHHS, 1999). It was also the hope of many that these advantages would result in greater adherence to treatment regimens and the ability to effectively treat a larger segment of the population of people with schizophrenia. Because people with schizophrenia carry a high risk of hospitalization it has been hypothesized that the therapeutic advantages would result in decreased use of inpatient care and lower total spending levels on treatment. A finding that the newer medications offset their own costs would imply that they represented a cost effective innovation.

The empirical evidence offered in this paper does not support the existence of a cost offset for the introduction of atypical antipsychotic agents, including the one with the largest market share today, Olanzapine. Recent clinical research shows that the newer drugs produce some troubling side effects of their own that differ from those of the older

[5] We also examine the inclusion of a quadratic time trend in a specifications. The linear term was always negative and the positive offset estimate was obtained in all cases.

drugs, namely weight gain and the risk of diabetes. Thus there are no easy answers concerning whether the atypical antipsychotic agents are globally superior to conventional drugs in the area. Our results offer some evidence that informs the debate over how carefully the use of new antipsychotic agents should be scrutinized with respect to their efficiency. One finding is that the take up of atypical antispychotic drugs has been quite rapid reaching 70% in 6 years. The empirical analysis conducted implies an annual growth rate in use of the newer drugs of 7.3%. We also show that the take up of the new drugs varies by race, clinical circumstances and geography. Particularly troubling is the lower rate of take up for blacks who may benefit from the specific side effect profiles offered by the new drugs. A second finding is our failure to find any evidence of a cost offset for the new generation of antipsychotic medications. The evidence is consistent with the previous work by Duggan (2005) that used data from a different state and a different approach to identification.

The higher levels of spending for patients treated with the newer atypical antipsychotic medications appear to be explained by higher levels of contact with treatment providers among patients using the newer drugs, possibly die to great adherence to treatment plans. For example, patients treated with the newer drugs made 35% to 45% more visits per year for treatment that did those using the older medications (10.3 vs. 13.9 visits in 1996 and 9 vs. 6.2 visits in 2000). The 13.9 and 9 visits are closer to recommended levels of care (Lehman 1999).

Answers about what drugs are most efficiently prescribed for treatment of schizophrenia are not simple, and require a consideration of what constitutes an efficient match with respect to preferences for different patterns of side effects. Patient response to

specific agents and the potential adherence to treatment plans under different drug regimens needs considerably more investigation.

Figure 1

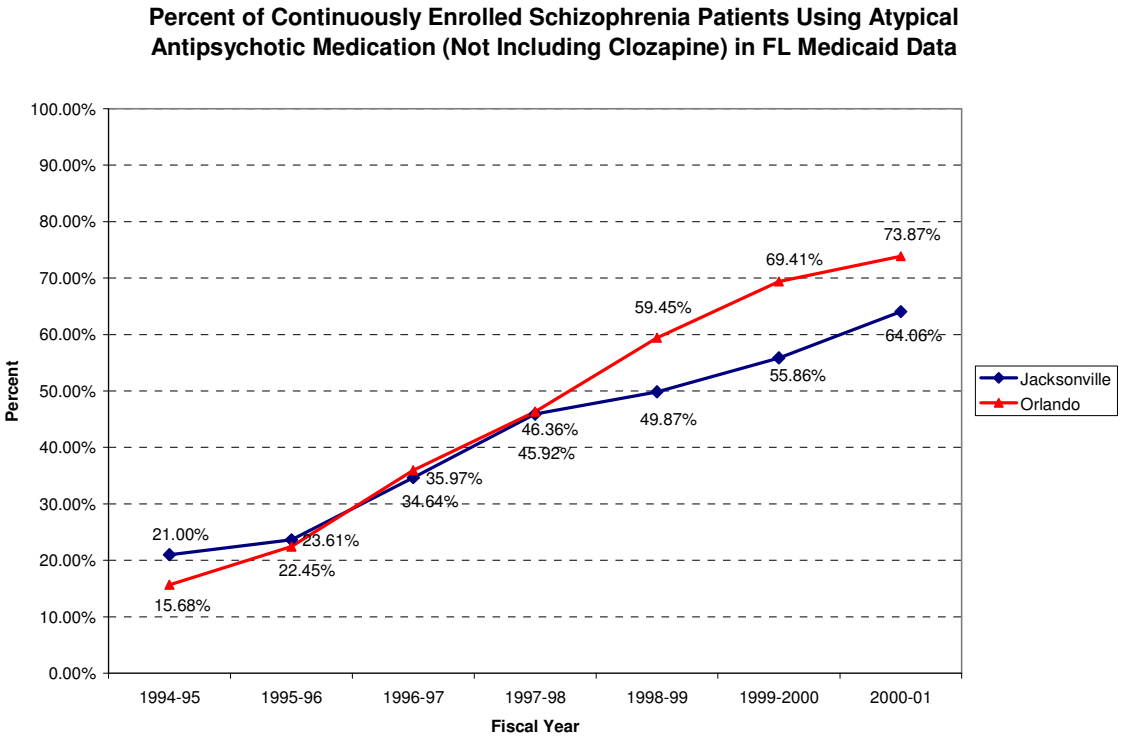
Percent of Continuously Enrolled Schizophrenia Patients Using Atypical Antipsychotic Medication (Not Including Clozapine) in FL Medicaid Data
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Percent
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
Fiscal Year
21.00%
23.61%
35.97%
46.36%
49.87%
55.86%
64.06%
15.68%
22.45%
34.64%
45.92%
59.45%
69.41%
73.87%
Jacksonville
Orlando

Figure 2

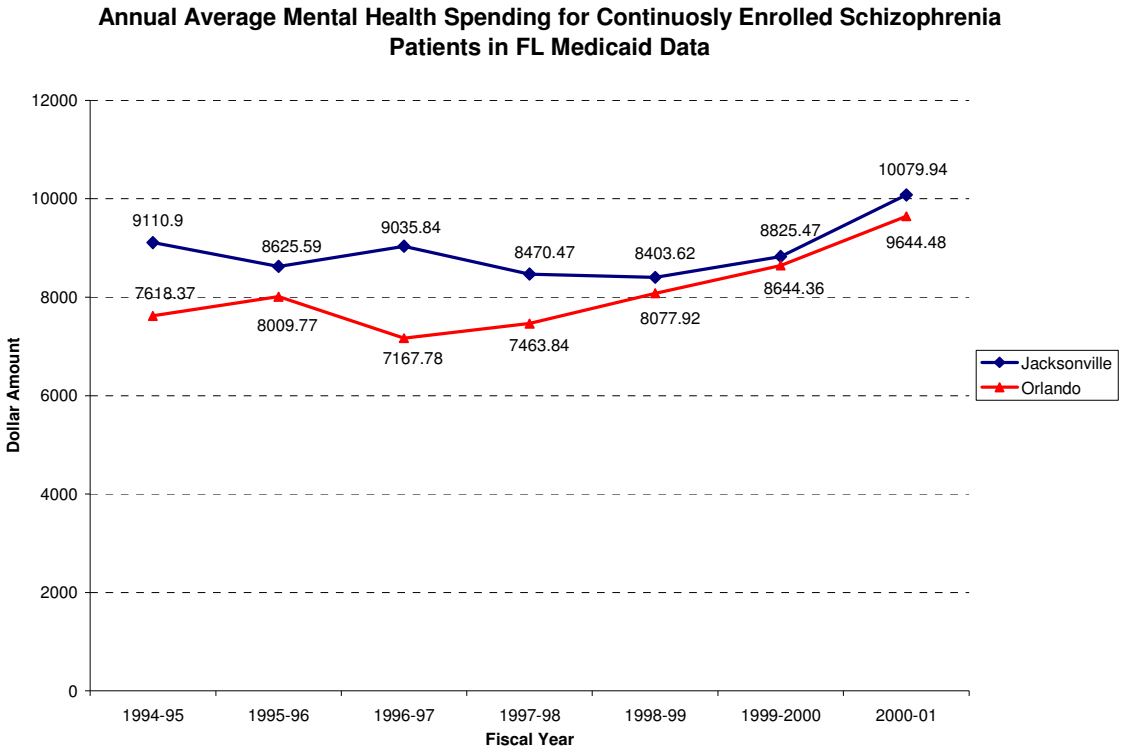
Annual Average Mental Health Spending for Continuosly Enrolled Schizophrenia Patients in FL Medicaid Data
12000
10000
8000
6000
4000
2000
0
Dollar Amount
9110.9
8625.59
9035.84
8470.47
8403.62
8825.47
10079.94
7618.37
8009.77
7167.78
7463.84
8077.92
8644.36
9644.48
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
Fiscal Year
Jacksonville
Orlando

Table 1 Descriptive Statistics	
Variable	**Mean (SD)**
Mental Health Spending (current $)	8593
	(10,126)
Age (in years)	41.3
	(11.2)
Female = 1	0.53
White = 1	0.47
Black = 1	0.33
Other non-white = 1	0.20
SSI = 1	0.97
Orlando = 1	0.42
Substance Abuse = 1	0.12
Uses an atypical drug = 1	0.45
Time (year counter)	

Table 2 First Stage Linear Probability Model Results (Response = Atypical Antipsychotic dispensed)		
Variable	**Estimate**	**Estimate**
Black	-0.122	-0.122
	(0.09)	(0.09)
Other non-white	-0.063	-0.063
	(0.01)	(0.01)
Age	-0.004	-0.004
	(0.001)	(0.001)
Female	0.051	0.051
	(0.01)	(0.01)
SSI	-0.038	0.041
	(0.03)	(0.024)
Substance Abuse	0.094	0.094
	(0.02)	(0.01)
Orlando	-0.095	-0.048
	(0.02)	(0.02)
# atypicals	0.012	-
	(0.013)	-
# atypicals x Orlando	0.051	-
	(0.01)	-
Zyprexa	-	0.009
	-	(0.01)
Seroquel	-	0.018
	-	(0.02)
Geodon	-	-0.008
	-	(0.02)
Z x Orlando	-	0.051
	-	(0.026)
S x Olrando	-	0.066
	-	(0.02)
G x Orlando	-	0.019
	-	(0.02)
Time	0.071	0.073
	(0.01)	(0.01)
Constant	0.328	0.339
	(0.03)	(0.03)
R2	0.15	0.15
F	240	172
N	13,446	13,446

Table 3 Results: log total mental health spending per year[1]			
Variable (1)	**OLS**	**GMM-IV**	**GMM-IV**
Apsy-at	0.98	1.32[2]	0.63[2]
	(0.03)	(0.40)	(0.38)
Black	-0.26	-0.22	-0.30
	(0.05)	(0.06)	(0.55)
Other non-white	0.25	-0.23	-0.28
	(0.05)	(0.04)	(0.04)
Age	0.002	0.002	0.0004
	(0.002)	(0.002)	(0.00001)
Female	0.08	0.07	0.10
	(0.04)	(0.03)	(0.03)
SSI	0.42	0.43	0.39
	(0.09)	(0.07)	(0.07)
Substance Abuse	0.97	0.94	1.01
	(0.04)	(0.07)	(0.06)
Orlando	-0.26	-0.27	-0.24
	(0.05)	(0.03)	(0.03)
Time	-0.02	-0.05	-0.02
	(0.01)	(0.04)	(0.03)
Constant	7.55	7.46	7.67
	(0.14)	(0.47)	(0.16)
	R^2 = 0.15	R^2 = 0.18	R^2 = 0.19
	N = 13,447	N = 13,447	M = 13,447
		IVF-Test 25.83	IVF – Test 10.23
[1] Robust SE in parentheses			
[2] Endogenous regressor			

Table 4 Alternative GMM Results on Log Mental Health Spending		
Endogenous Regressor	IV Estimate[1]	F Test for Instruments
Use Olanzapine	0.03	23.64
	(0.41)	
Use Seroquel	3.75	19.03
	(1.14)	
Use Geodon	0.32	58.115
	(1.71)	
[1] standard error in parentheses		

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