

**Managed Care and Trends in Hospital Care for Mental Health and Substance Abuse Treatment in Massachusetts: 1994-1999**

October 1, 2002

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This research is supported by grant R01 MH60894 from the National Institute of Mental Health.

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## Abstract

**Background:** Rates of inpatient care for mental health and substance abuse treatment have been reported to fall after the introduction of managed care, but the actual decline may be overstated. Almost all managed care impact studies are based on pre-post comparisons, which have two drawbacks: secular downward trends may be attributed to a managed care effect and self-selection may exaggerate the impact of managed care. Therefore it is useful to examine long-term population-based trends in use.

**Aims of Study:** This paper examines trends in inpatient care for mental health and substance abuse treatment in Massachusetts between 1994 and 1999 by service provider and payer. We analyze how managed care impacts the trends in mental health and substance abuse care.

**Methods:** We provide an overview of the health market in Massachusetts and compare trends in mental health and substance abuse services with all inpatient services by service providers (acute and non-acute hospitals), and by major payers (Medicare, Medicaid and all other payers). To analyze the impact of managed care, we compare the per discharge cost of managed care and fee for service plans in Medicare and Medicaid. Finally, we examine the role played by sample selection and hospital networks in managed care on costs.

**Results:** The reduction in service costs for mental health and substance abuse, about 30% in six years, is mostly due to the decline in the average cost per inpatient episode. Managed care has reduced both the quantity (average length of stay) and intensity of health care (expenditure per day). Differences in case mix have little to do with the differences in costs by insurance type. Simulations suggest that the creation of hospital networks by managed care accounts for around 50% of the differential between the average costs of HMO and FFS.

**Discussion:** We find that the cost savings from mental health and substance abuse services are larger than for physical health. There is little difference in the types of patients treated by managed care and fee for service plans, but the average length of stay and average day cost is lower for managed care plans. The data is limited to inpatient discharges from Massachusetts and therefore our conclusions may not be readily extended to other places. Furthermore, our analysis is based on the estimated cost rather than the actual payment paid to the hospital.

**Implication for Health Care Provision and Use:** The analysis highlights the importance of hospital selection in lowering the cost of care. The lower cost of care cannot be attributed to network hospitals treating “healthier” patients than fee for service plans.

**Implications for Health Policies:** Contrary to popular belief, the analysis shows that the experience of mental health and substance abuse and non-mental health and substance abuse services is similar. Creation of networks is an important strategy in managed care.

**Implications for Further Research:** This paper provides the groundwork for extending the analysis to areas with market characteristics different to those of Massachusetts. Further research should focus on the long-term trends in health outcomes between managed care and fee for service patients.

## 1. Introduction

Inpatient care for mental health and substance abuse (MH/SA) is one of the sectors in the health care system that has been most affected by managed care. Rates of inpatient treatment have been reported to fall dramatically after the introduction of managed care (Frank and McGuire, 1997; Huskamp, 1997). There are reasons to believe, however, that these studies might overstate the actual decline in inpatient care associated with managed care. First, almost all the managed care impact studies are based on pre-post comparisons; with this methodology, secular downward trends must be accounted for in order to isolate a managed care effect. In research on outpatient care in Massachusetts, Ma and McGuire (2002) found very strong downward trends in use prior to managed care. Unless these trends are accurately figured, managed care might look to have more of an effect than it really does. Second, if beneficiaries can choose plans, people who anticipate using higher cost services might choose to avoid managed care for another option; that is, self-selection may exaggerate the impact of managed care. As a complement to the typical managed care study, it is useful therefore to examine long-term population-based trends in use.

The paper studies trends in the rates of use in inpatient MH/SA care in Massachusetts, a state among those with high managed care penetration in Medicaid, Medicare, and other payers. By combining information from several data sources, including specialty hospitals not included in discharge abstract data bases, we put together a comprehensive picture of the trends in inpatient care for MH/SA between 1994 and 1999, a period of rapid growth in managed care. We compare, first, the overall trends of inpatient use with the experience in MH/SA services. Moreover, we compare, in aggregate, the experience of Medicaid, Medicare, and other payers. To analyze the impact of managed care, we compare the per discharge costs of managed care and fee-for-service

plans in Medicare and Medicaid. In this last analysis, we estimate how much the creation of provider networks contributes to a managed care effect.

The last analysis focuses on two public payers: Medicaid and Medicare. This choice is made because these payers are important for public policy, but also for other reasons. First, their experiences of managed care are different. Medicaid managed care coverage came quickly in Massachusetts and is extensive. Managed care has come to Medicare slowly, and its coverage rate is the lowest among major payers. Second, their contracting practices for managed care are different. While each Medicare plan is allowed to provide MH/SA services, Medicaid contracts with a separate management group to oversee MH/SA services for its enrollees.<sup>1</sup> Finally, the denominators for these populations are available for further analysis; similar figures are not readily available for other private payers.

The paper is organized as follows. In Section 2, we provide an overview of the health market in Massachusetts, focusing on Medicare and Medicaid, as well as a description of the several data sets used in the analysis. Section 3 presents a summary of the aggregate use for MH/SA services in Massachusetts. We compare trends in MH/SA services with all inpatient services, with respect to service providers (acute and non-acute hospitals), and with respect to major payers (Medicare, Medicaid and all other payers). We find a clearly declining trend in MH/SA service cost over the sample period. Moreover, a large portion of the cost reduction (about two thirds) is due to a decrease in the cost per discharge. In Section 4, we explore how managed care affects average cost by comparing the cost per discharge of managed care and fee-for-service plans in Medicare and Medicaid. Our results show that managed care reduces both the quantity (average length of stay) and intensity of health use (expenditure per day). Simulations indicate that creation of a network, a

practice widely adopted by managed care, accounts for approximately half of the cost differential between managed care and fee-for-service plans. We conclude in Section 5.

## **2. Background and Data**

### **2.1. Background**

Before we describe our data, it is useful to give a brief background of the health markets in Massachusetts. We focus on the two largest public payers: Medicare, the health program for the aged and the disabled,<sup>2</sup> and Medicaid, the health program for children and the poor.<sup>3</sup>

Medicare is a health program for people of 65 years of age and older, some disabled people under 65 years of age and people with end-stage renal disease. It is by far the nation's largest health program, covering about 39 million Americans, and is administrated by the Centers for Medicare & Medicaid Services (CMS).<sup>4</sup> Medicare consists of two different health insurance plans: hospital insurance (referred to as Part A) and medical insurance (referred to as Part B). Part A covers most inpatient services, including some nursing facilities, and is free to the beneficiary. Part B covers outpatient services and inpatient services not covered in Part A, but requires a monthly premium of around \$50. In both Parts A and B, there are two types of plans for each enrollee: a traditional fee-for-service plan (FFS) administered by the federal government and managed care plans (HMOs) operated by private companies. For instance, in 1999, there were 15 Medicare HMO plans in

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<sup>1</sup> Medicaid currently contracts with the Massachusetts Behavioral Health Partnership to oversee the MH/SA services.

<sup>2</sup> For a detailed description of the eligibility requirements for Medicare, see <http://www.hcfa.gov/medicare/medicare.htm>.

<sup>3</sup> In Massachusetts, Medicaid and the Children's Health Insurance Program (CHIP) are combined into one program called MassHealth, administrated by the Division of Medical Assistance. For a detailed description on the eligibility for MassHealth program, see [http://www.state.ma.us/dma/masshealthinfo/applmemb\\_IDX.htm](http://www.state.ma.us/dma/masshealthinfo/applmemb_IDX.htm).

<sup>4</sup> Centers for Medicare & Medicaid Services (CMS) was previously named as Health Care Financing Administration (HCFA).

Massachusetts. Among them, Tufts' Senior Horizon, Harvard Pilgrim's First Seniority and Fallon's Senior Plan are the three largest Medicare HMO plans.

Medicaid is a program jointly funded by the federal and state governments to assist states in the provision of adequate medical care to eligible needy persons. It is the largest program providing medical and health-related services to the poor. Within broad national guidelines that the federal government provides, each state can establish its own eligibility standards, determine the type, amount, duration and scope of services, set the rate of payment for services, and, finally, is responsible for administering its own program.

In Massachusetts, the Division of Medical Assistance (DMA) administrates the Medicaid program; it pays for health care for certain low and medium income people who are under 65 and do not live in nursing homes or long term facilities, particularly children and families with children or pregnant women.

The DMA determines the coverage of each Medicaid enrollee by assigning him to one of seven coverage plans according to which selection criteria are met.<sup>5</sup> Each Medicaid enrollee can choose from a number of insurance plans, depending on his coverage plan.<sup>6</sup> In addition to FFS and HMOs, Medicaid enrollees have a third option: the Primary Care Clinician (PCC) plan—a fee for service type plan where the primary care clinician receives an enhanced reimbursement for managing the health care of the enrollee. The PCC plan is administrated by the DMA.

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<sup>5</sup> The coverage plans are MassHealth Basic, MassHealth Standard, MassHealth Prenatal, MassHealth Limited, MassHealth Basic Buy-in and CommonHealth. MassHealth Basic and MassHealth Standard are two largest coverage plans.

<sup>6</sup> The number of available insurance plans, however, may depends on one's coverage.

A significant difference between Medicare and Medicaid for MH/SA services is that Medicaid uses a carve-out program, the Massachusetts Behavioral Health Partnership (MBHP).<sup>7</sup> The DMA contracts with the MBHP to cover MH/SA services for all Medicaid enrollees in the PCC plan and some enrollees in HMO plans.<sup>8</sup> Because our interest is in MH/SA services, in the analysis we categorize the insurance types of Medicaid enrollees into three types: FFS, MBHP and HMO.

Table 1 shows the total population of Massachusetts, as well as Medicare and Medicaid enrollment in Massachusetts between 1994 and 1999. As seen in Table 1, the total population grew very slowly from 1994 to 1999 (2.4%), as did Medicare enrollment (3.6%). Approximately 15% of the Massachusetts' population was enrolled in Medicare throughout the sample period. In contrast, Medicaid enrollment increases substantially within six years, from seven to nine hundred thousand enrollees.<sup>9</sup> The 33% increase in Medicaid enrollment, however, is largely due to welfare expansions in 1997.<sup>10</sup>

Table 1 also displays the penetration of managed care in Medicare and Medicaid. Despite the fact that the number of Medicaid enrollees has increased substantially from 1994 to 1999, the penetration rate of managed care is almost unchanged over the sample years. This is due to a stable

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<sup>7</sup> Fisher et al (1998) present a case study of how one selective hospital network was formed for Medicaid beneficiaries in Massachusetts during the early nineties.

<sup>8</sup> For instance, DMA requires all HMO enrollees in MassHealth Basic to enroll into MBHP.

<sup>9</sup> The enrollment figure for Medicaid includes dual-eligibles - that is, enrollees who are qualified for both Medicare and Medicaid. While these patients are primarily covered by Medicare, they are also partially supported by Medicaid. For instance, in 1999, 18% of Medicare discharges in acute hospitals are sponsored partly by Medicaid. Given that Medicare patients who are also qualified for Medicaid are usually disabled and use more health care, the actual proportion of enrollees covered by Medicare and Medicaid are likely to be smaller.

<sup>10</sup> In April 1995, the federal government approved a five-year Medicaid research and demonstration project for Massachusetts, which expanded the insurance coverage for the needy and placed greater reliance on managed care. A publicity campaign that raised awareness about the availability of free/affordable health care for qualifying families and children was embarked upon in July 1997. Total enrollment of Medicaid increased by almost 10% from 1996 to 1997, and continued to grow in the next two years.

state policy in promoting Medicaid - over 65% of Medicaid enrollees have been covered by managed care since 1994 (the national average was 23% in 1994 and 56% in 1999).<sup>11</sup> By comparison, the rate of managed care penetration for Medicare is much lower: 5.3% in 1994 and 24.3% in 1999, though it is still above the national average (18% in 1999).

## **2.2. Data**

This paper incorporates three different data sources on acute and non-acute care hospitals in Massachusetts to provide a comprehensive view of inpatient care for MH/SA between 1994 and 1999;<sup>12</sup> all data are maintained by the Division of Health Care Finance and Policy (DHCFP), a state agency of Massachusetts. Our data source for acute care hospitals is the “Hospital Case Mix & Charge Data Base;” these data provide reliable and detailed information on case mix and charges for each discharge in every acute care hospital.<sup>13</sup> The data include clinical information, such as diagnosis and reason for admission, treatment and services provided to a patient and status of a patient’s stay in the hospital, along with a description on patient characteristics, such as demographics, expected payer and zip codes. The charge element provides the full, undiscounted total and service charges a hospital billed. More importantly, the data allow us to identify the specific type (e.g. managed or non-managed) and name (e.g. Tufts’ Senior Horizon) of the patient’s payer, a key piece of information for our analysis.

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<sup>11</sup> See <http://www.hcfa.gov/medicaid/trends99.pdf> for the national summary of Medicaid.

<sup>12</sup> Our data actually cover 8 years, beginning in 1992. Nevertheless, data before 1994 do not contain the indicator that differentiates managed care from non-managed care discharges. Given that this indicator is important for the analysis, we use only data after 1994.

<sup>13</sup> DHCFP requires each acute hospital to submit its report on the quarterly basis. The quarterly reports are then edited for compliance with regulatory requirements using a one percent standard: a hospital’s report is rejected and asked for re-submission if more than one percent of discharges are disqualified. A discharge is disqualified if one of type A or two of type B variables were entered with errors. The detailed lists of Type A and Type B variables are available in the documentation manual of “Hospital Case Mix & Charge Data Base.”

Our data source for non-acute care hospitals (e.g. specialty psychiatric hospitals) is the “DHCFP-403 Cost Report;” these data provide information on inpatient statistics and expenses of a hospital between 1994 and 1999. Compared with data on acute care hospitals, the 403 Cost Report has two drawbacks. First, the data are less reliable, particular in 1994 and 1995. Second, the data are less detailed - information is collected at the hospital level. As a result, we only know the total charges and services at the hospital level.<sup>14</sup> No demographic or clinical information is available at the individual level.

As is widely known, hospital charges do not represent payments by Medicare, Medicaid or private managed care plans.<sup>15</sup> Nonetheless, charges can be used to estimate the costs incurred by each payer by converting charges to costs using the “Cost to Charge Ratio (CCR),” the third data set maintained by DHCFP. These data provide information on the ratio of total costs to charges for each hospital on a yearly basis. Although the CCR is a hospital-wide figure that covers services other than MH/SA, it at least provides a way to approximate MH/SA costs. In the following, we estimate costs by applying hospital-year specific CCR’s to the charge data.

### **3. Aggregate Utilization**

This section provides an overview of aggregate inpatient use for MH/SA services in Massachusetts. Here, we address three important questions: how different are trends for MH/SA services, who supplies MH/SA services, and who pays for MH/SA services. We answer the first question by comparing the costs of MH/SA services with those of overall inpatient care; the second and third questions are answered by comparing trends in MH/SA services with respect to service

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<sup>14</sup> For some service measures, like discharges and inpatient days, we are able to identify major payers that use the services, such as Medicaid and Medicare.

providers (acute and non-acute hospitals) and with respect to major payers (Medicaid, Medicare, and all other payers).

### **3.1. Provision of MH/SA Services**

Table 2 displays costs for MH/SA, non-MH/SA, and all inpatient services from acute and non-acute care hospitals between 1994 and 1999.<sup>16</sup> The cost figures for all years are deflated using the medical component of the Consumer Price Index (CPI), base year 1994, obtained from the Bureau of Labor Statistics. The service cost for all inpatient care was \$5,767 million in 1994, which decreased to \$4,664 million in 1997, and then stabilized afterward. The cost for MH/SA services follows a similar pattern: \$488 million in 1994, falling to \$372 in 1997 and then to \$361 million by 1999. Although the cost of all inpatient care and MH/SA are both declining, the cost for MH/SA services declines slightly faster - its share of total cost declining from 8.5% in 1994 to 7.7% in 1999. To better explain this observation, we use Figure 1 to compare the percentage change in total cost for MH/SA and for non-MH/SA services, each of them being normalized by its figure in 1994. In Figure 1, it is seen that the service cost for MH/SA drops 26% from 1994 to 1999, approximately 8% more than that of non-MH/SA services.

We investigate the source of the cost reduction by listing the number of discharges and cost per discharge in Table 3.<sup>17</sup> According to Table 3, the number of discharges for MH/SA and for non-MH/SA services fell modestly during 1994-1999, about 7.0%, the same as non-MH/SA

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<sup>15</sup> The nominal charge that a hospital bills is different from the actual cost that a payer pays, usually a 30-40% difference (Cutler, McClellan, Newhouse and Remler, 1998).

<sup>16</sup> Services of MH and SA for acute hospitals are identified from the major disease category (MDC) of patients, where mental health and substance abuse are coded as 19 and 20 respectively. MH services in non-acute care hospitals are listed as psychiatric acute care services under routine inpatient services. It is not possible to separately identify SA services in non-acute care hospitals.

<sup>17</sup> The increase in MH/SA discharges in 1998 is due to a reported increase in discharges from non-acute hospitals.

discharges.<sup>18</sup> On the other hand, the cost per-discharge declined much more rapidly over the same period: 11.7% for non-MH/SA and 20.4% for MH/SA services. The drop in average cost per discharge accounts for about two thirds of the drop in MH/SA cost.

### **3.2. Who Provides Care?**

Table 4 presents the cost shares for MH and SA services in acute and non-acute care hospitals. Our data can separately identify substance abuse services from acute hospitals only.<sup>19</sup> According to Table 4, the cost of SA services consists of a small share, about 10%, of total MH/SA cost. Even though the share of costs attributed to MH services is stable overall, its share in acute versus non-acute hospitals changes dramatically; the share of acute care hospitals increases from 44.0% in 1994 to 53.1% in 1999, while that of non-acute care hospitals decreases from 45.6% to 36.9%.

To further examine the source of cost reduction, Table 5 presents the number of discharges and average costs for MH and SA services in acute and non-acute hospitals. On average, an SA discharge costs about half as much as an MH discharge from an acute hospital, and even less than half of a corresponding discharge from a non-acute hospital. The cost for non-acute hospitals is likely to be higher because they specialize in treating more chronic and seriously ill patients. Although the size of the cost reduction by hospital type varies, all of them have dropped consistently over the period.

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<sup>18</sup> While the trend of discharge number for MH/SA service in our data is quite close to the national average, the number for overall service is a little different. Bao and Sturm (2001) find that the number of discharges for MH/SA services decreased about 5% between 1994 and 1997 (their data covers from 1988 to 1997). The discharge number for overall services, however, has almost unchanged in the same periods.

<sup>19</sup> The DHCFP-403 Cost Report, the data source for non-acute care hospitals, does not list substance abuse separately under routine inpatient services.

The total number of MH/SA discharges fell from 80,878 in 1994 to 75,202 in 1999 (see Table 3). As shown in Table 5, we find that the drop is mostly from a decrease in SA discharges; it explains most of the drop in MH/SA service costs. While the number of MH discharges is almost unchanged, we observe a fall in MH non-acute discharges and an increase in MH acute discharges. Such a shift in discharges may explain the cost reduction for MH/SA services since an MH discharge from a non-acute hospital is more expensive than from an acute hospital. Table 5 allows us to examine this possibility. In Table 5, there are about three thousand discharges previously treated at non-acute hospitals now being treated at acute hospitals. However, given the size of the substitution and the cost differential between acute and non-acute hospitals, the estimated cost saving of a shift from acute to non-acute hospitals can at most account for 2% of total MH/SA cost. Apparently, there is still a significant part of cost savings unexplained.

### **3.3. Who Pays for Care?**

Table 6 shows the MH/SA services cost shares for the three major payers: Medicaid, Medicare, and all other payers (Others).<sup>20</sup> The 1994 figure is problematic because few non-acute hospitals report costs by payers that year, so we do not report it. Over the sample years, the cost shares of each payer are quite stable: around 30% for Medicaid, 40% for Medicare and 30% for all other payers. The two public payers, Medicaid and Medicare, account for 70% of total MH/SA cost, despite the fact that they make up less than 30% of the Massachusetts' population.

As each payer has a different enrollment base, Table 7 presents the per-enrollee cost of the three major payers.<sup>21</sup> On average, an enrollee of other payers costs about \$30 for inpatient MH/SA

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<sup>20</sup> The database for non-acute hospitals do not report the total cost by each payer. We calculate the total cost of each payer for non-acute hospitals using the total service cost of a hospital times its shares of inpatient days for each payer.

<sup>21</sup> Due to data limitations, we are unable to show per-episode cost for each payer. Data on non-acute care hospitals are collected on a hospital basis, preventing us from breaking down the number of discharges for each payer.

services, roughly one fifth the cost of a Medicaid or a Medicare enrollee. Due to a rapid decline in the per-enrollee cost at Medicare and Medicaid, however, the gap between the two public payers and other payers has reduced over the sample period. For instance, Medicaid per-enrollee cost has decreased from \$198 in 1995 to \$120 in 1999, a 39% drop. Medicare experienced a 25% drop as well. As is evident from Table 7, most of the cost reduction for MH/SA services is concentrated in Medicaid and Medicare.

#### **4. Managed and Non-Managed Care**

One important aim of the paper is to explore how managed care impacts the trends in MH/SA services. Traditionally, health care is paid by fee-for-service, where each enrollee and health-care provider is linked to the insurer by insurance and payment contracts. The insurance contract specifies the premium and payments (co-payments or deductibles) that an enrollee has to pay at the time of service; the payment contracts specify how health-care providers are paid when services are supplied, either by cost or capitation. The financial incentives in those contracts (e.g. co-payment and capitation) serve to overcome the moral hazard faced by health-care providers and consumers.<sup>22</sup> Nevertheless, given that patients do not bear the full cost, these financial incentives are not successful in completely controlling moral hazard.

Managed care, however, adopts a number of additional practices to solve the problem of moral hazard. Managed care plans review the services supplied by its providers and, if necessary, deny payment for inappropriate services (utilization reviews); they require each enrollee to see a primary care physician (gatekeeper) before getting an referral to a specialist; they set up a network of preferred providers (physicians, hospitals, and pharmaceutical companies) that accept lower

prices in exchange for access to the insurance pool; they may “carve out” certain health benefits, especially MH/SA services, by offering a separate plan or contracting separately with other service vendors.<sup>23</sup> By implementing these practices, it is reported that managed care significantly reduces its service cost, either by controlling the quantity of health care (Ma and McGuire, 2002) or by bargaining for lower supply prices (Cutler, McClellan, and Newhouse, 2000).<sup>24</sup>

In this section, we explore the impact of managed care on MH/SA services by comparing the average discharge cost in acute hospitals for patients enrolled in managed care and fee-for-services plans of Medicare and Medicaid<sup>25</sup>. We focus on acute hospitals because the data allow us to identify the specific plan type of a discharge. We concentrate on Medicaid and Medicare payers, partly because they are responsible for most of the drop in cost over the sample years, but also because, as previously noted, they have different managed care experiences and contracting practices.

## **4.1. Medicare**

### **4.1.1. Per Discharge Cost**

We display in Figure 2 the average cost of discharges of Medicare managed care and fee-for-service plans. Compared with FFS, the average cost for HMOs is consistently lower over the

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<sup>22</sup> For an extensive review on how financial incentives in the contracts affect the behaviors of health providers and consumers, see Newhouse (1996).

<sup>23</sup> A “carve-out” program refers to the case when an insurer, instead of contracting with a service vendor to offer a full range of services, carves out the benefits of some services and diseases by offering a separate plan or by contracting separately with other service vendors for the management of risks. For a complete description of the carve-out programs, see Frank and McGuire (2000).

<sup>24</sup> Cutler, McClellan, and Newhouse (2000) compares the treatment of heart attacks and newly diagnosed chest pain in HMOs and traditional plans and finds that HMOs have 30 to 40 percent lower expenditures than traditional indemnity plans. Actual treatments and health outcomes differ little; virtually all the difference in spending comes from lower unit prices. Ma and McGuire (2001) uses data of outpatient treatment for mental illness patients and finds out a even larger effect---both the price and quantity reduced about 30-40%.

<sup>25</sup> Lindrooth Norton and Dickey (2002) employ a regression-based approach in a similar spirit to the analysis here. They use data from part of Medicaid managed care for 1991-1995.

sample years.<sup>26</sup> Aside from the level difference, HMOs and FFS exhibit quite similar patterns: both decline between 1994 and 1997, attain a minimum in 1998, and then rebound a little in 1999, even though managed care penetration increases four fold within the sample years.

#### **4.1.2. Quantity and Intensity Effects**

The average cost per discharge can be further decomposed into the product of average length of stay (ALOS) and average day cost (ADC); the first one can be regarded as the “quantity” of treatment; the second one, the “intensity” of treatment. Figures 3 and 4 display the relative change of ADC and ALOS by plans (FFS and non-FFS); each of them normalized by the 1994 FFS figure. While ALOS for both plans shows clearly declining trends, trends for ADC appear to be relatively stable; it suggests that the reduction in ALOS is the primary cause for the reduction in per-discharge cost over the sample years.<sup>27</sup>

Figure 3 and 4 allow us to compare the difference between managed care and non-managed care plans. Over the sample years, managed care plans cost less than FFS, with lower ALOS and ADC. In 1999, for instance, the ALOS and ADC for HMOs are approximately 10% lower than the corresponding figures for FFS. These differences are not sensitive to managed care penetration.

#### **4.1.3. Sample Selection**

The above analysis does not consider self-selection: patients admitted to acute hospitals for MH/SA services may have different health conditions, dependent on their plan choices. Some evidence suggests the presence of self-selection (Brown et al., 1993; Rossiter and Wilensky,

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<sup>26</sup> Aside from MH/SA services, Greenwald et al. (2000) also finds that there were significant differences between the actual cost of managed care and fee-for-services beneficiaries for inpatient services.

<sup>27</sup> Bao and Sturm (2001) also shows that a declining trend for the average length of stay using the national data. Nevertheless, they find a much smaller size of reduction, about 5% within 94 and 97.

1986);<sup>28</sup> that is, patients with worse health conditions are attracted to FFS for its generous coverage.<sup>29</sup> Without properly accounting for the severity difference, a simple cost comparison between managed care and FFS plans is likely to be misleading. We therefore construct an “adjusted” average cost that is calculated by applying the same diagnostic related group (DRG) distribution to each plan. The “adjusted” cost accounts for differences in case mix across plans, and provides a more accurate comparison of the average cost of HMO and FFS plans. Table 8 presents the unadjusted and adjusted average costs for each year by plan.<sup>30</sup> Examination of Table 8 shows that the cost differential between HMOs and FFS is still quite significant when adjusted average cost is used, though slightly mitigated compared with unadjusted costs. So differences in the case mix are unlikely to be the major determinant of the cost differential between HMO and FFS plans.

#### **4.1.4. Network Effects**

By establishing a network, a managed care plan covers less, or even none, of the treatment cost when enrollees use out-of-network providers. This acts as a financial incentive to encourage use of in-network providers. In principle, a managed care plan can bargain for lower supply prices with providers hoping to access the insurance pool. (Ma and McGuire, 2002; Town and Vistnes, 2001). Managed care plans may construct networks of providers with less intensive and costly practice patterns.

Table 9 presents the discharge shares from the top five hospitals for each major Medicare HMO plan. We focus on the discharges for 1998 and 1999 because there are very few HMO

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<sup>28</sup> For a survey for the evidence of self selection for Medicare enrollees, see Rossiter and Wilensky (1986).

<sup>29</sup> In addition to self-selection from patients, the selection may be also induced by the managed plan. For an empirical study on the service level selection, see Cao and McGuire (2001).

discharges prior to 1997. As Table 9 shows, the discharge shares of HMO are more concentrated than FFS. For instance, in 1999, the combined shares of the top five hospitals for FFS is less than a quarter, while the number is 53.9% for Tufts' Senior Horizon, 59.7% for Harvard Pilgrim's First Seniority and even 97.8% for Fallon's Senior Plan. Obviously, managed care plans use fewer acute care hospitals.

How effective is the network? We address this question by estimating how much of the cost differential between FFS and HMO plans could be explained if FFS used the same network as HMO plans. Given that the number of discharges for each managed plan is quite small, we combine all HMO plans into one non-FFS plan. The predicted average cost for FFS is calculated by assuming that FFS has the same discharge distribution as the non-FFS plan, while allowing each hospital to charge differently for FFS and non-FFS plans. The simulated result in Figure 5 suggests that more than 50% of the cost differential between HMO and FFS can be accounted for by the change in health providers. In other words, the HMO networks are composed of hospitals that have lower average cost for FFS discharges as well as HMO discharges. In practice, the network will be even more effective if FFS can negotiate better discounts with providers in the network.

## **4.2. Medicaid**

### **4.2.1. Per Discharge Cost**

Figure 6 displays the overall average cost, as well as the average MH/SA cost by insurance type. Compared with FFS, the average cost for the managed care groups, HMOs and the MBHP, is

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<sup>30</sup>The adjusted average cost is estimated by summing over the product of the overall Medicare DRG distribution and the average cost of every DRG for each payer. We include only DRGs that have at least one hundred discharges in a year.

lower. Similar to Medicare, there is a downward trend in the average cost of managed care, which has contributed to the overall decline in average cost during the sample period.<sup>31</sup>

Some cost patterns are unique to Medicaid. First, the cost trend for FFS is increasing over time, while that for other payers are declining; this may indicate the presence of self-selection. Second, throughout the sample period, MBHP always has higher average costs than HMOs, even though they follow similar declining trends. This suggests that the two managed care groups have taken different approaches to reduce costs. We investigate this hypothesis further below.

#### **4.2.2. Quantity and Intensity Effects**

We decompose average cost into ADC and ALOS, and show the percentage changes in ADC and ALOS in Figures 7 and 8, respectively, following the same normalizations used in the Medicare analysis. In Figure 7, we see that the ADC for FFS is increasing, while the ADC for the managed care groups is decreasing, or increasing by a much smaller magnitude. Examination of Figure 8 shows that the ALOS for both managed care groups are decreasing, while that for FFS is almost unchanged over time. These observations differ from the Medicare findings.

Next, we compare the MBHP with HMOs. From Figures 7 and 8, we see that MBHP and HMOs take different strategies in controlling their average costs. In Figure 8 we find that the ALOS for HMOs has been approximately 20% lower than that for the MBHP over the sample years. MBHP, however, appears to perform better in containing ADC. According to Figure 7, the ADC for MBHP in 1994 is almost identical with that of HMOs. By 1996, MBHP has managed to attain the lowest ADC among the three insurance types, and maintains its ADC about 10% lower than

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<sup>31</sup> Another cause for the decline in the overall average cost is the shift of discharges from FFS to managed care groups. Examination of discharges shows that fee-for-service discharges have decreased by approximately 25%, or around two thousand. In contrast, managed care discharges have grown significantly, in particular PCC discharges. Discharges have increased by about six thousand, or discharges have trebled over the time period.

HMOs. This implies that the carve-out program may be better in reducing the intensity, rather than the quantity of the treatment.

#### **4.2.3. Sample Selection**

Table 10 lists the adjusted and unadjusted average cost for Medicaid by insurance type, following the same procedure for Medicare used in Table 8. Similar to Medicare, our results show that adjusted average cost across payers does not converge, even accounting for differences in the DRG distribution of each payer. This confirms our previous findings that the difference in costs across payers has little to do with differences in the complexity of cases treated. However, it must be noted that the DRG distribution may not be sensitive enough to capture the underlying severity of enrollees in different insurance plans. A better measure of the severity level of patients may be necessary to further investigate the presence of selection.

#### **4.2.4. Network Effects**

We now turn to examine networks of hospitals in Medicaid managed care. Table 11 presents the discharge shares from the top five hospitals over the sample period by payer. As most of MH/SA discharges in managed care are from the carve-out program (MBHP), we do not disaggregate HMO discharges by health plans. In 1999, 58.7% of HMO and 44.6% of MBHP discharges came from these five hospitals. In contrast, only 13.4% of FFS discharges were from these hospitals. We conclude that Medicaid managed care, both HMOs and the MBHP, have higher concentrations amongst these top five hospitals. Compared with MBHP, HMOs have a higher concentration of discharges. This may explain in part why HMOs have lower cost levels than the MBHP.

The next step is to see how much of the cost differential between FFS and managed care can be explained by the creation of networks. We repeat the simulation for Medicaid, following the method in Table 9 for Medicare, except now we have three payers. The solid lines in Figure 9 represent the actual average cost for each year by payer group. The dashed lines are the predicted AC for FFS where FFS discharges are fixed to the HMO and MBHP distribution of discharges, respectively. The results are consistent with the findings from Medicare: FFS would have lower average costs if it allocates its discharges similar to HMOs or the MBHP. With the exception of 1996, predicted AC for FFS discharges follows actual costs for MBHP very closely. The simulation exercise for Medicaid returns even stronger results than those found for Medicare. Figure 9 suggests that almost all of the cost differential between the MBHP and FFS can be attributed to the change in health providers. The result is not so strong for HMOs, with approximately 80% of the cost differential explained by changing health providers. In Section 4.2.2 we found that HMOs tend to focus on reducing quantity while the MBHP focuses on reducing the intensity of treatment. In order for FFS to reduce its costs to the level of HMO costs, it would also need to reduce the quantity of treatment provided.

## **5. Discussion**

This paper examines the trends in MH/SA inpatient care in Massachusetts between 1994 and 1999. We first compare the trends in MH/SA services with overall inpatient services. Next, we compare the cost of MH/SA services by service providers (acute and non-acute hospitals) and by major payers (Medicaid, Medicare and all other payers). Finally, we analyze how managed care practices impact the cost of MH/SA services using Medicare and Medicaid discharges from acute care hospitals. Specifically, we focus on two practices: networks and carve out programs.

There are a number of findings in our analysis. First, we find that the trends for total cost between MH/SA services and all other inpatient services are quite similar, though the cost savings from MH/SA services are somewhat larger. Despite the conventional view that MH/SA services are very different from overall services, the analysis shows that the experience of MH/SA and non-MH/SA services is similar. At the system level, the impact of managed care on resource use seems to be less than found in some studies of particular plan changes

Second, we find that the cost reduction in MH/SA services is largely due to a decrease in the average cost per discharge. Although non-acute hospitals cater for more severe and chronically ill patients, both acute and non-acute hospitals experience similar reductions in their per discharge costs. Furthermore, our analysis shows that the decrease in average cost is mostly from a reduction in length of stay.

Third, we find that managed care plans have a smaller average length of stay (ALOS) and a smaller average day cost (ADC); both contribute to a lower average cost per inpatient episode. In addition, differences in the cost between managed and non-managed plans cannot be easily explained by differences in the case mix of different plans. Our simulations suggest that the creation of a network, a practice widely used by managed care, explains at least 50% of the cost differential between managed and non-managed plans.

## 6. References

- Bao, Y and Sturm, R. "How do Trends for Behavioral Health Inpatient Care Differs from Medical Inpatient Care in U.S. Community Hospitals?" *Journal of Mental Health Policy and Economics*, 2001, 4, pp. 55-63.
- Barro, Jason R. and David Cutler. "Consolidation in the Medical Care Marketplace: A Case Study from Massachusetts." National Bureau of Economic Research, (Cambridge, MA) Working Paper No. W5957, 1997.
- Becker, L. "The Effect of HMO on Fee-For-Service Health Care Expenditures: Evidence from Medicare." *Journal of Health Economics*, 1997, 16, pp. 453-481.
- Cao, Z. and McGuire, T.G. "Service Level Selection by HMOs in Medicare." Mimeo, Boston University, 2001.
- Cutler, D., McClellan, M. and Newhouse J.P. "How Does Managed Care Do It?" *Rand Journal of Economics*, 2000, 31(3), pp. 526-548.
- Cutler, D. McClellan, M., Newhouse, J.P. and Remler D.K. "Are Medical Prices Declining? Evidence from Heart Attack Treatments." *Quarter Journal of Economics*, 1998, 113(4), pp. 991-1024.
- Fisher, W.H., Lindrooth, R.C., Norton, E.C. and B. Dickey. "How Managed Care Organizations Develop Selective Contracting Networks for Psychiatric Inpatient Care: A Massachusetts Case Study," *Inquiry*, 1998, 35, pp. 417-431.
- Frank, R.G. and McGuire, T.G. "Savings from a Carve-Out Program for Mental Health and Substance Abuse in Massachusetts Medicaid," *Psychiatric Services*, 1997, 48(9), pp. 1147-1152.
- Frank, R.G. and McGuire, T.G. "Economics and Mental Health" in Newhouse, J.P. and Culyer A.Y., eds., *Handbook of Health Economics*. Amsterdam: North Holland Press, 2000.

- Huskamp, H.A. "The Impact of a Managed Behavioral Health Care Carve-Out and Benefit Expansion on Outpatient Spending for Mental Health and Substance Abuse Services," doctoral dissertation, Harvard University, 1997.
- Lindrooth, R.C., Norton, E.C., and Dickey, B. "Provider Selection, Bargaining, and Utilization Management in Managed Care," *Economic Inquiry*, July 2002, vol. 40, no. 3, 348-365.
- Ma, C.A. and McGuire, T.G. "Network Effects in Managed Health Care," *Journal of Economic Management and Strategy*, 2002, 11, pp. 1-35.
- Newhouse, J. P. "Reimbursing Health Plans and Health Providers: Efficiency in Production versus Selection," *Journal of Economic Literature*, 1996, 34, pp. 1236-1263.
- Remler, D.K., Donelan, K., Blendon, R.J., Lundberg, G.D., Leape, Lucian A., Culkin, D.R., Binss, K., and Newhouse, J.P. "What do Managed Care Plans do To Affect Care? Result from a Survey of Physicians," *Inquiry*, 1997, 34 pp. 196-204.
- Rossiter, L. and Wilensky, G. "Patient Self-Selection in HMOs," *Health Affairs*, 1986, Spring, pp. 66-80.
- Town, R. and Vistnes, G. "Hospital competition in HMO networks," *Journal of Health Economics*, 2001, 20-5 pp. 733-753.

**7. Table 1: Enrollment and Managed Care Penetration of Medicaid & Medicare,**

**and Total Population in Massachusetts: 1994-99**

Year	Population*	Medicaid**		Medicare**	
		Enrollment	Managed Care %	Enrollment	Managed Care %
1994	6,031,352	700,449	67.0	918,000	5.3
1995	6,062,335	686,056	65.5	939,000	6.5
1996	6,085,393	696,550	65.6	936,000	11.3
1997	6,115,476	764,228	66.6	943,000	16.3
1998	6,144,407	884,548	66.5	946,000	20.4
1999	6,175,169	929,757	66.7	951,000	24.3

\* We obtain the MA population from the website of the U.S. Census Bureau ([www.census.gov](http://www.census.gov)).

\*\* Medicare and Medicaid enrollment are obtained from Division of Medical Assistance and Center for Medicare and Medicaid Services (CMS), respectively.

**7.1. Table 2: Total Costs and Cost Shares for MH/SA, Non-MH/SA and All Inpatient**

**Services in Massachusetts: 1994-99**

		1994	1995	1996	1997	1998	1999
MH/SA	Cost	488	436	425	372	375	361
	(Share %)	(8.5)	(8.4)	(8.5)	(8.0)	(8.0)	(7.7)
Non MH/SA	Cost	5278	4743	4598	4291	4328	4335
	(Share %)	(91.5)	(91.6)	(91.5)	(92.0)	(92.0)	(92.3)

Total Services	Cost	5767	5179	5024	4664	4702	4696
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Note: The total service cost is in millions of dollars and deflated using the medical component of the CPI (base year 1994).

### 8. Table 3: Discharges and Cost Per-Discharge for MH/SA and Non-MH/SA

#### 9. in Massachusetts: 1994-99

		1994	1995	1996	1997	1998	1999
MH/SA	Discharges	80878	77848	76735	74658	81800	75202
		(100.0)	(96.3)	(94.9)	(92.3)	(101.1)	(93.0)
	Average Cost	6034.4	5595.4	5543.9	4987.2	4579.3	4804.4
		(100.0)	(92.7)	(91.9)	(82.6)	(75.9)	(79.6)
Non MH/SA	Discharges	811348	762192	738139	745267	753689	754218
		(100.0)	(93.9)	(91.0)	(91.9)	(92.9)	(93.0)
	Average Cost	6034.4	5595.4	5543.9	4987.2	4579.3	4804.4
		(100.0)	(95.7)	(95.8)	(88.5)	(88.3)	(88.3)

Note: The average cost is in dollars and deflated using the medical component of the CPI (base year 1994).

The number in parenthesis compares the figure in the current year with the figure in 1994 (1994 is set equal to 100).

**Table 4: Total Costs and Cost Shares for MH and SA Services by Acute and Non-Acute Hospitals in Massachusetts: 1994-99**

	1994	1995	1996	1997	1998	1999
MH Non-Acute	214.7	210.4	194.4	191.0	184.7	191.9
(Share %)	(44.0)	(48.3)	(45.7)	(51.3)	(49.3)	(53.1)
MH Acute	222.5	184.7	192.7	142.6	153.2	133.3
(Share %)	(45.6)	(42.4)	(45.3)	(38.3)	(40.9)	(36.9)

SA Acute	51.2	40.5	38.3	39.1	36.7	36.1
(Share %)	(10.5)	(9.3)	(9.0)	(10.5)	(9.8)	(10.0)
Total Cost (million)	488.0	435.6	425.4	372.3	374.6	361.3

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994).

## 10. Table 5: Discharges and Cost Per Discharge for MH and SA Services by Acute and

### 11. Non-Acute Hospitals in Massachusetts: 1994-99

		1994	1995	1996	1997	1998	1999
MH Non-Acute	Discharge	25113	25087	25476	20694	27934	21158
	Average Cost	8856	7354	7568	6884	5486	6296
MH Acute	Discharge	35341	36110	36170	37702	38049	38409
	Average Cost	6073	5832	5377	5062	4851	4999
SA Acute	Discharge	20424	16651	15089	16262	15817	15635
	Average Cost	2498	2434	2527	2401	2323	2307

Note: The cost per discharge is in dollars and deflated using the medical component of the CPI (base year 1994).

**Table 6: Cost Shares of MH/SA Services by Major Payers in Massachusetts: 1994-99**

	1994	1995	1996	1997	1998	1999
Medicare %	25.9	40.8	38.6	36.7	37.5	37.4
Medicaid %	12.3	31.2	28.4	29.5	30.2	31.0
Others %	61.8	28.0	33.0	33.8	32.4	31.6
Total Cost (million)	488.0	435.6	425.4	372.3	374.6	361.3

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994).

**Table 7: Per-Enrollee Cost for MH/SA Services by Major Payers  
in Massachusetts: 1995-99**

Payer	1995	1996	1997	1998	1999
Medicare	189.3	175.4	144.8	148.3	142.1
Medicaid	197.9	173.5	143.8	127.8	120.4
Others	27.5	31.5	28.6	28.1	26.6

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994).

**Table 8: Adjusted by DRG and Unadjusted Per-Discharge Cost for MH/SA Services in  
Medicare Plans in Massachusetts: 1994-99**

	1994	1995	1996	1997	1998	1999
<b>11.1.1. Adjusted Average Cost</b>						
FFS	5003	5309	5304	5265	5376	6029
HMO	3666	4236	3418	3988	3795	4536
<b>11.1.2. Unadjusted Average Cost</b>						
FFS	5180	5311	5319	5375	5498	6136
HMO	4059	4054	3315	3854	3790	4506

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994)

**12. Table 9: Discharge Shares of Top Five Hospitals for MH/SA Services in**

**13. Medicare Plans in Massachusetts: 1994-99**

Medicare Plans	1994	1995	1996	1997	1998	1999
FFS (%)	20.3	21.2	21.0	19.7	20.7	21.5
Fallon Senior (%)	100.0	100.0	100.0	100.0	99.6	97.8
Tufts Senior Horizon (%)	0.0	0.0	0.0	100.0	56.2	53.9
Harvard First Seniority (%)	0.0	0.0	0.0	0.0	66.1	59.7
Other HMOs (%)	88.5	65.1	54.7	44.5	60.7	65.6

**Table 10: Adjusted and Unadjusted Per-Discharge Cost for MH/SA Services in Medicaid Plans in Massachusetts: 1994-99**

	1994	1995	1996	1997	1998	1999
<b>13.1.1. Adjusted Average Cost</b>						
FFS	4894	5372	5527	6184	7149	7384
HMO	5641	5035	4716	4364	4124	4340
MBHP	5311	4151	3548	2761	3543	3404
<b>13.1.2. Unadjusted Average Cost</b>						
FFS	4795	5257	5359	6090	7435	7698
HMO	5827	5179	4872	4366	4053	4241
MBHP	5268	4566	3826	3024	3281	3354

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994)

**Table 11: Discharge Shares of Top Five Hospitals for MH/SA Services in Medicaid Plans in Massachusetts: 1994-99**

Medicaid Plans	1994	1995	1996	1997	1998	1999
FFS (%)	29.1	30.2	27.2	24.3	14.2	13.4
MBHP (%)	21.5	19.4	24.5	35.3	45.2	44.6
HMO (%)	69.2	68.6	66.4	58.6	43.5	58.7

FIGURE 1. The Percentage Change in Total Inpatient Cost for MH/SA Services and Non-MH/SA Services Relative to 1994 Total Costs, 1994-1999

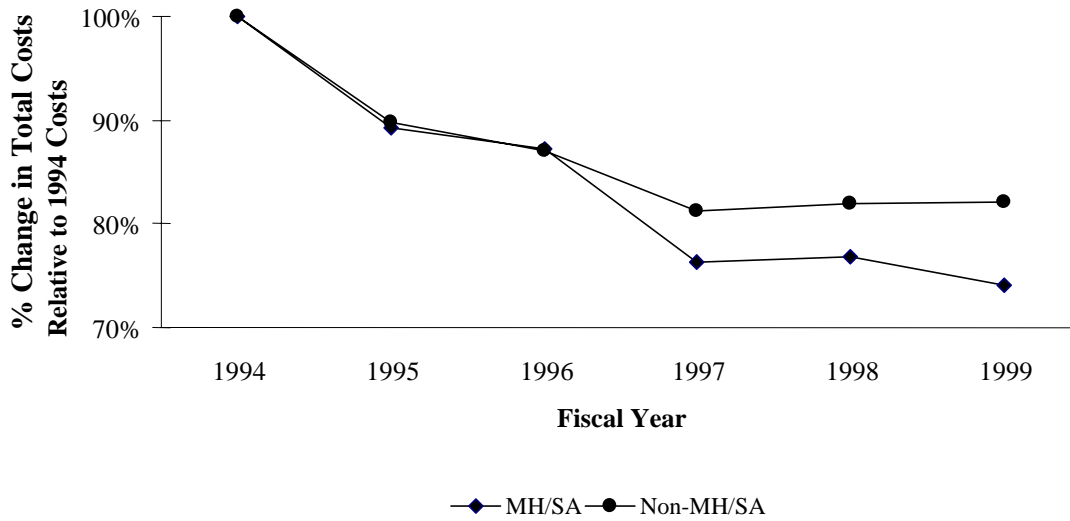


FIGURE 2. The Average Cost of a Medicare Discharge by Payer in 1994 Dollars, 1994-1999

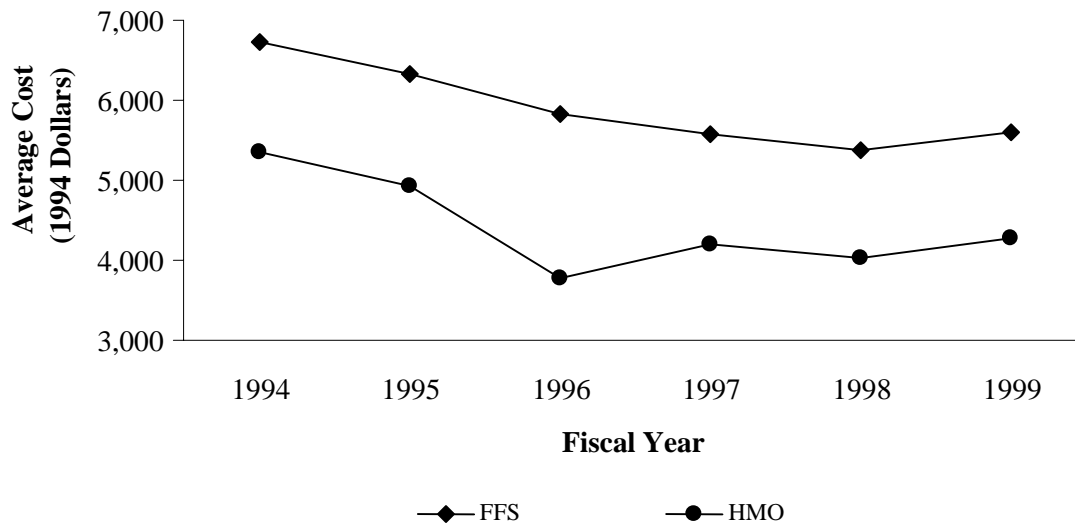


FIGURE 3. The Average Day Cost of Medicare Discharges Relative to FFS Costs in 1994 by Payer, 1994-1999

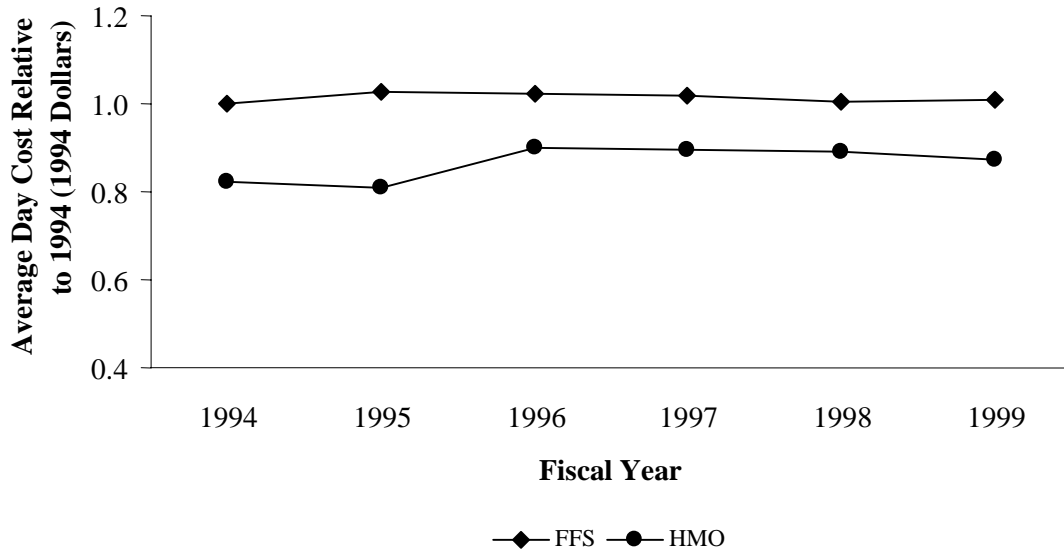


FIGURE 4. The Average Length of Stay of Medicare Discharges Relative to 1994 Average Length of Stay by Payer, 1994-1999

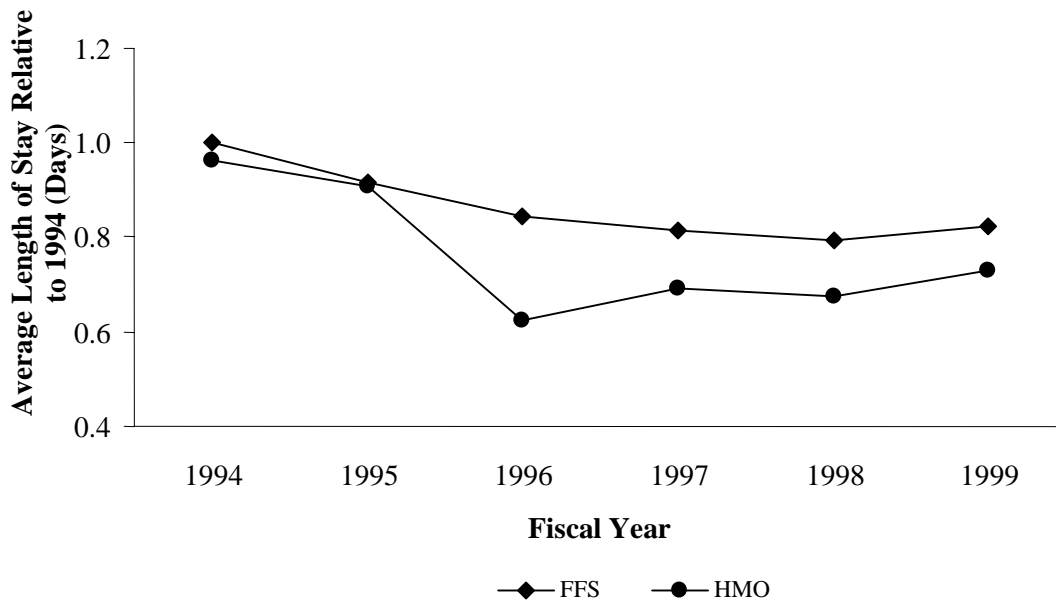


FIGURE 5. Network Effects for Medicare: Predicted FFS Average Cost using HMO Discharge Distribution, 1994-1999

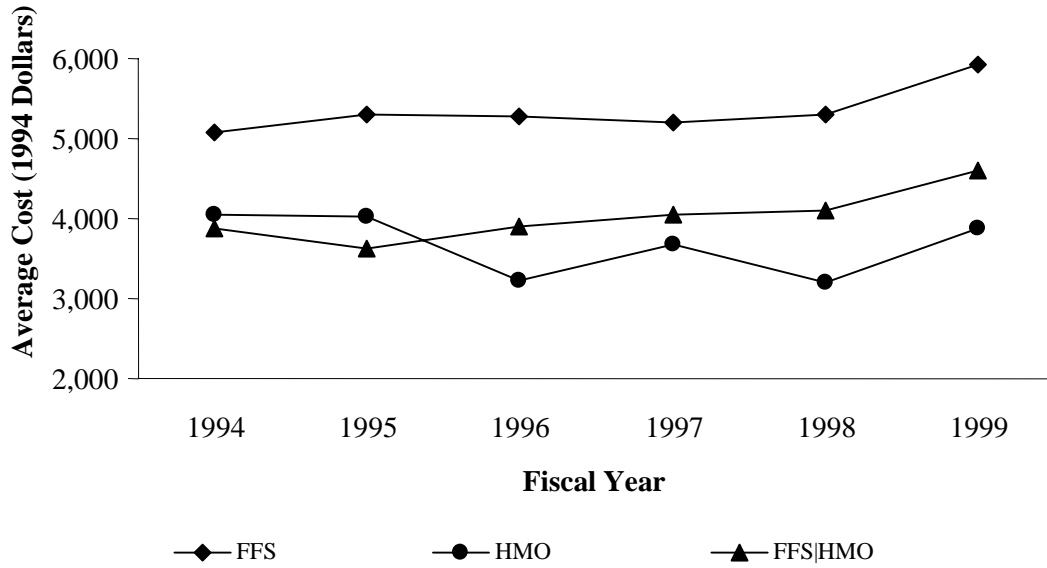


FIGURE 6. The Average Cost of Medicaid Discharges by Payer, 1994-1999

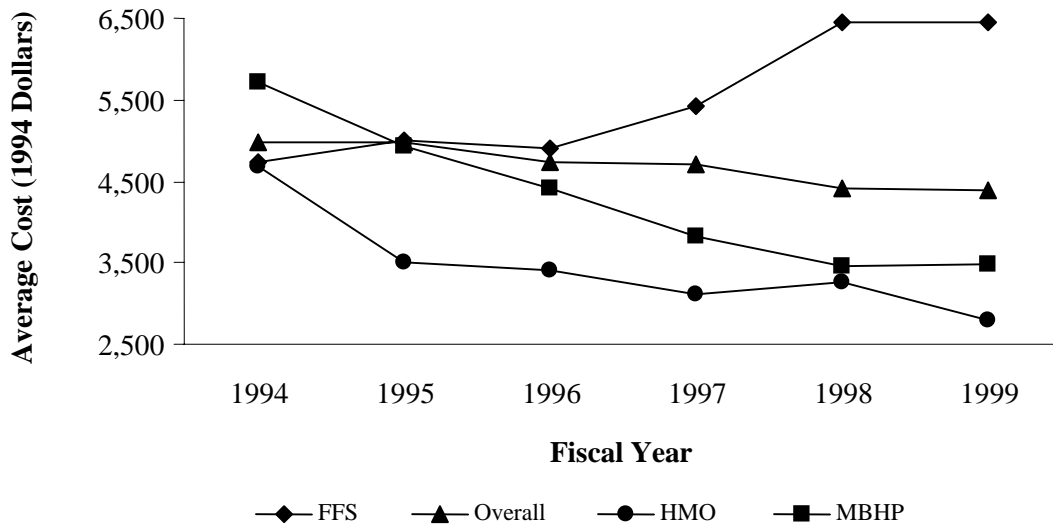


FIGURE 7. The Average Day Cost of Medicaid Discharges Relative to FFS Costs in 1994 by Payer, 1994-1999

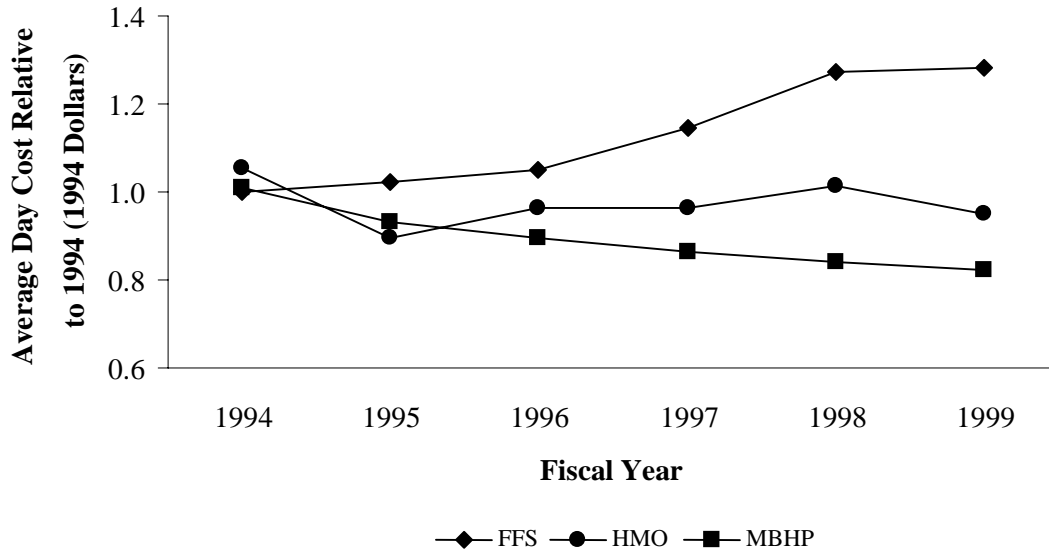


FIGURE 8. The Average Length of Stay of Medicaid Discharge Relative to 1994 Average Length of Stay by Payer, 1994-1999

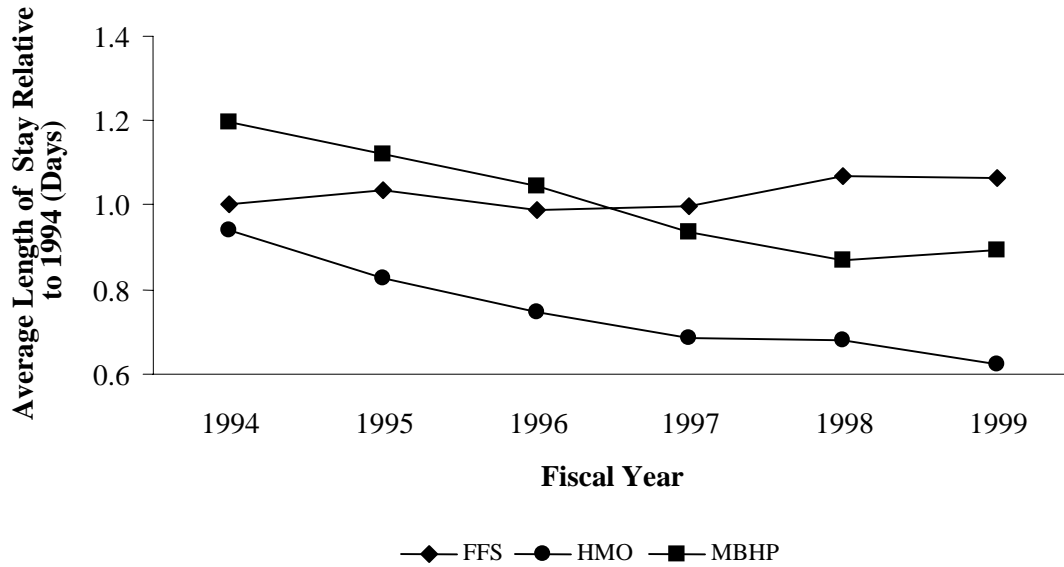


FIGURE 9. Network Effects for Medicaid: Predicted FFS Average Cost using Non-FFS Discharge Distributions, 1994-1999

