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## The Costs of NH’s Health Care System: Hospital Prices, Market Structure, and Cost-Shifting

March 2012

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## **About this paper**

We thank the New Hampshire Hospital Association (NHHA) for sharing with us the audited financial statements and standard financial spreadsheets they collect from the state's hospitals, and for their assistance in clarifying a number of issues with the data. The analysis and opinions expressed in this paper, however, are those of the Center alone.

This paper is one of a series published by the New Hampshire Center for Public Policy Studies on the topic of health care finance and insuring the New Hampshire workforce. The New Hampshire Insurance Department has sponsored this work.

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## Executive Summary

Senate Bill 392 required the New Hampshire Insurance Department (NHID) to hold public hearings regarding an insurance company's petition to increase the base rate for health insurance coverage. In response to that requirement, the NHID solicited input regarding the factors that affect health insurance costs in the state. This report has been developed in response to two specific questions: How does the mix of public (Medicare and Medicaid) and private payers affect private insurance payments through the phenomenon of cost-shifting? And what other factors might explain the observed variation in payments in the health care system?

Rather than focusing on aggregate health care costs, our analyses try to understand variation in how much hospitals are paid for a basket of services, adjusted for the underlying complexity of the patients being served in a given hospital, and the prevailing wages in the area. Using this approach means that we will not assess variation in the levels of utilization – the number of services provided – but rather the payment for a given service.

Using the most recent data available, this analysis assesses the extent to which quality of care, the sickness or complexity of the population served, payer mix (Medicare or Medicaid's share of overall business), differences in hospital costs, and underlying market competition best explain the observed differences in the prices paid by health insurance companies to hospitals. As cost-shifting is a critical part of the New Hampshire debate regarding price variation across the state, this analysis also addresses this topic and the factors that may explain cost-shifting.

***Variation in prices paid to hospitals*** – Variation in prices paid by health insurance companies to hospitals are not explained by differences in the quality of care, the complexity of the population served, payer mix, levels of market competition or the penetration of managed care. Of those factors analyzed, the age of the population and the level of market competition were the best predictors of hospital prices, though the relationships observed were somewhat weak. Our conclusion is based on a simple descriptive analysis of the relationship between market structure, characteristics of the hospital's payer mix, and characteristics of the community within which the hospital resides, using data on the relative health insurance payment levels for the same set of services.

***Hospital cost-shifting*** - Hospital cost-shifting makes up a large and growing share of the health care premium dollar and is largely dependent upon the share of a hospital's revenue structure that is Medicare. Based on our analysis of 2009 data, below-expense reimbursement from Medicare accounted for 40 percent of cost-shifting in the state. Medicaid accounted for 24 percent, with uncompensated care accounting for the remaining third. Not surprisingly, payer mix is highly correlated with the observed hospital cost-shifting. In 2009, the share of a hospital's revenues that were public was the single best predictor of the level of cost-shifting per private pay discharge.

While Medicare is the primary driver of hospital cost-shifting, there is an association between changes in Medicaid reimbursement levels and cost-shifting. Between 2001 and 2009, Medicaid reimbursement relative to expenses fell significantly. In 2001, Medicaid reimbursed hospitals at approximately 72 percent of expenses. In 2009, that had fallen to 47 percent. Those hospitals that

saw a significant decrease in their Medicaid payment levels relative to expenses during that period saw cost-shifts more than twice as big as those in areas that saw moderate decreases or actual increases.

This finding suggests that one can expect recent budgetary changes to have a significant impact on hospital efforts to cost shift. Recent budgetary changes with state's disproportionate share program effectively reduced Medicaid payments to hospitals by an average of 27 percent. Based on these results, one can anticipate an effort on the part of hospitals to shift some of this reduction onto private insurance premiums. How much of a change will result is a complex function of a variety of different factors as hospitals can respond to these reimbursement changes in a variety of ways including changing their business model, reductions in services and/or community benefits as well as cost-shifting.

The results here also suggest that variation in the level of market competition in New Hampshire has a limited impact on cost-shifting behavior. Our results suggest that as market concentration increases, hospital cost-shifting increases. However, the relationship is weak especially when compared with the association between public payers and cost-shifting behavior. However, this analysis cannot rule out the possibility that this finding is a result of a small degree of variation in the level of competition across the state. Based on the economic definitions of market competition used in this analysis, there are no "competitive" hospital markets in New Hampshire.

## **Policy implications**

One of the primary topics tackled in this analysis was the relationship between market structure (competition among providers), payer mix, and the prices paid to hospitals. The results suggest that while an increasing level of competition among hospitals is associated with lower prices, the relationship is a weak one. A more robust predictor of prices is an aged population and the level of cost-shifting, a relationship that is primarily driven by the share of a hospital's revenue base that is covered by Medicare. Reductions in the level of Medicaid reimbursement over time are associated with higher prices – presumably driven by the cost-shifting phenomenon – but the growth in Medicare is the most significant contributor.

This means that by exclusively focusing on Medicaid, cost-shifting and reimbursement levels, policymakers may miss an important part of the health care price puzzle. If we are concerned about cost-shifting and the implications on private premiums and hospital payment levels, we should focus attention on federal decisions around Medicare – particularly given an aging population.

There are important caveats to this analysis. First, the analysis was a simple one in that it used descriptive techniques to point to potential areas policymakers could focus on to understand changes in costs, prices paid and premiums. This was not a sophisticated multivariate analysis that could demonstrate causality.

Second, there are important factors that we did not consider in this analysis, including differences in how health systems adopt and use technology. The development of new treatments, such as for management of long-term diseases or for diagnosing and treating

diseases, are just two examples of ways in which technology has increased expenditures.<sup>1</sup> A technical review panel established by the Medicare program concluded that approximately 50 percent of the growth in health care spending can be attributed to medical technology.<sup>2</sup> Presumably, some of the variation experienced across New Hampshire is a function of variable adoption of technologies. Unfortunately, we had no obvious proxy measure for such adoptions.

## Data and methods

Our analysis attempts to provide insight into two questions associated with health care cost variation and its impact on private insurance costs.

1. Are health care costs most closely correlated to the degree of competition among hospitals, rather than other factors that we might expect – such as quality of care or the makeup of the patient population?
2. Is the phenomenon of cost-shifting related to the payer mix, or do other factors – such as market leverage – play a larger role in determining the level of cost-shifting that occurs?

To answer these questions, the Center developed a variety of indicators. These are discussed below. The primary measures of interest were variation in payments across the hospital system, along with an understanding of the factors affecting hospitals' cost-shifting behavior. In what follows, we provide a description of the other data used in the analysis.

### ***Correlation and the precision of the estimates***

In this analysis, we have relied on the coefficient of determination ( $R^2$ ) to define the relationship between two variables. For example, we have examined the relationship between hospital costs and hospital quality, between the amount of cost-shifting per private patient and the portion of public payers in the hospital, and so on. We have reported the results of a linear regression between two variables and the resulting  $R^2$  value from the linear regression.

We have used the coefficient of determination to examine these relationships because it is a standard statistical test. The coefficient of determination describes the goodness of fit between two variables on a linear scale. Statisticians know that the  $R^2$  is a useful descriptor of the degree of linear association between two variables, and that it has two key properties of magnitude and direction. When it is near zero, there is no correlation, but as it approaches 1 there is a strong negative or positive relationship between the variables (respectively).

One of the concerns for statisticians is the precision of such estimates, which can be affected by the size of the sample. For example, if New Hampshire were home to 1,000 hospitals, but we only looked at the correlation between cost and quality for 20 of those hospitals, we would be rightly concerned that another sample of 20 different hospitals would produce a different result. However, in this case we are examining the full “universe” of 26 hospitals in New Hampshire.

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<sup>1</sup> Richard A. Rettig, “Medical Innovation Duels Cost Containment,” *Health Affairs* (Summer 1994): 15.

<sup>2</sup> Technical Review Panel on the Medicare Trustees Reports, *Review of Assumptions and Methods of the Medicare Trustees' Financial Projections* (December 2000), [http://www.cms.hhs.gov/ReportsTrustFunds/02\\_TechnicalPanelReports.asp#TopOfPage](http://www.cms.hhs.gov/ReportsTrustFunds/02_TechnicalPanelReports.asp#TopOfPage).

Therefore, issues regarding precision of the estimates and the size of sample are not applicable to our analysis.

Finally, we should note that correlation does not necessarily imply causation. If a strong correlation is observed between two variables A and B, there are several possible explanations: (a) A influences B; (b) B influences A; (c) A and B are influenced by one or more additional variables; (d) the relationship observed between A and B was a chance error. Nonetheless, it provides policy makers with information suggesting further discussion and analysis.

In our primarily descriptive (and univariate) analysis, one needs to be cautious about over-interpreting the results. More sophisticated techniques, including multivariate regression analysis – which controls for many factors in a given analysis – would have provided a more precise understanding of the relationship between the variables. However, these models were abandoned given the small number of data observations and the imprecision of the resulting estimates.<sup>3</sup>

### ***Hospital cost-shifting measures***

The primary source of data for this analysis is the Center's 10 years of analysis of hospital finances, which includes data on patient service revenue by payer, hospital margins, the provision of uncompensated care, and our estimates of hospital cost-shifting.

This analysis has allowed us to measure several important concepts including:

- Cost-shift per private patient – equal to the total amount of cost-shifts to private insurance payers divided by the number of private payers in that hospital in that year
- Cost-shift as a percent of net patient revenue
- Operating margin
- Percent of revenues and patients that are public payers (Medicare and Medicaid)
- Medicaid and Medicare payment levels – equal to the net patient revenue for those public payers, divided by the appropriate public payer expenditures (the list price)

Other data – including information on demographics and market level dynamics – are also included to support this descriptive analysis. This includes the percent of the population in the area age 65 and over, Medicaid recipients as percent of the area population, poverty rates, average income per household, and prevailing wages in the area.

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<sup>3</sup> There are only 26 hospitals in New Hampshire, and although we attempted to pool data across years, we were unable to effectively control for statistical issues associated with the correlation between a hospital's behavior in one year and the next.

### ***Relative prices***

The best readily available source of data on the variation in hospital payments in New Hampshire is produced by the New Hampshire Insurance Department in their report, "New Hampshire Acute Care Hospital Comparison (2008)."<sup>4</sup> The cost measure in this analysis is a combined index of a market basket index for outpatient services and an index accounting for case mix adjusted average prices per discharge on the inpatient side. The NHID measures of price variation used in this analysis are case-mix adjusted. The inpatient methodology is based on the hospital rate regulation system used in Maryland. Charges per case and the case mix index are the two measures used to establish and control hospital costs and the system has been successfully operating for years. The outpatient methodology used adjusts for the differences in services provided and, indirectly, case mix intensity.

### ***Adjusting prices paid to hospitals for input prices***

The Center has attempted to adjust the NHID Acute Care Hospital Comparison estimates for regional differences in input prices. As a proxy for regional differences in input prices, the Center used the average hourly wage for registered nurses across sub-state wage areas in New Hampshire. According to staffing pattern data available from the New Hampshire Department of Employment Security, the registered nurse occupational category comprises approximately 30 percent of staffing in hospitals. Also, according to the same source, registered nurse hourly wages vary by sub-state wage area in New Hampshire. Therefore, we used this sub-state variation from the state mean registered nurse hourly wage as a proxy for regional differences in all input prices.

Table 1 shows the mean wage for occupational code 29-1111 (registered nurses) for all of the sub-state wage areas defined by the New Hampshire Department of Employment Security for the years 2008 through 2011. Wages are below the state average in northern and western parts of New Hampshire, with the exception of the Lebanon-Hanover area. This region is home to the Dartmouth-Hitchcock Medical Center, the state's largest hospital, and this probably accounts for the higher than state average registered nursing wages in that region. Nursing wages are generally higher than the state average in the southern sub-state areas of Manchester and Nashua.

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<sup>4</sup> A complete discussion can be found here:

[http://www.nh.gov/insurance/consumers/documents/nh\\_ac\\_hosp\\_comp.pdf](http://www.nh.gov/insurance/consumers/documents/nh_ac_hosp_comp.pdf)



**Table 1: Registered Nurse Wages in New Hampshire**

29-1111 Mean Wage	Registered Nurses			
	<b>Source: NH Occupational Employment and Wages</b>			
	2008	2009	2010	2011
State	\$29.26	\$29.56	\$30.21	\$30.99
Claremont	\$26.10	\$29.48	\$33.02	\$27.88
Concord	\$28.42	\$28.78	\$29.71	\$30.75
Conway	\$26.99	\$27.21	\$28.01	\$25.82
Exeter	\$27.04	\$28.15	\$31.87	\$30.84
Keene	\$26.24	\$27.61	\$28.17	\$30.02
Laconia	\$26.66	\$27.16	\$28.66	\$30.43
Lebanon-Hanover	\$32.39	\$32.70	\$33.01	\$34.22
Manchester	\$31.16	\$31.70	\$31.88	\$32.64
Nashua	\$29.83	\$29.72	\$29.97	\$31.96
North Country	\$25.93	\$25.20	\$25.92	\$27.14
Peterborough	\$26.89	\$27.48	\$27.65	\$28.41
Plymouth	\$31.85	\$29.94	\$29.42	\$29.14
Portsmouth	\$30.14	\$30.32	\$29.91	\$30.64
Rochester-Dover	\$27.00	\$27.01	\$26.90	\$26.01
Standard Deviation	2.28	2.03	2.22	2.46
COV	7.79	6.86	7.35	7.94

### ***Measures of market concentration***

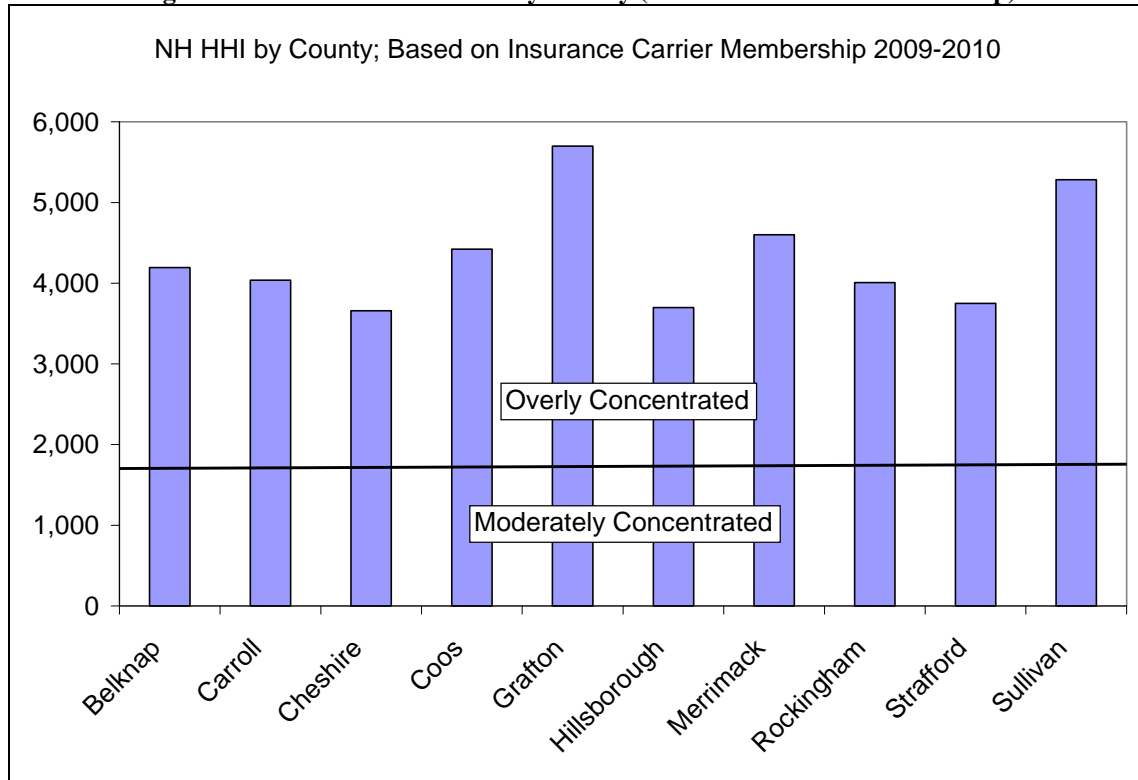
In this analysis, market competition was measured in the insurance market and in the market for inpatient and outpatient services. For both markets, the Center created a Herfindal-Hirschman Index (HHI). An HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. For example, for a market consisting of four firms with shares of 30, 30, 20 and 20 percent, the HHI is equal to 2600 ( $30^2 + 30^2 + 20^2 + 20^2 = 2,600$ ). Thus, the HHI approaches zero in a market with a large number of firms of the same size. Conversely, the HHI would increase as the number of firms in the market decreases and as the size between those firms increases. Markets in which the HHI is between 1,000 and 1,800 points are considered to be moderately concentrated, and those in which the HHI is in excess of 1,800 points are considered to be overly concentrated.

### **The Insurance Market**

The Center used the NHID Insurance Carriers Membership Summary to create an HHI for each county in New Hampshire. In that NHID report, membership is equal to member months divided by the total months between July 2009 and June 2010.

Figure 1 shows the HHI for New Hampshire Insurance Carriers, based on the membership statistics by county.

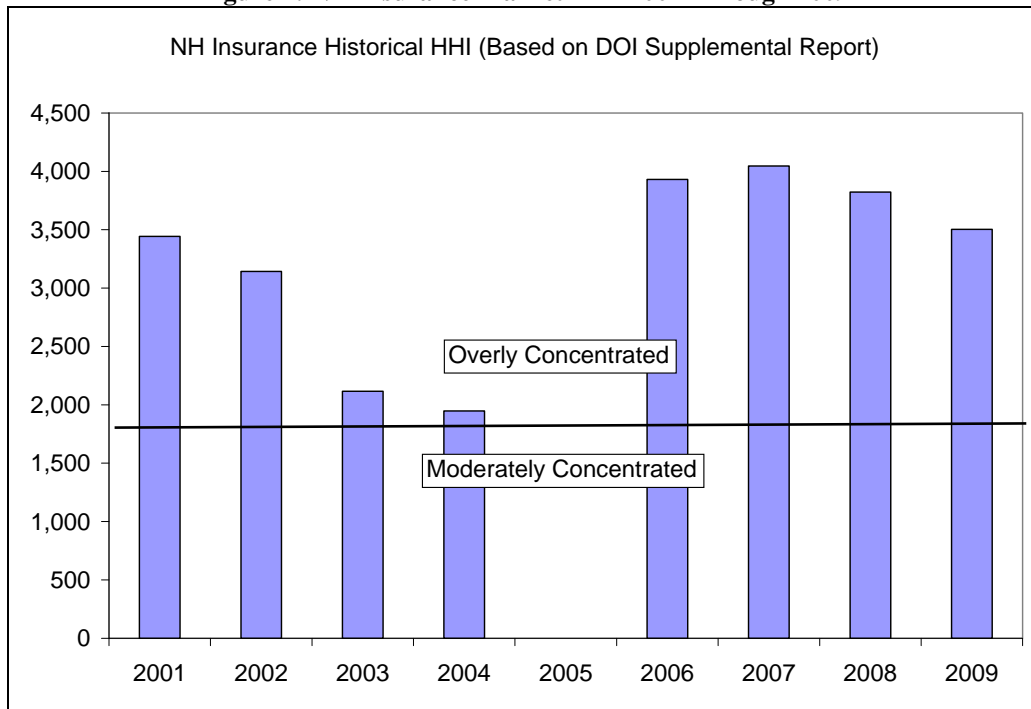
**Figure 1: Health Insurance HHI by County (Insurance Carrier Membership)**



In 2002, the Insurance Commissioner issued a bulletin requiring all New Hampshire licensed health insurance companies, health maintenance organizations, fraternal benefit societies, and third-party administrators to submit a report detailing their coverage offered in New Hampshire. The Center used these reports to calculate a state HHI over time, based on the Membership by Covered Lives section of that report.

Data was not available for the year 2005. In 2006, the Department substantially revised the bulletin that describes how data need to be submitted to the NHID. For this reason, data from 2006 and later years cannot be compared to prior submissions.

Figure 2 shows the New Hampshire state level HHI over time, using data from the NHID supplemental reports. Note that the data from 2006 to 2009 (which may not be comparable to data prior to 2005) shows an overly concentrated (uncompetitive) private insurance market in New Hampshire.

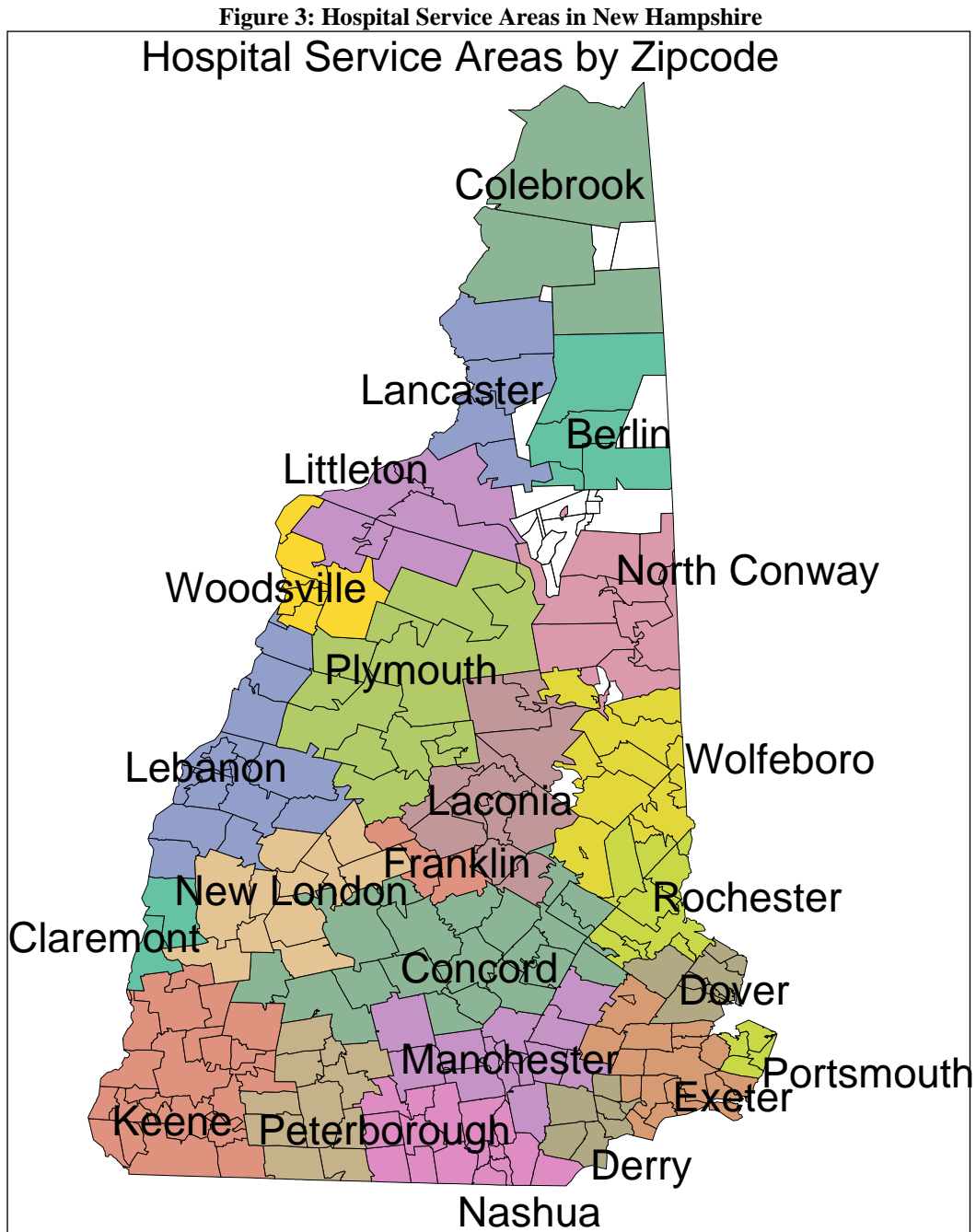
**Figure 2: NH Insurance Market HHI 2001 Through 2009**

### ***Measures of market concentration in the hospital market***

Hospital market shares (and HHIs for each hospital market) were calculated for each hospital service area in New Hampshire, using New Hampshire Hospital Inpatient Origin and Number of Procedures Ambulatory Care Reports for the years 2001, 2006 and 2009. These reports show the number of discharges by town and by hospital for each year. The analysis was limited to those towns that have 2 percent or more of any hospital admission in that year.

Each city and town in New Hampshire was identified as belonging to one of 24 hospital service areas. The number of patients from each service area admitted to each hospital was summed for each hospital. This approach allowed the Center to include all the hospitals in New Hampshire in the calculation, even if that admission to the hospital came from a patient outside of the main hospital service area. For example, a few hundred patients from the Manchester hospital service area are admitted to Parkland Medical in Derry, even though that hospital is outside of the Manchester service area. Likewise, while most of the admissions from the Derry hospital service area are admitted to Parkland Medical, a few hundred each year are admitted to Catholic Medical Center and Elliott Hospital in the Manchester hospital service area.

Figure 3 shows the hospital services areas identified according to zip code.



The results of the market share and HHI analysis reveal that each hospital service area is dominated by one or two hospitals, although nearby hospitals may have small shares of the market. Based on this analysis, no hospital service area in New Hampshire would be considered “competitive” according to standard economic definitions.

Moreover, market share has remained relatively constant over time. The following table (Table 2) shows that the total market share, measured by a hospital's share of total discharges in New Hampshire, has changed little in the last decade, offering further evidence that local hospitals remain dominant in their local markets.

**Table 2: Hospital Market Shares Across Time**

NUMBER AND PERCENT OF INPATIENT DISCHARGES in NEW HAMPSHIRE BY HOSPITAL BY TOWN SOURCE: NEW HAMPSHIRE HOSPITAL ASSOCIATION						
	2000	2001	2005	2006	2008	2009
ALICE PECK DAY MEMORIAL	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%
ANDROSCOGGIN VALLEY	2.0%	2.0%	1.6%	1.5%	1.2%	1.1%
CATHOLIC MEDICAL	7.8%	7.9%	8.3%	7.9%	7.8%	7.4%
CHESHIRE MEDICAL	4.6%	4.6%	4.2%	4.1%	4.6%	4.2%
CONCORD	9.6%	10.3%	10.0%	9.9%	9.8%	10.5%
COTTAGE	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%
ELLIOT	10.5%	10.6%	10.9%	10.9%	10.6%	10.4%
EXETER	4.1%	4.4%	4.5%	4.6%	4.8%	5.2%
FRANKLIN REGIONAL	1.3%	1.1%	1.1%	0.9%	0.9%	0.7%
FRISBIE MEMORIAL	3.2%	3.1%	3.1%	3.3%	3.4%	3.5%
HUGGINS	1.4%	1.5%	1.4%	1.4%	1.3%	1.2%
LAKES REGION GENERAL	4.2%	4.2%	3.9%	4.2%	3.9%	3.8%
LITTLETON REGIONAL	1.3%	1.3%	1.2%	1.1%	1.2%	1.1%
MARY HITCHCOCK MEMORIAL	15.0%	13.9%	14.4%	15.0%	16.7%	17.1%
MARY HITCHCOCK PSYCH MEMORIAL	0.9%	0.8%	0.9%	0.8%		
MEMORIAL	1.4%	1.3%	1.2%	1.2%	1.2%	1.2%
MONADNOCK COMMUNITY	1.6%	1.6%	1.4%	1.2%	1.3%	1.2%
NEW LONDON	1.0%	0.9%	0.7%	0.5%	0.6%	0.7%
PARKLAND MEDICAL	2.9%	3.0%	2.5%	2.6%	2.7%	2.6%
PORTSMOUTH REGIONAL	5.5%	5.3%	6.0%	5.7%	4.7%	4.8%
SOUTHERN NH MEDICAL	7.2%	7.7%	8.3%	8.3%	8.3%	7.8%
SPEARE MEMORIAL	0.9%	0.9%	1.1%	1.1%	0.9%	0.8%
ST. JOSEPH	4.9%	5.1%	4.4%	4.3%	4.6%	5.0%
UPPER CONNECTICUT VALLEY	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
VALLEY REGIONAL	1.6%	1.5%	1.4%	1.4%	1.2%	1.1%
WEEKS MEMORIAL	0.8%	0.9%	0.9%	0.9%	0.7%	0.7%
WENTWORTH-DOUGLASS	4.3%	4.4%	5.0%	5.4%	5.8%	6.1%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

### ***Hospital quality measurements***

Our quality measures are based on composite scores for a variety of measures of hospital quality, including patients' assessments of the hospital, and hospital's use of best practices in surgery, treatment of heart attacks, congestive heart failure and community acquired pneumonia. The sources of these data are varied including surveys of patients and CMS (Centers for Medicare & Medicaid Services) data collection from individual patient charts, among others. Each quality domain and indicators within that domain are included below.

### **Patient Experiences (2009)<sup>5</sup> Survey of Patients' Hospital Experience (HCAHPS) -- Survey Results**

- Communication with Nurses
- Communication with Doctors
- Communications about Medicine
- Responsiveness of hospital staff
- Discharge Information
- Pain management
- Cleanliness of hospital

<sup>5</sup> <http://www.nhqualitycare.org/index.php/reports/hcahps?id=68&date=091231>

- Quietness of hospital
- Rating of the hospital
- Willingness to recommend

#### **Hospital Management of Surgical Infection Prevention (2009)<sup>6</sup>**

- Prophylactic Antibiotic Received Within One Hour Prior To Surgery
- Prophylactic Antibiotic Selection
- Prophylactic Antibiotic Discontinued Within 24 Hours After Surgery
- Recommended VTE Prophylaxis Ordered
- Recommended VTE Prophylaxis Received
- Controlled 6am Postop Serum Glucose
- Appropriate Hair Removal
- Composite Score

#### **Hospital Management of Heart Attack (2009)<sup>7</sup>**

- Aspirin At Arrival
- Aspirin At Discharge
- Beta Blocker At Discharge
- ACEI Or ARBs For LVSD
- Smoking Cessation Counseling
- Composite Score

#### **Hospital Management of Congestive Heart Failure (2009)<sup>8</sup>**

- LVE Assessment
- ACEI Or ARBs For LVSD
- Smoking Cessation Counseling
- Discharge Instructions
- Composite Score

#### **Hospital Management of Community Acquired Pneumonia (2009)<sup>9</sup>**

- Antibiotics Within 6 Hours
- Blood Cultures Prior To Antibiotics
- Appropriate Antibiotics
- Pneumococcal Vaccination
- Influenza Vaccination
- Smoking Cessation Counseling
- Composite Score

Figure 4 shows the composite quality indicator for each hospital in the state. A hospital with a perfect score in each of the categories would have received a 100 percent composite score. A

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<sup>6</sup> <http://www.nhqualitycare.org/index.php/reports/scip?id=67&date=091231>

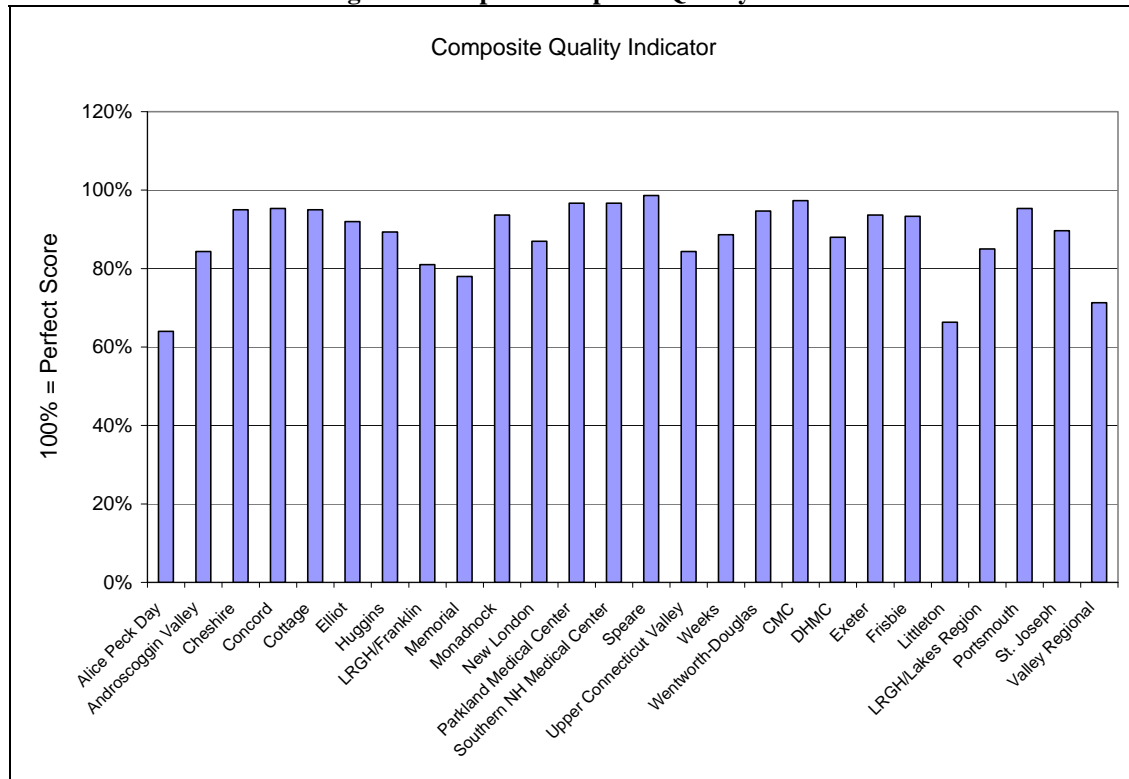
<sup>7</sup> <http://www.nhqualitycare.org/index.php/reports/ami?id=64&date=091231>

<sup>8</sup> <http://www.nhqualitycare.org/index.php/reports/chf?id=65&date=091231>

<sup>9</sup> <http://www.nhqualitycare.org/index.php/reports/cap?id=66&date=091231>

simple average of each quality indicator was taken. Where data were not available, the indicator was excluded from the calculation<sup>10</sup>.

**Figure 4: Hospital Composite Quality Index**



**Private insurance market and managed care**

One important characteristics of the market that could affect prices is the degree to which managed care has penetrated a given market. Markets in which care is actively managed and where reimbursement is capitated could result in lower costs of care and ultimately lower reimbursement levels. To capture this component of the market, the Center used data on enrollment by plan design using the New Hampshire Comprehensive Health Care Information System (CHIS).

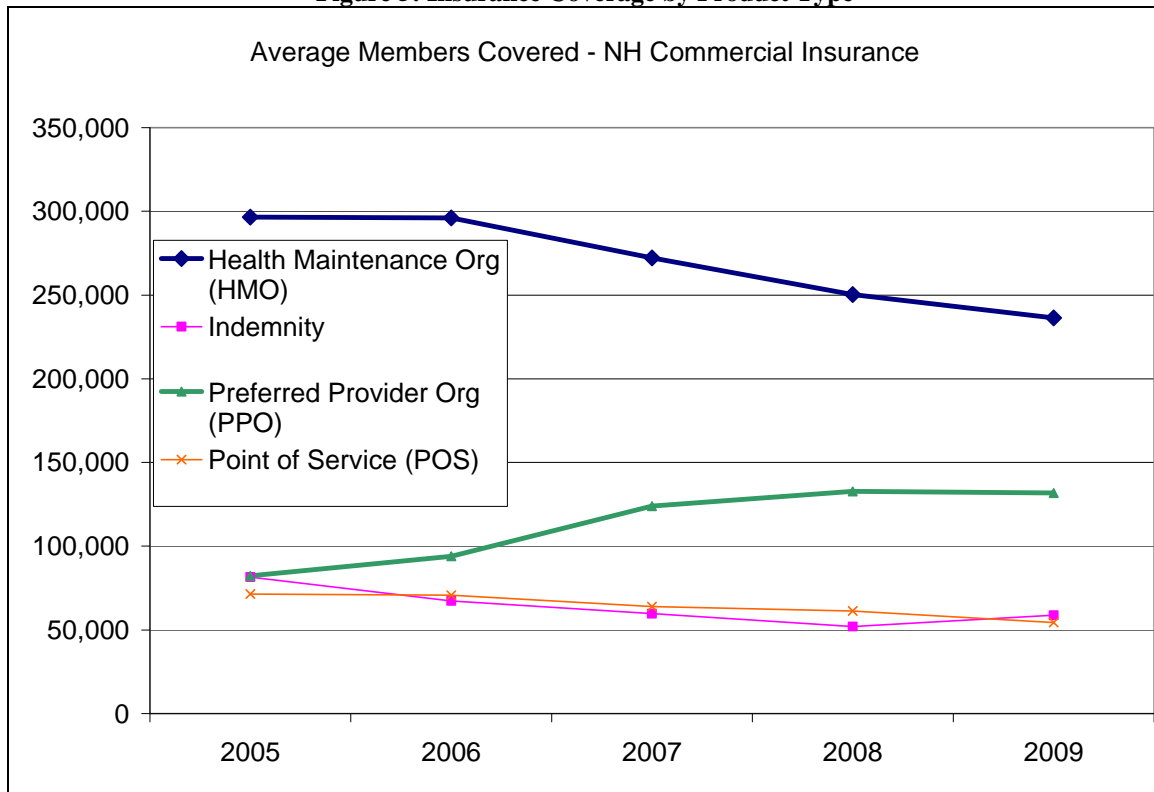
The following chart, developed from data taken from the CHIS system, shows the average members covered by commercial insurance in New Hampshire by types:

- IND = Indemnity Major Medical Coverage
- PPO = Preferred Provider Organization
- POS = Point of Service

<sup>10</sup> The NH QualityCare data is collected from individual patient charts and submitted for entry into the Centers for Medicare & Medicaid Services (CMS) Data Warehouse. The data are not case mix adjusted. According to the website “The information on www.NHQualityCare.org does not represent the overall health care picture in New Hampshire. NH QualityCare should not be the only source for drawing conclusions about the care at any one hospital.”

- HMO = Health Maintenance Organization

**Figure 5: Insurance Coverage by Product Type**



The chart shows that the number of members under HMO plans has declined, while the number of members under PPO plans has increased.<sup>11</sup>

HMO and POS are health insurance products offered by insurers where consumers choose a primary care provider. Consumers are usually then referred to other service providers in the network through that primary care provider. Primary care providers may be nurse practitioners, or other types of health care providers that are not primary care physicians. PPO refers to a type of health insurance product offered by insurers where enrollees may go outside the network, but would incur larger costs in the form of higher deductibles, higher coinsurance rates, or non-discounted charges from the providers.<sup>12</sup>

Any of these products (HMO, POS and PPO) may have networks that include practically all providers in the state, or some subset of those providers.

The distinction between HMO, POS and PPO products has important implications for health insurance prices and costs. An HMO is very restrictive, because it does not allow its members to use health insurance services outside of its own network. Members who receive emergency

<sup>11</sup> The underlying reasons for this apparent drop off in HMO plans, such as change in actual benefits, movement to self-insured coverage, or benefit design, is not known.

<sup>12</sup> Description of NH plans based on <http://www.sbhi.net/new-hampshire.htm>



treatment outside of the network are required to pay that bill directly. Also HMO members must establish a relationship with a primary care physician that is inside the existing HMO network. Therefore, HMO products could properly be considered managed care products.

A PPO product is less restrictive, because it allows the PPO member to go outside the network, and use a portion of their benefits to pay for services outside the network. However, the PPO member cannot use 100 percent of their benefits outside the network. POS plans will allow the covered member to choose their primary health care provider from any network, and upon that doctor's referral, he or she can use their complete benefits out of the network. Therefore, PPO and POS products could not properly be considered managed care products, since they place less emphasis on the primary care physician to patient relationship.

The following table shows that the HMO products, as a percent of the total, have declined in nearly every New Hampshire insurance market.

**Table 3: HMO as a Percent of Total Enrollment**

<b>HMOs as a Percent of Commerical Enrollment</b>					
	2005	2006	2007	2008	2009
State	55.7%	56.1%	52.4%	50.4%	49.1%
Berlin	68.4%	67.8%	56.4%	55.9%	58.9%
Claremont	57.9%	56.2%	52.5%	48.9%	45.9%
Colebrook	57.3%	61.1%	61.6%	52.9%	52.6%
Concord	62.2%	62.9%	55.9%	54.8%	53.2%
Derry	51.9%	52.8%	49.7%	48.3%	46.0%
Dover	52.1%	52.7%	50.0%	44.6%	44.7%
Exeter	45.5%	46.4%	44.0%	41.2%	39.8%
Franklin	62.7%	64.2%	55.2%	52.7%	52.6%
Keene	59.5%	62.5%	58.0%	55.9%	50.5%
Laconia	50.8%	51.2%	46.4%	43.5%	44.1%
Lancaster	74.7%	67.1%	60.9%	56.2%	54.4%
Lebanon	38.8%	37.6%	34.2%	31.4%	31.6%
Littleton	62.6%	54.5%	50.0%	49.2%	51.0%
Manchester	57.3%	56.9%	53.8%	53.0%	51.4%
Nashua	62.8%	63.6%	61.3%	59.5%	57.3%
North Conway	46.5%	47.9%	49.3%	54.6%	56.5%
Peterborough	58.7%	59.4%	57.3%	57.2%	56.3%
Plymouth	58.7%	58.5%	52.8%	51.1%	49.8%
Portsmouth	42.0%	42.4%	40.6%	38.7%	39.0%
Rochester	54.2%	54.6%	51.9%	48.5%	47.1%
Wolfeboro	55.2%	56.4%	55.0%	54.8%	56.4%
Woodsville	63.6%	62.0%	58.6%	55.8%	55.2%

## Hospital cost-shifting: results

When payment received for services from any payer is inadequate to cover its expenses, a hospital must find the financial support for those services from some other source, change its expense structure so that the reimbursement levels are adequate to cover costs, or suffer the consequences of financial shortfalls. Medicare and Medicaid are generally considered to reimburse at rates lower than expenses on a consistent basis, and most agree that, in the face of these changes, hospitals have balanced their books on the backs of the privately insured.

A common term for this is “cost-shifting.” One definition of cost-shifting is “the allocation of unpaid costs of care delivered to one patient population through above-cost revenue collected from other patient populations.”<sup>13</sup> Other terms that are used to describe the same facts are “price shifting,” “margin shifting,” “price discrimination,” and “reimbursement shifting.” The Center’s work has documented that this phenomenon has both changed over time and varies considerably by geography.

Despite this documented variation, little analysis has been conducted on the reasons behind price variation or why providers can cost-shift. As Morrissey (2001) notes in “Cost-shifting: New Myths, Old Confusion, and Enduring Reality,” cost-shifting is likely to result from market characteristics, specifically the lack of competition in the health care markets. In fact, a recent report on the implications of Medicare payment shortfalls suggested that in the least competitive markets, hospitals experiencing Medicare payment shortfalls increased prices to private insurers. In more competitive markets, hospitals seeing shortfalls from Medicare payments lowered costs.<sup>14</sup>

From a policy perspective, this means that focus solely on cost-shifting and reimbursement levels may cause policymakers to miss at least part of the policy point: that is, if you are concerned about cost-shifting and the implications on private premiums and hospital payment levels, other factors – including changing market dynamics and market competition – suggest other policy tools may be important as well.

This analysis reviews how cost-shifting has changed over the past 10 years and the degree to which variation in the underlying payer mix explains any of the changes in the level of cost-shifting over that time.

### ***Hospital cost-shifting (2009)***

Figure 6 shows the Center’s traditional analysis of hospital cost-shifting using the hospital (as opposed to the consolidated health system) as the unit of analysis. Figure 6 is a hydraulics

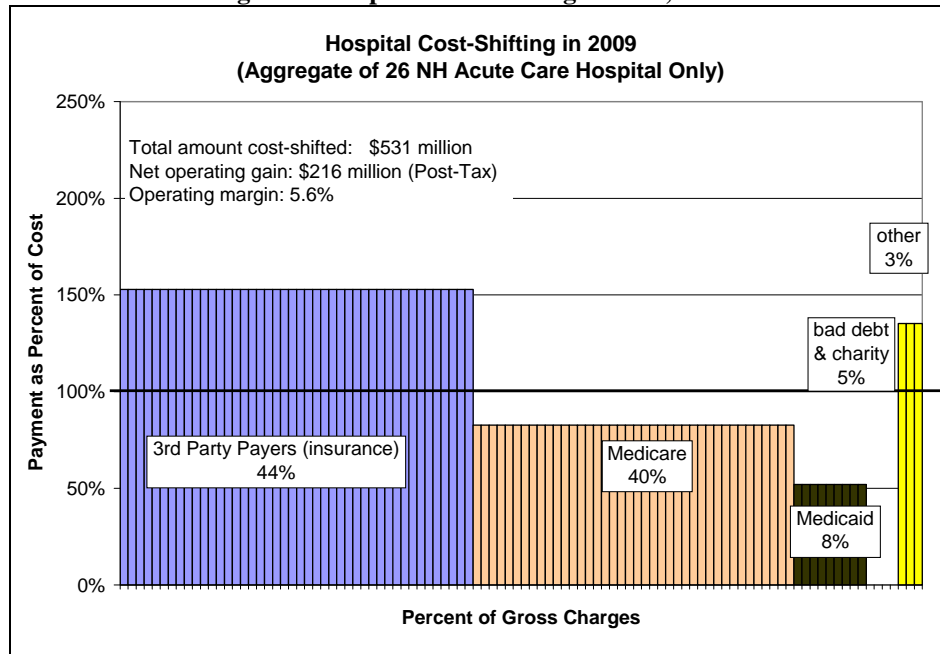
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<sup>13</sup> “Cost-shifting: An Integral Aspect of U.S. Health Care Finance,” Al Dobson, The Lewin Group, November 13, 2002, at an invitational meeting “When Public Payment Declines Does Cost-Shifting Occur? Hospital and Physician Responses,” sponsored by The Robert Wood Johnson Foundation and conducted by AcademyHealth in Washington D.C., November 13, 2002.

<sup>14</sup> Robins, James. “Hospitals Respond to Medicare Payment Shortfalls by Both Shifting Costs and Cutting Them, Based on Market Concentration.” *Health Affairs*, 30, no.7 (2011):1265-1271.

diagram that exhibits the aggregate of revenues and cost-shifting of New Hampshire’s 26 acute care hospitals in 2009.<sup>15</sup>

**Figure 6: Hospital Cost Shifting in 2009, Initial**



The horizontal axis of this diagram is divided into 100 sections, each representing 1 percent of gross charges. It shows that 44 percent of gross charges were billed to insurance companies on behalf of insured individuals.<sup>16</sup> Another 40 percent of charges were billed to Medicare, and 8 percent were billed to the state Medicaid program. Five percent of charges were never paid; they were written off, either as charity care or as bad debt. Three percent were billed to “other.”<sup>17</sup> Less than 1 percent of charges were fully paid by uninsured persons.

The vertical axis of Figure 6 displays percentage of expenses. A thick black horizontal line marks 100 percent of expenses. A payer whose payments exactly equaled expenses would be represented by vertical bars that rise exactly to this 100 percent level.

The height the vertical bars rise indicates what percent of expenses that payer type actually paid. On average in 2009, private insurers paid almost 150 percent of expenses. Both Medicare and Medicaid paid less than costs.

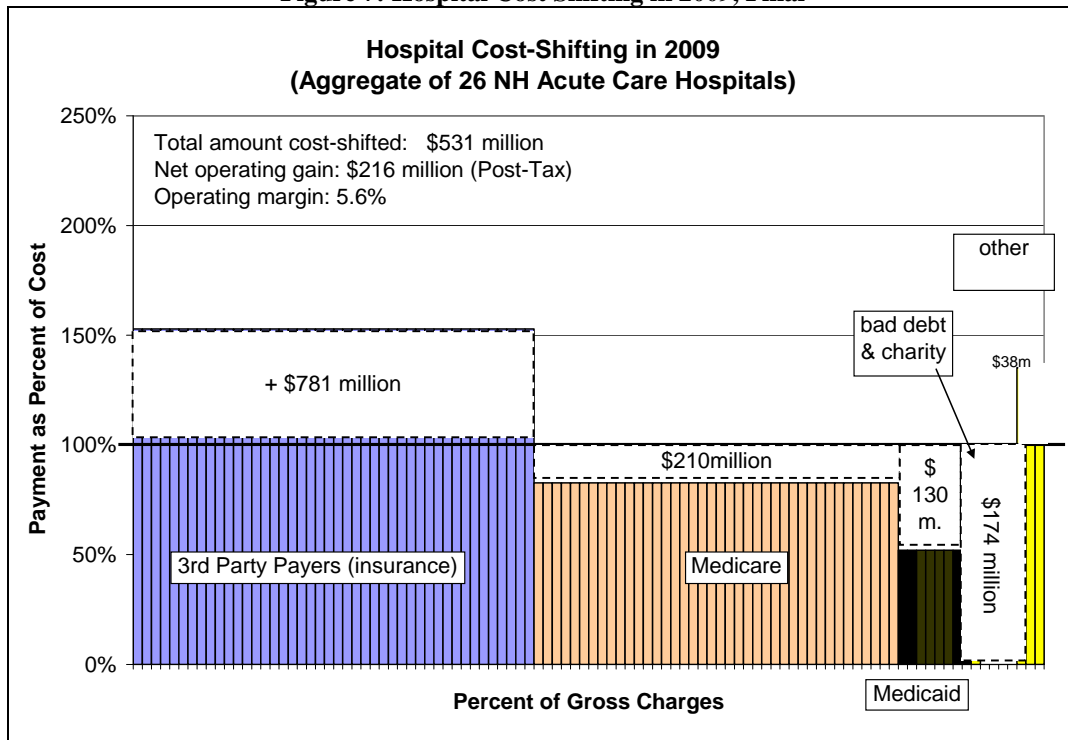
<sup>15</sup> For a step-by-step review of how these aggregate numbers were calculated, see “Cost-shifting in New Hampshire Hospitals, 2004,” New Hampshire Center for Public Policy Studies, Feb. 2006.

<sup>16</sup> A certain portion of the third-party payer amounts in these figures (and all subsequent hydraulics diagrams) is uncompensated care that is incompletely identified by the hospitals. See our discussion of uncompensated care in “Cost-shifting in New Hampshire Hospitals, 2004,” NHCPPS, Feb. 2006.

<sup>17</sup> The “other” category is larger than it should be. Some hospitals— including Memorial in North Conway – did not differentiate between insurance categories in the financial data they submitted to NHHA. A portion of this category is for charges billed to insurance companies, military health, lab charges, as well as the State’s Medicaid disproportionate share program payments, among others.

Figure 7 shows the surplus or deficit relative to the costs of providing services by each payer. Medicare payments were \$210 million short of paying for the cost of services to Medicare patients. Medicaid payments were \$130 million short of paying for cost. And uncompensated care was \$174 million short. Taken together, hospitals were \$531 million short of paying for their expenses for these three categories of payers. To make up the difference, the health systems had to charge other payers – primarily third-party private insurers – above cost for patient services. Payments on behalf of insured persons, mostly from their insurance companies, were \$781 million higher than expenses. Payments from self-insured persons who paid for their entire hospital care and payments from “other” payers were \$38 million above expenses.

**Figure 7: Hospital Cost Shifting in 2009, Final**



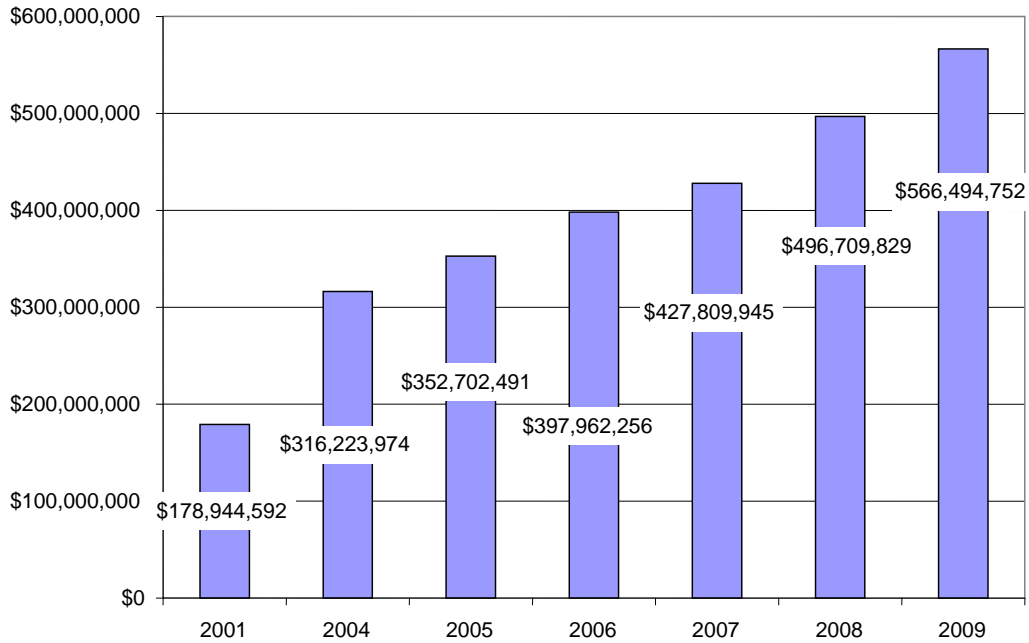
In addition to shifting sufficient revenues to meet their patient services costs, hospitals have also generated surpluses in the form of positive operating margins. The hospitals were able to cost-shift the \$472 million they were short, and they were also able to set aside \$189 million above the breakeven point, enough to result in an operating margin of 5.3 percent.

**Changes in hospital cost-shifting (2001-2009)**

The cost-shifting phenomenon has grown considerably since the Center began conducting its work on cost-shifting in 2001. As Figure 8 illustrates, our analysis of the 2001 finances of the same 26 hospitals showed that the hospitals had to shift approximately \$179 million to meet operating expenses costs and, in addition, create operating margins of almost \$49 million. In 2009, the magnitude of the cost-shift had grown considerably. Over that time period, the aggregate amount cost-shift increased by over 200 percent, or almost 15 percent per year.

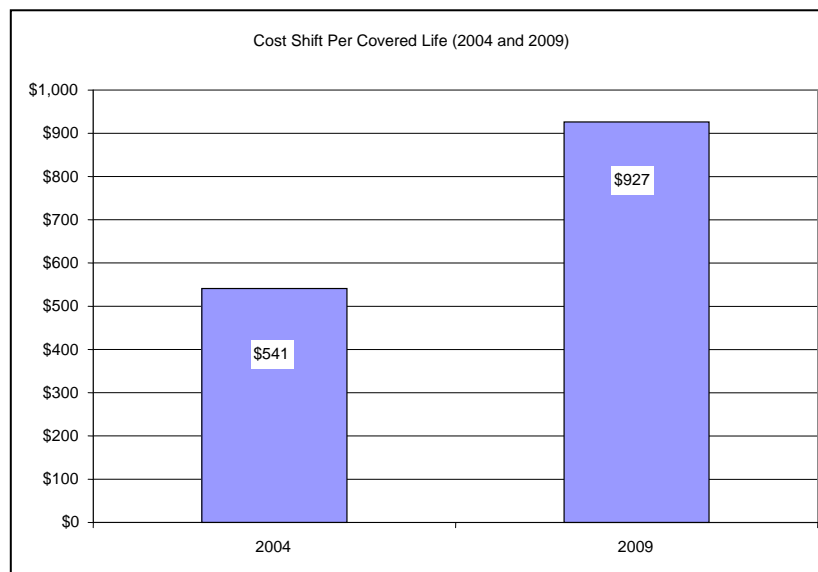
**Figure 8: Hospital Cost Shifting Trends**

Hospital Cost Shifting 2001- 2009 (Hospital Only)



The hospital cost-shift is growing larger by other measures as well. As shown in Figure 9 below, the cost-shift per covered life (in the private market) is also increasing. Between 2004 and 2009 the cost-shift per covered life increased by 11 percent per year.

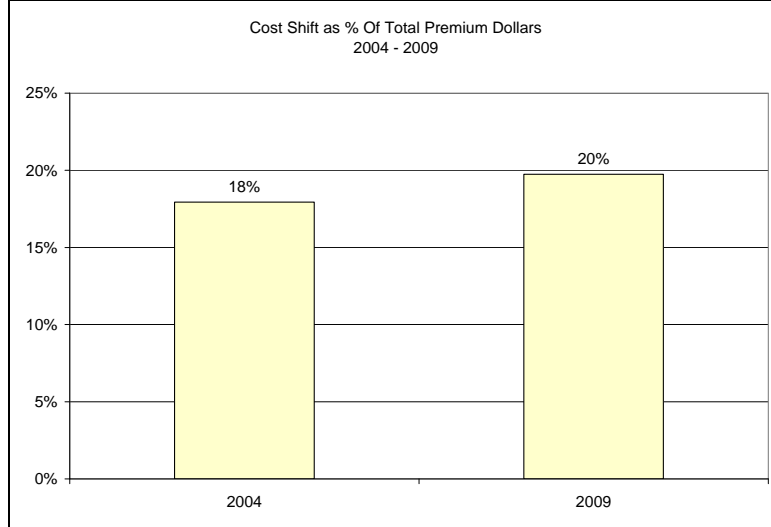
**Figure 9: Cost shift per Covered Life, Selected Years**



In addition, as the hospital cost-shift per covered life has grown, the cost-shift as a share of total premium dollars in the system has grown as well. Over the same time period (2004-09), the cost-

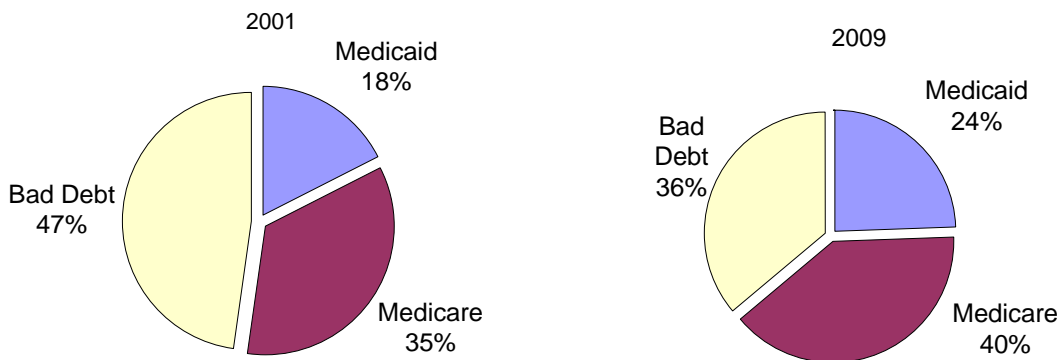
shift as a percent of the total premium paid in the private market has grown from 18 percent to 20 percent. In other words, by 2009 almost one-fifth of the value of private premiums was a function of the cost-shift resulting from below-expense reimbursements (see Figure 10).

**Figure 10: Cost Shift Compared to Premium Dollars; Selected Years**



Of particular interest in understanding the change in cost-shifting is the reason behind the phenomenon. In 2001, hospitals cost-shifted approximately \$178 million as a result of below-expense reimbursement by public payers – Medicaid (\$31m), Medicare (\$62m) – and as a result of providing uncompensated care to patients (\$86m). As pointed out elsewhere, this amount grew considerably, and the source of the cost-shift changed as well. In 2009, below expense reimbursement for Medicare (\$210m) accounted for the largest share of the cost-shift followed by uncompensated care (\$191m) and Medicaid. By 2009, as shown in Figure 11 below, Medicare was the single largest driver of the cost-shift. Almost 42 percent of the growth in the amount of cost-shift was a function of the Medicare program.

**Figure 11: Cost-shift Amount by Payer**



## Factors affecting the level of hospital cost-shifting

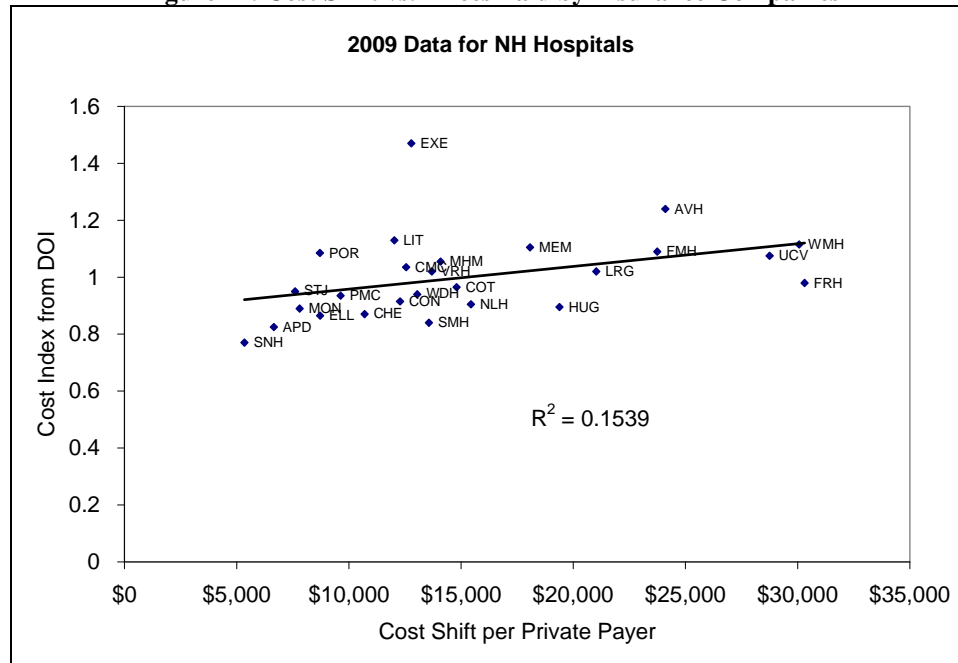
A recent analysis of Medicare reimbursement rates and hospital cost-shifting behavior found that – after controlling for area population, volume, and occupancy – the level of market competition and Medicare payment levels relative to expenses had a significant impact on the level of hospital cost-shifting. In what follows, we explore the degree to which the level of hospital cost-shifting – as measured by the cost-shift per private pay discharge – is correlated to other factors.<sup>18</sup>

### Point in time analysis

For each of the indicators, we developed statistics measuring the correlation that exists between the variables in hand and the cost-shift per private patient. The measures included in this analysis were the hospital’s percent of revenue from the public sector (Medicare and Medicaid), the percent of revenue from Medicaid, market share in the hospital’s market, Medicaid payment levels, market wages as a proxy for input prices, percent of the population over 65 and median income. For each analysis, we computed measures of association, including coefficients of variation which can be shown both graphically and summarized with a statistics called the  $R^2$ .

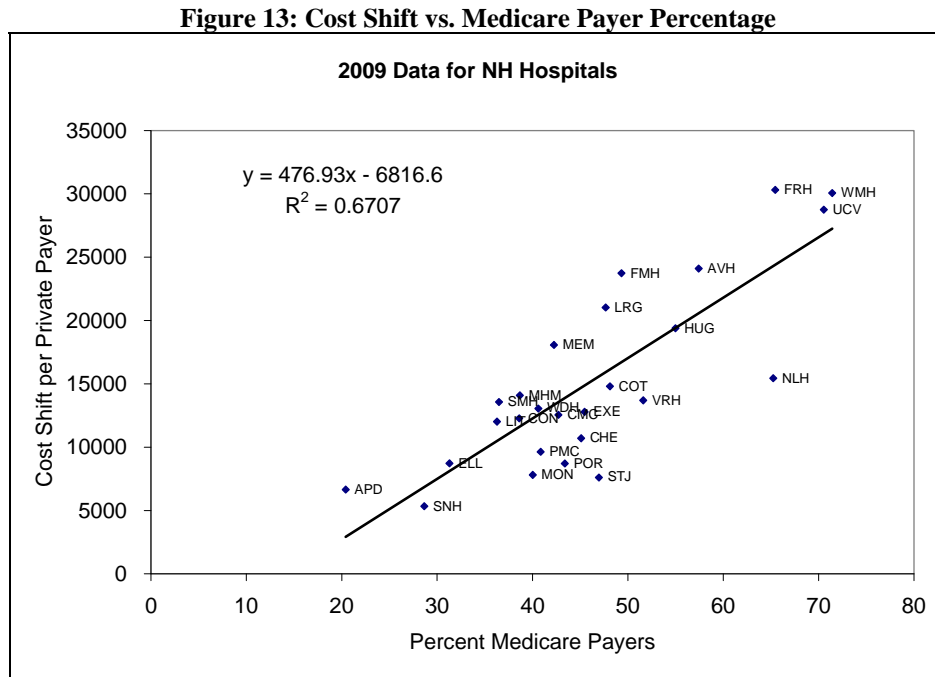
Figure 12 displays the relationship between prices paid by insurance companies to hospitals and cost-shift per private patient in fiscal year 2009. In this case, insurance prices are slightly correlated with cost-shift per private payer. In other words, as the amount cost shifted increases, so does the price of hospital services to insurance companies.

Figure 12: Cost Shift vs. Prices Paid by Insurance Companies



<sup>18</sup> Multivariate analysis, simultaneously controlling for various characteristics of the hospital and the community within which the hospital resides, would have been the most appropriate approach to understand the relationships being explored here. However, the study sample size was too small – even after pooling data across years – to provide any statistically meaningful information.

Figure 13 shows a similar graph looking at the correlation between the share of a hospital's revenue which is Medicare and the level of cost-shifting. The correlation between this factor and the level of cost-shifting as measured by the  $R^2$  is significantly higher than that of the cost index<sup>19</sup>.



In order to take advantage of all data points, we also produce coefficients of determination for each of the indicators using all years for which data was available (2005-09). Appendix A includes each of the graphical displays of these calculations, for each of the indicators of interest.

Table 4 shows the relationship between the indicator and the level of cost-shifting for all the variables. The first column shows the relationship established based on all hospital data from 2005-09 and for 2009 only.

**Table 4: Understanding Factors Correlated with the Level of Cost-shifting**  
Coefficient of Determination (R)

Variable	2005-2009	2009 Only
Percent of Revenue from Public Sector	.40	.53
Percent of Revenue from Medicaid	.16	.49
Market Share (Competition)	.04	.06
Medicaid Payment Levels	.01	.23
Market Wages	-.12	-.21
Percent of Population Over 65	.31	.40
Median Income	-.24	-.40

<sup>19</sup> This relationship could in fact be circular. That is, a higher portion of public payers would of necessity mean fewer private payers, and therefore mean higher cost shift per private patient.

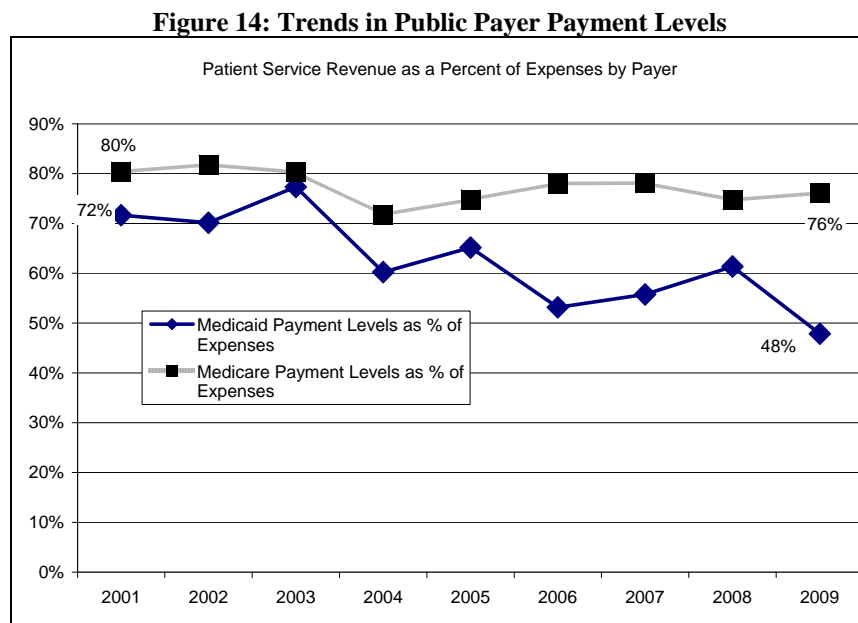


The results suggest that the single best predictor of the level of cost-shifting is the share of the hospital’s revenue structure that is based on public payers. The higher the share of a hospital’s revenue structure that is based on public payers, the higher the cost-shift. Not surprisingly, the percentage of the population over the age of 65 is also a strong predictor of the level of cost-shift. This likely stems from the fact that the higher the proportion of a hospital market that is over the age of 65, the higher the share of that hospitals’ revenue structure is related to Medicare. Market competition – the concentration of the market in which the hospital is operating – had almost no impact on the level of cost shifting.

**Longitudinal analysis and public reimbursement levels**

As shown in the analysis above, the factors most highly correlated with the level of cost-shifting were the public sector share of overall hospital revenues, costs and the level of market concentration in the hospital’s service area. To understand how cost-shifting is changing, we analyzed changes in these characteristics over time. During this time, the only factors which significantly changed were the levels of Medicaid and Medicare reimbursement.

Between 2001 and 2009, there were significant changes to hospital payments across the state of New Hampshire. In 2005, the state restructured its approach to paying for Medicaid outpatient services, effectively lowering reimbursement rates for non-critical access hospitals. Moreover, although health care costs increased, payment levels were generally held constant across this period, effectively resulting in lower reimbursement rates relative to the costs of business. In fact, as shown in Figure 14, Medicaid and Medicare payment levels relative to expenses declined. In the case of Medicaid, the decline was significant. In 2001, Medicaid payment as a share of expenses was approximately 72 percent; by 2009, it had shrunk to approximately 48 percent.



Given these declines in reimbursement level, the theory of cost-shifting would suggest that decreases in the level of Medicaid payment would be correlated with higher levels of cost-

shifting. To test this theory, we looked at how Medicaid payment levels changed over the same time period and grouped the hospitals into those that experienced a large and moderate decrease in Medicaid reimbursement levels relative to expenses, and those that saw an increase. In addition, to tease out the implications of market structure on the cost-shifting dynamic, we broke hospitals into two groups: those in highly concentrated markets in which a single hospital was dominant, versus more competitive markets where market concentration was weaker.

Table 5 looks at the level of cost-shifting broken down this way and allows one to assess the degree to which competition and changes in payment levels impact cost-shifting behavior. This analysis suggests that even after controlling for market competition, changes in Medicaid payment levels have a large impact on the size of the cost-shift. Those hospitals that saw a significant decrease in their Medicaid payment levels relative to expenses saw cost-shifts more than twice as big as those in areas that saw moderate decreases or actual increases.

**Table 5: Cost Shift in Markets, by Change in Medicaid Payment Levels**

Median Level of Cost Shift Per Private Patient (2009)			
Change in Medicaid Payment Levels	Market Share		
	Uncompetitive	More Competitive	All Markets
Large Decrease	\$4,787	\$4,447	\$4,617
Moderate Decrease	\$1,481	\$2,457	\$1,969
Increases	\$1,203	\$1,150	\$1,176
All	\$2,490	\$2,685	

## Variation in hospital payments

The New Hampshire Insurance Department's analysis of hospital prices paid by health insurance companies to hospitals demonstrated significant variation in hospital payments for the same services.<sup>20</sup> In 2009, there was significant variation among hospitals in prices. On the inpatient side, Exeter Hospital had prices that were 129% of the mean. Compare that to Cheshire with prices that were 69% of the mean. Variation in prices paid among hospitals for outpatient services was even larger.

With the passage of time, we now have the capacity to understand how that variation has changed over time. Table 6 and Table 7 below show inpatient and outpatient price comparisons for the years 2005 through 2009. The mean, standard deviation and coefficient of variation are calculated for each hospital across all the years available. The final column of each table shows the coefficient of variation (CV), which represents the degree of variation one year to the next in the price of that hospital relative to the rest. For example, a CV of 3 percent means the standard deviation is equal to 3 percent of the average. A set of data with smaller CV than the other is taken as more consistent.

In the tables below, there is very little variance in relative costs for most hospitals across the years, and this is particularly true for the outpatient cost measure. This finding implies that high cost hospitals tend to hold their position as high cost hospitals (relative to all hospitals over time)

<sup>20</sup> [http://www.nh.gov/insurance/consumers/documents/nh\\_ac\\_hosp\\_comp.pdf](http://www.nh.gov/insurance/consumers/documents/nh_ac_hosp_comp.pdf)

while low cost hospitals tend to remain low cost hospitals over time. There are, however, some important exceptions to this. Alice Peck Day and Androscoggin Valley hospitals, for example, showed a significant variance in their prices paid relative to other hospitals for inpatient services over time.

**Table 6: Inpatient Hospital Price Index (2005-2009)**

New Hampshire Acute Care		Hospital Comparison					Source: NH Dept of Insurance			
INPATIENT	Code	2005	2006	2007	2008	2009	Mean	StDev	CV	
Alice Peck Day	APD	1.31	1.26	1.19	0.91	0.87	1.11	0.21	18.5%	
Androscoggin Valley	AVH	0.88	0.80	0.86	0.96	1.04	0.91	0.09	10.2%	
Cheshire	CHE	1.00	0.77	0.72	0.67	0.69	0.77	0.14	17.6%	
CMC	CMC	0.91	0.87	0.98	0.93	0.95	0.93	0.04	4.5%	
Concord	CON	0.97	1.00	1.12	1.11	1.15	1.07	0.08	7.4%	
Cottage	COT	0.98	1.05	0.84	0.96	0.95	0.96	0.08	8.1%	
Elliot	ELL	0.99	0.88	0.94	0.87	0.85	0.90	0.06	6.2%	
Exeter	EXE	1.58	1.52	1.48	1.37	1.29	1.45	0.12	8.1%	
Frisbie	FMH	1.36	1.24	1.30	1.14	1.12	1.23	0.10	8.2%	
LRGH/Franklin	FRH	1.03	1.07	1.07	1.10	1.09	1.07	0.03	2.4%	
Huggins	HUG	0.82	0.80	0.85	0.92	0.88	0.85	0.05	5.6%	
Littleton	LIT	1.00	1.18	1.10	1.25	1.14	1.13	0.09	8.2%	
LRGH/Lakes Region	LRG	1.12	1.04	1.07	1.15	1.19	1.11	0.06	5.4%	
Memorial	MEM	1.02	1.00	0.96	0.91	1.13	1.01	0.08	8.2%	
DHMC	MHM	1.06	1.14	1.18	1.12	1.23	1.15	0.06	5.5%	
Monadnock	MON	0.73	0.85	0.84	0.76	0.75	0.79	0.05	6.8%	
New London	NLH	0.78	0.96	0.77	0.78	0.74	0.81	0.09	10.9%	
Parkland Medical Center	PMC	0.95	0.86	0.87	0.93	0.94	0.91	0.04	4.6%	
Portsmouth	POR	1.16	1.13	1.19	1.25	1.27	1.20	0.06	5.0%	
Speare	SMH	0.61	0.71	0.81	0.72	0.71	0.71	0.07	9.8%	
Southern NH Medical Center	SNH	0.77	0.81	0.69	0.76	0.74	0.75	0.04	5.9%	
St. Joseph	STJ	1.00	0.95	0.94	0.89	0.88	0.93	0.05	5.3%	
Upper Connecticut Valley	UCV	0.94	0.91	1.05	1.19	1.13	1.04	0.12	11.5%	
Valley Regional	VRH	0.98	1.07	0.97	1.14	1.07	1.05	0.07	6.7%	
Wentworth-Douglas	WDH	0.91	0.90	0.85	0.93	0.95	0.91	0.04	4.2%	
Weeks	WMH	1.12	1.22	1.37	1.30	1.23	1.25	0.09	7.6%	
Mean		1.00	1.00	1.00	1.00	1.00	1.00			
StDev		0.20	0.19	0.20	0.19	0.19	0.18			

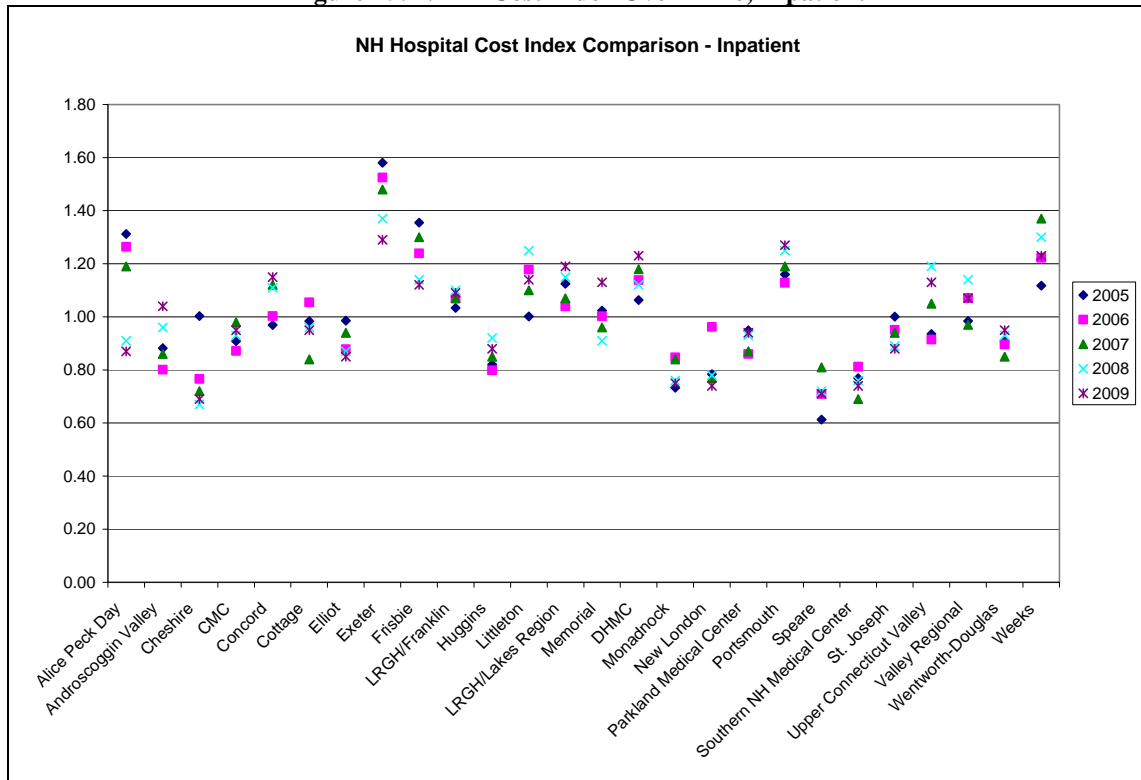
**Table 7: Outpatient Hospital Price Index (2005-2009)**

New Hampshire Acute Care		Hospital Comparison					Source: NH Dept of Insurance			
OUTPATIENT	Code	2005	2006	2007	2008	2009	Mean	StDev	CV	
Alice Peck Day	APD	0.75	0.78	0.77	0.77	0.78	0.77	0.01	1.7%	
Androscoggin Valley	AVH	1.36	1.31	1.37	1.39	1.44	1.37	0.05	3.4%	
Cheshire	CHE	1.13	1.12	1.07	1.06	1.05	1.09	0.04	3.3%	
CMC	CMC	1.34	1.31	1.12	1.13	1.12	1.20	0.11	9.2%	
Concord	CON	0.69	0.70	0.71	0.71	0.68	0.70	0.01	1.8%	
Cottage	COT	0.86	0.86	0.95	0.95	0.98	0.92	0.06	6.2%	
Elliot	ELL	0.97	0.96	0.88	0.88	0.88	0.91	0.05	5.2%	
Exeter	EXE	1.38	1.52	1.60	1.61	1.65	1.55	0.11	7.0%	
Frisbie	FMH	1.13	1.02	1.05	1.05	1.06	1.06	0.04	3.9%	
LRGH/Franklin	FRH	0.93	0.90	0.89	0.89	0.87	0.90	0.02	2.6%	
Huggins	HUG	0.89	0.99	0.91	0.91	0.91	0.92	0.04	4.1%	
Littleton	LIT	1.19	1.17	1.12	1.10	1.12	1.14	0.04	3.4%	
LRGH/Lakes Region	LRG	0.90	0.88	0.88	0.88	0.85	0.88	0.02	2.1%	
Memorial	MEM	1.03	1.02	1.08	1.08	1.08	1.06	0.03	2.9%	
DHMC	MHM	0.73	0.79	0.86	0.87	0.88	0.83	0.07	7.9%	
Monadnock	MON	1.01	1.01	1.04	1.03	1.03	1.02	0.01	1.5%	
New London	NLH	0.90	0.99	1.09	1.07	1.07	1.02	0.08	7.7%	
Parkland Medical Center	PMC	1.07	0.96	0.95	0.95	0.93	0.97	0.06	5.8%	
Portsmouth	POR	1.04	0.95	0.92	0.92	0.90	0.95	0.05	5.7%	
Speare	SMH	0.89	0.92	0.80	0.97	0.97	0.91	0.07	7.7%	
Southern NH Medical Center	SNH	0.78	0.82	0.96	0.80	0.80	0.83	0.07	8.7%	
St. Joseph	STJ	1.06	1.04	1.02	1.02	1.02	1.03	0.02	1.6%	
Upper Connecticut Valley	UCV	1.13	1.09	1.07	1.06	1.02	1.07	0.04	3.7%	
Valley Regional	VRH	0.96	0.96	0.98	0.99	0.97	0.97	0.01	1.4%	
Wentworth-Douglas	WDH	0.95	1.04	0.96	0.96	0.93	0.97	0.04	4.3%	
Weeks	WMH	0.94	0.89	0.95	0.95	1.00	0.95	0.04	4.0%	
Mean		1.00	1.00	1.00	1.00	1.00	1.00			
StDev		0.18	0.18	0.18	0.18	0.20	0.18			

Moreover, relative costs for the 26 New Hampshire hospitals have not moved toward the average over time. These findings imply a hospital price “stickiness,” suggesting little short-term responses to shifts in quality, demographic factors, or underlying cost structures over time and among hospitals in the same year.

One can see this phenomenon in Figure 15.<sup>21</sup> Each dot represents a year of data for a given hospital. There is no obvious pattern in changes in the level of costs from 2005 (the diamonds) through 2008 (the asterisks). Nor do hospitals significantly change their position relative to other hospitals, though there are hospitals that demonstrated significantly lower prices over time and those that saw significant increases.

Figure 15: NHID Cost Index Over Time; Inpatient



<sup>21</sup> Outpatient services showed a similar pattern.

## **Factors affecting variation in hospital prices**

In this analysis, we attempt to understand the variation in hospital prices shown in the previous analysis. The literature suggests that there are many different factors which can affect health care costs (and prices) including market competition, characteristics of hospitals (teaching status for example), characteristics of the population being served, the community within which the services are being provided, and the practice patterns within the hospitals.

In this analysis, we review the relationship between these prices and the following variables:

- Competition among hospitals
- Population over the age of 65
- Income in the community
- Hospital quality
- HMO penetration

As mentioned previously, the measure of prices paid is a combined inpatient/outpatient case mix adjusted index developed by the New Hampshire Insurance Department. To control for variation in input costs, we adjust this index by wages paid to nurses. The following analyses show linear regressions with coefficients of determination as the measure of correlation using only one year of data. Only one year of data was used due to a statistical phenomenon called auto-correlation which made analysis using data from all hospitals across all years problematic.

### ***Hospital area competitiveness***

As mentioned earlier, hospital area competitiveness was measured by calculating an HHI for each hospital market area in New Hampshire. In Figure 16, we show a correlation between the hospital HHI and the payment index. Arguably, prices would be lower in a more competitive market. That is, in a market in which the hospital HHI was higher (market competition lower), prices would be higher.

**Figure 16: Hospital HHI vs. NHID Cost index**

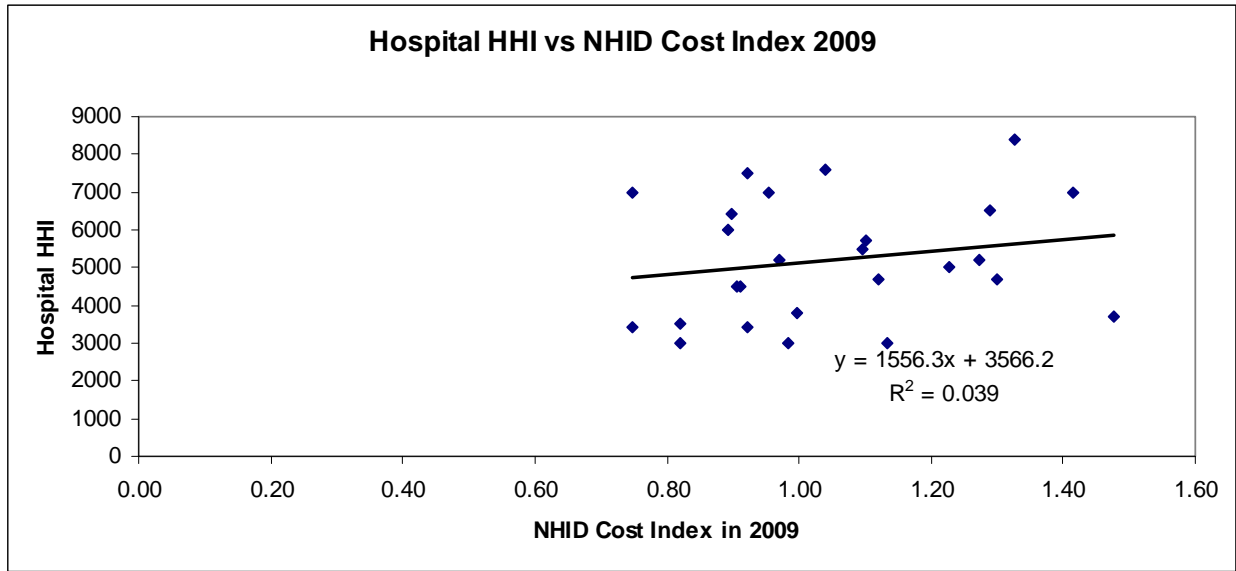


Figure 16 confirms this hypothesis, showing a small but positive correlation between the NHID cost index, and the level of competition in hospital market areas. Less competitive areas, as measured by a higher HHI, tend to have higher costs.

Grouping the data according to more uncompetitive to least uncompetitive (as in the following Table) shows this relationship in a slightly different way. We grouped hospital markets into higher, medium and lower levels of competition and assessed the index after adjusting for variation in costs.

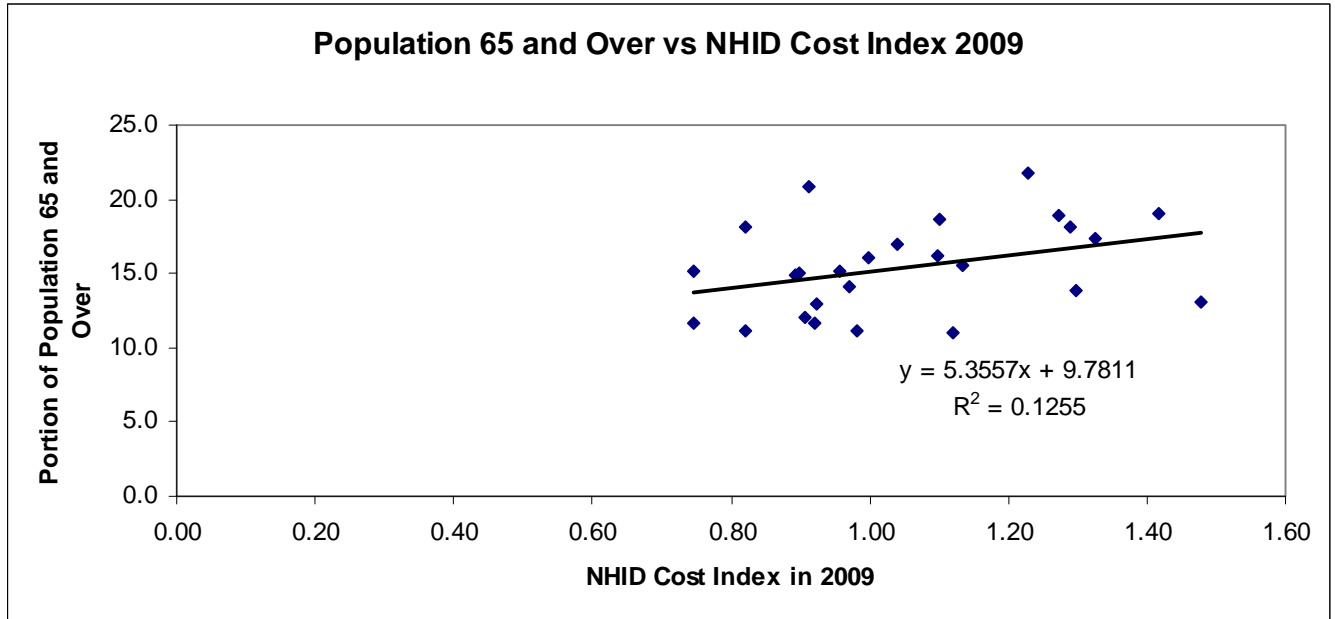
**Table 8: Grouped Data; Hospital HHI vs. NHID Cost Index**

Level of Competition	Average NHID Index Adjusted for Regional Costs	Average HHI
Lower	1.10	7286
Medium	1.06	5218
Higher	0.99	3350

**Population age 65 and over**

Age is highly correlated with health expenditures, so it is expected that an aged population will be more medically complex. The portion of the population age 65 and over was taken from U.S. Census data for New Hampshire and compared to the NHID cost index. Figure 17 shows the correlation between age and the insurance cost index.

**Figure 17: Population 65 and Over vs. NHID Cost Index**



There is a moderately positive correlation between the age of the population and the region-adjusted prices that insurance companies pay for services in hospitals. Hospital service areas with more seniors tend to incur higher health care payments. The grouped data in Table 9 also demonstrates the relationship.

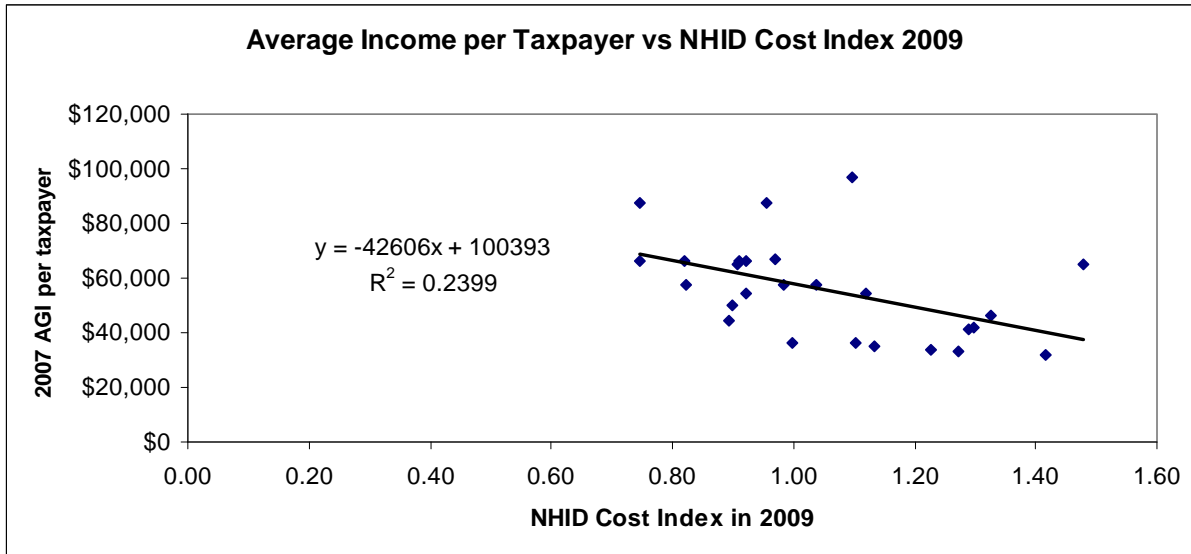
**Table 9: Grouped Data; Senior Population vs. NHID Cost Index**

Population Over The Age of 65	Average NHID Index Adjusted for Regional Costs	Population Age 65 +
High	1.16	18.9
Medium	1.00	15.1
Low	0.99	11.9

**Area average income**

Health care is thought to be at least in part a discretionary good. It follows that as income rises, so will health care use – and potentially health care prices. For this analysis, the Center compared taxpayer adjusted gross income (AGI), available from the Internal Revenue Service at the zip code level, with the NHID cost index adjusted for regional differences in wages.

**Figure 18: Average Income vs. NHID Cost Index**



As shown in Figure 18, there is a moderately strong negative correlation between the average income per taxpayer in each hospital service area and the prices that insurance companies pay to hospitals. One possible explanation for this relationship is that the higher income areas of the state are more likely to have more competitive markets. Another potential explanation is that those parts of the state with higher portions of people over the age of 65 are also areas with lower average incomes.

**Table 10: Grouped Data; Average Income vs. NHID Cost Index**

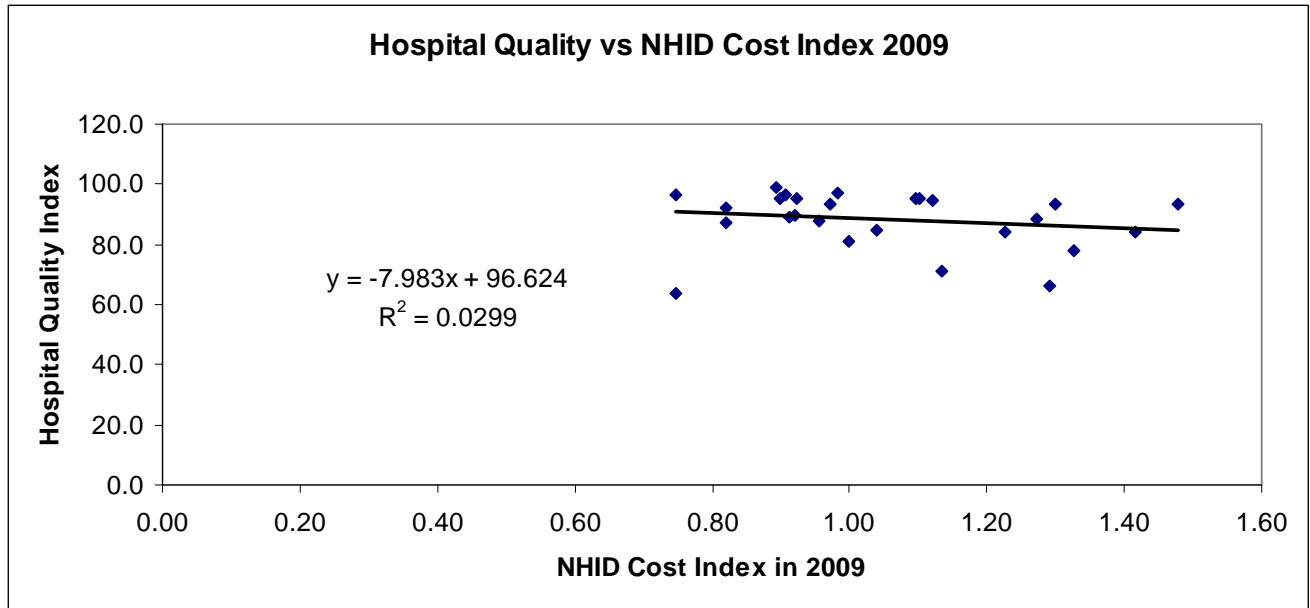
AGI Grouping	Average NHID Index Adjusted for Regional Costs	AGI per taxpayer for 2007
High	0.96	\$73,477
Medium	1.00	\$52,808
Low	1.22	\$36,256



### Hospital quality

Measures of quality of care were developed based on the New Hampshire Quality of Care data produced by the hospitals in New Hampshire ([www.nhqualitycare.org](http://www.nhqualitycare.org)). The indicators include measure of hospital patient experience, patient safety, wellness and hospital clinical quality. In Figure 19, we compare a summary composite index of local hospital quality (based on 2009 measures Experience Rating, Surgical Improvement, Heart Attack measures, Congestive Heart Failure measures, and Community Acquired Pneumonia measures) with NHID Acute Care Hospital Comparison estimates adjusted for regional differences in input prices.

Figure 19: Hospital Quality vs. NHID Cost Index



Perhaps not surprisingly, hospital costs have little to do with quality. Grouping the data, as was done in previous analysis on other factors, confirms the lack of correlation, and even suggests that as costs rise, hospital quality declines.

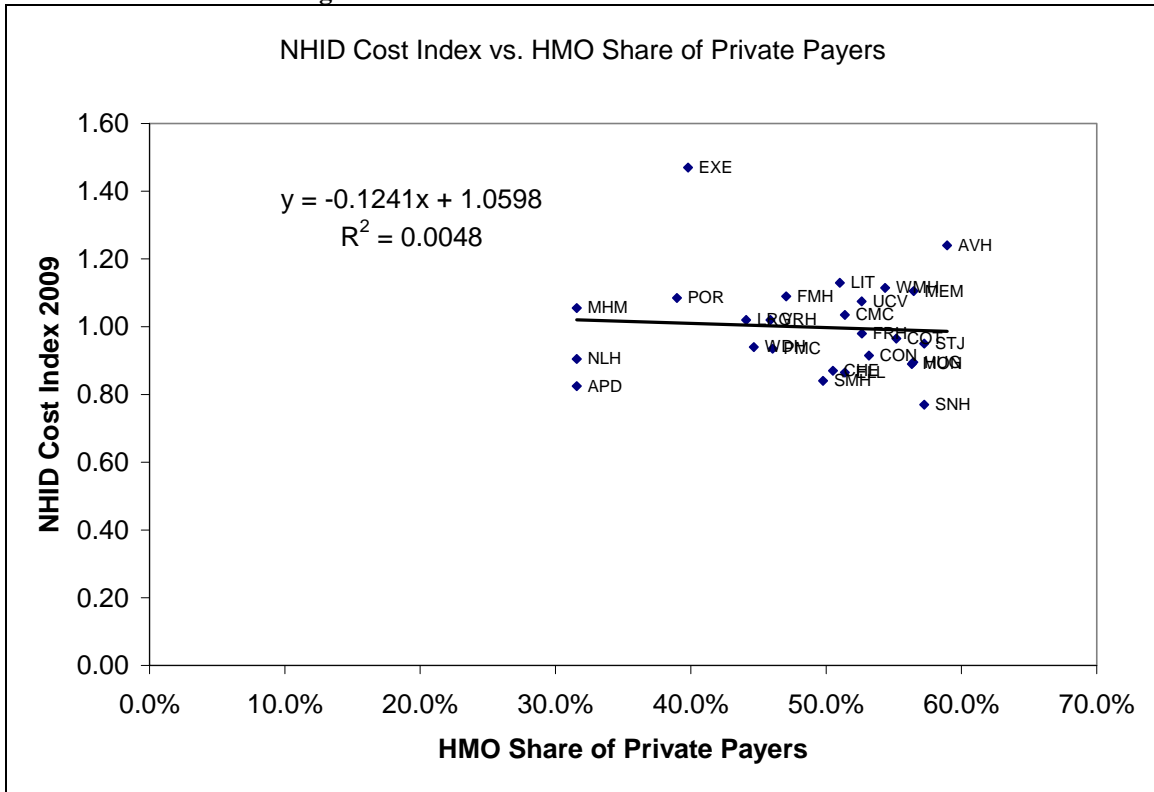
Table 11: Grouped Data; Hospital Quality vs. NHID Cost Index

Rank on 2 <sup>nd</sup> Column	Average NHID Index Adjusted for Regional Costs	Composite Quality Measure
High Quality	0.96	96.1%
Medium Quality	1.05	90.6%
Low Quality	1.15	76.8%

## HMO Penetration

One policy option often mentioned in conversations regarding controlling health care costs is the implementation of managed care. In the following chart (Figure 20), we examine the relationship between the NHID Acute Care Hospital Comparison estimates and the portion of private payers in each area that are covered under an HMO product. This allows us to test the hypothesis that increases in managed care penetration are associated with lower prices.

**Figure 20: HMO Penetration vs. NHID Cost Index**



While HMO penetration may result in lower over-all health care costs due to changes in the utilization of services, the above figure shows extremely weak correlation between the NHID cost index, and HMO share of payers in private insurance market.

### Appendix A

Figure A-1

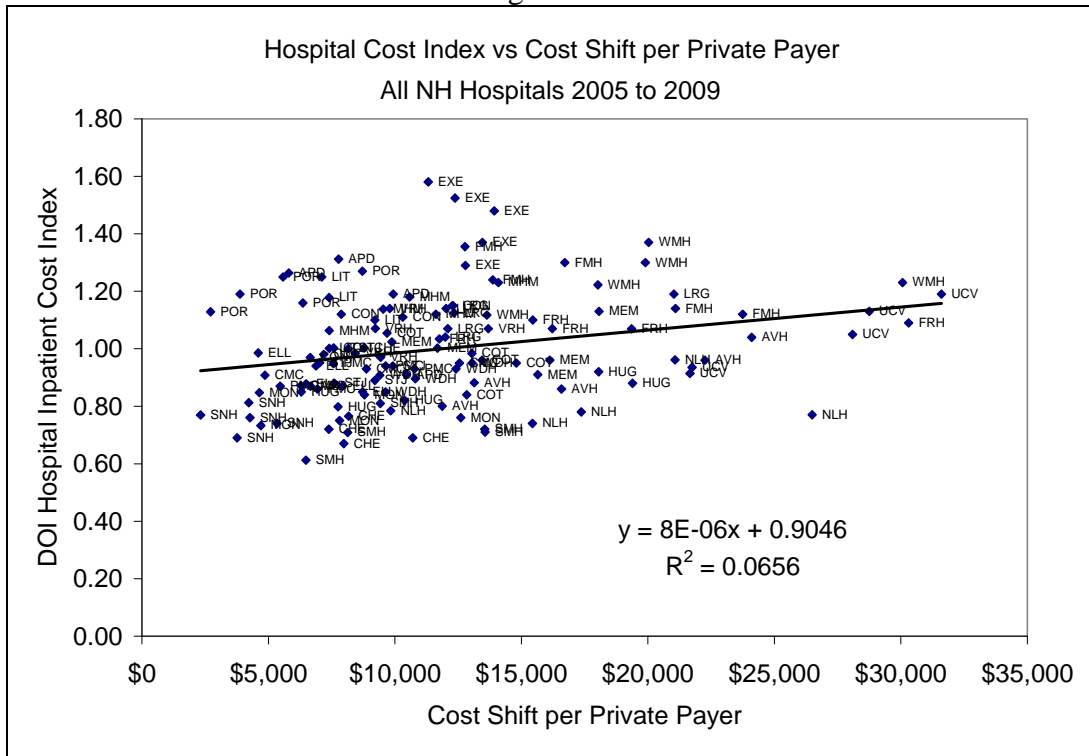


Figure A-2

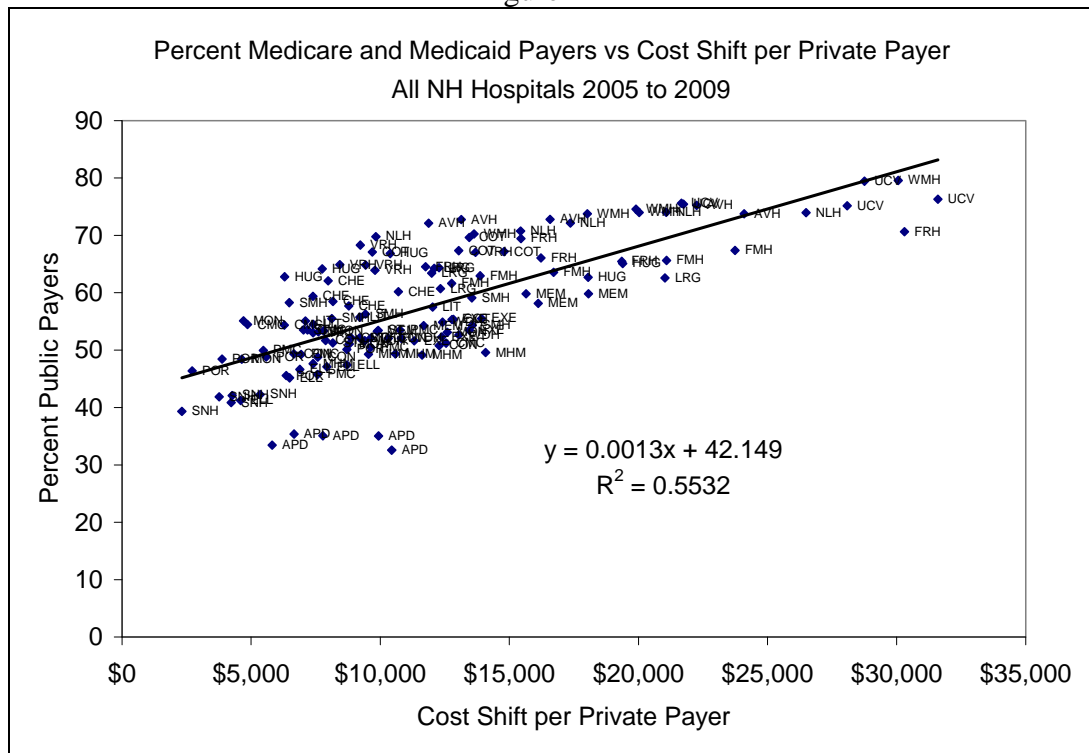


Figure A-3

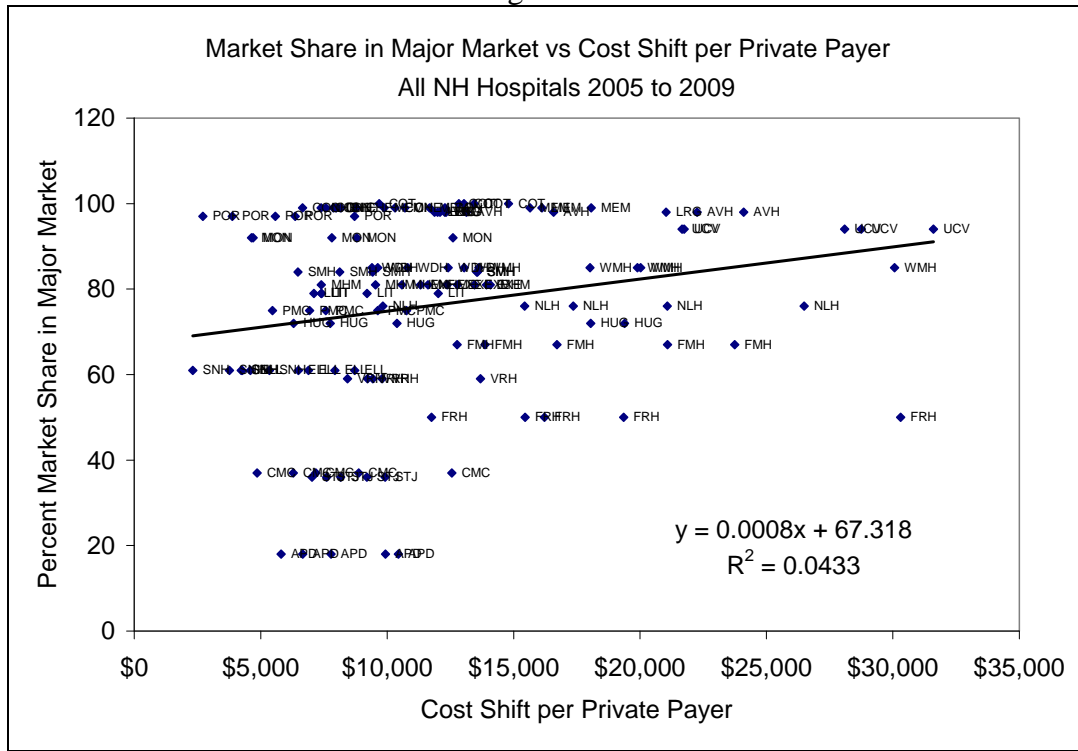
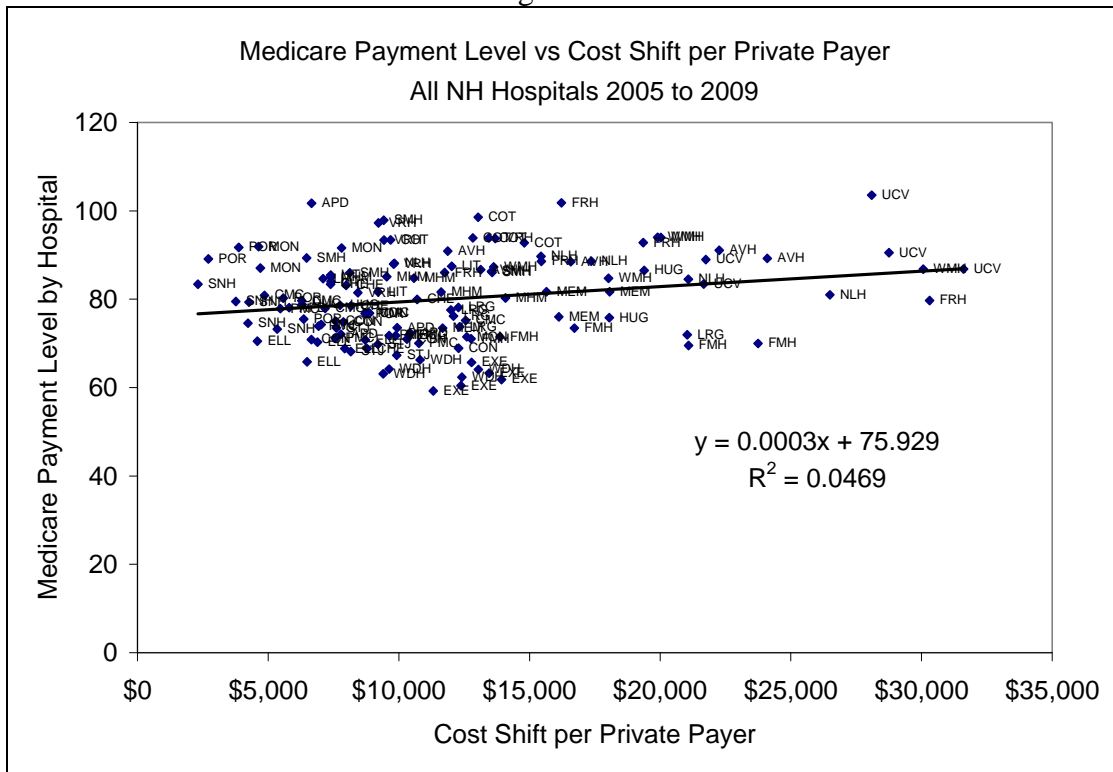


Figure A-4



### Appendix B

SB0392 specifically directs the NHID to “identify variations in the price that health carriers pay for health care services and shall undertake further analysis to *determine whether the observed price variations correlate to the sickness or the complexity of the population served, the relative proportion of patients on Medicare or Medicaid that are served by the health care provider, the cost to the health care provider of delivering the service, or the relative proportion of free or reduced care provided to the uninsured.*”

The following charts demonstrate that observed price variations (as measured by the average of the NHID inpatient and outpatient cost indices on Table 6 and Table 7) are not dependent on any of the above factors. That is to say variation in prices paid by health insurance companies to hospitals are not explained by differences in the quality of care, the complexity of the population served, payer mix, levels of market competition or the penetration of managed care.

#### Measuring against the sickness or the complexity of the population served

Figure B-1

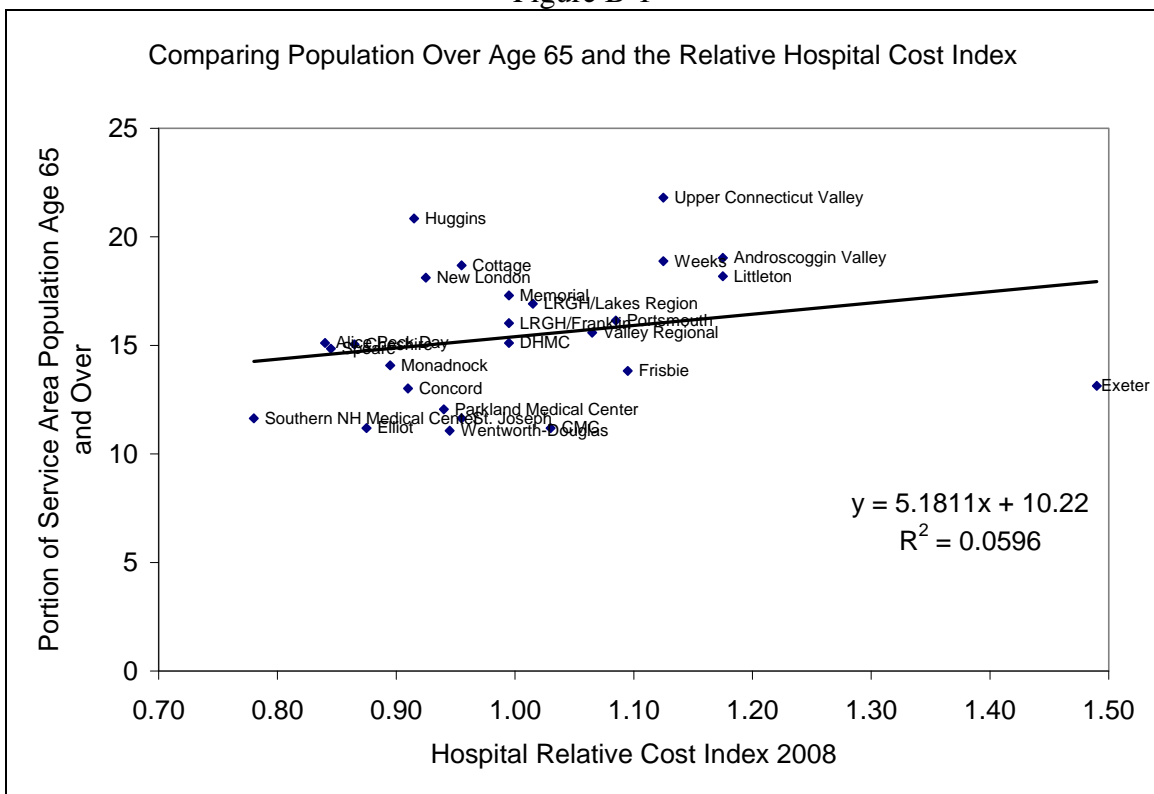


Figure B-2

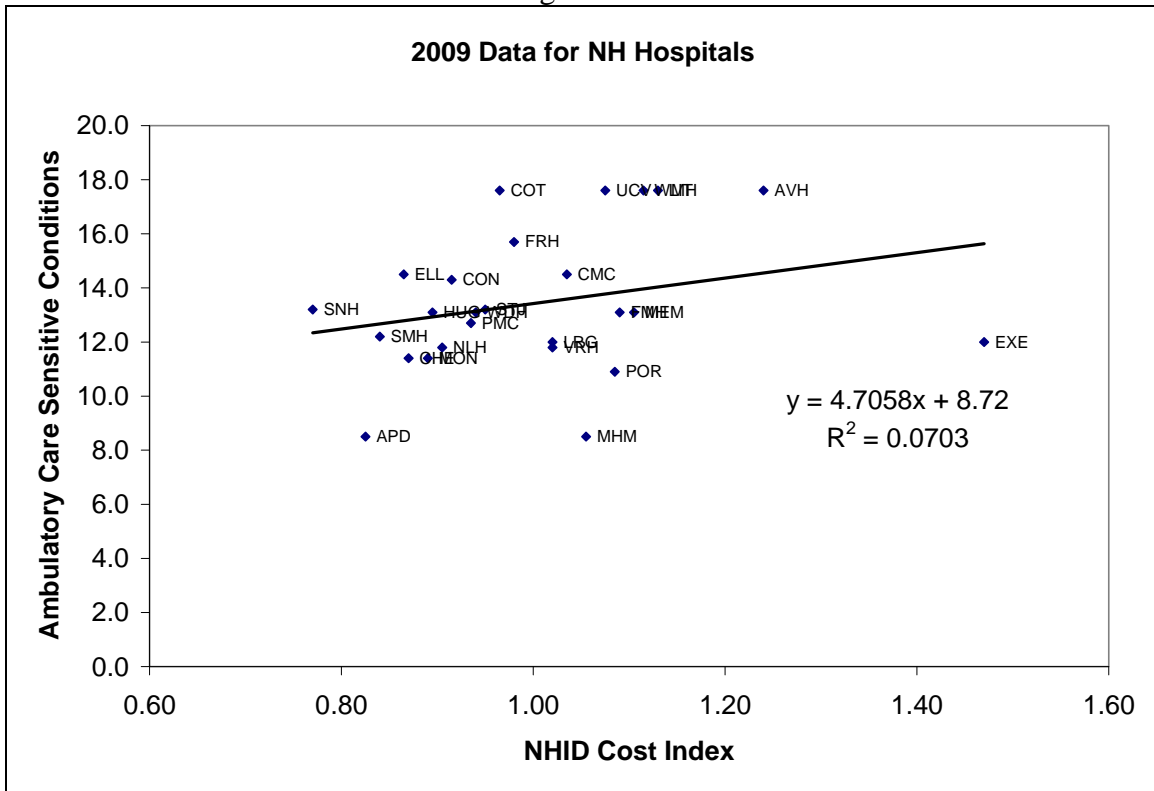
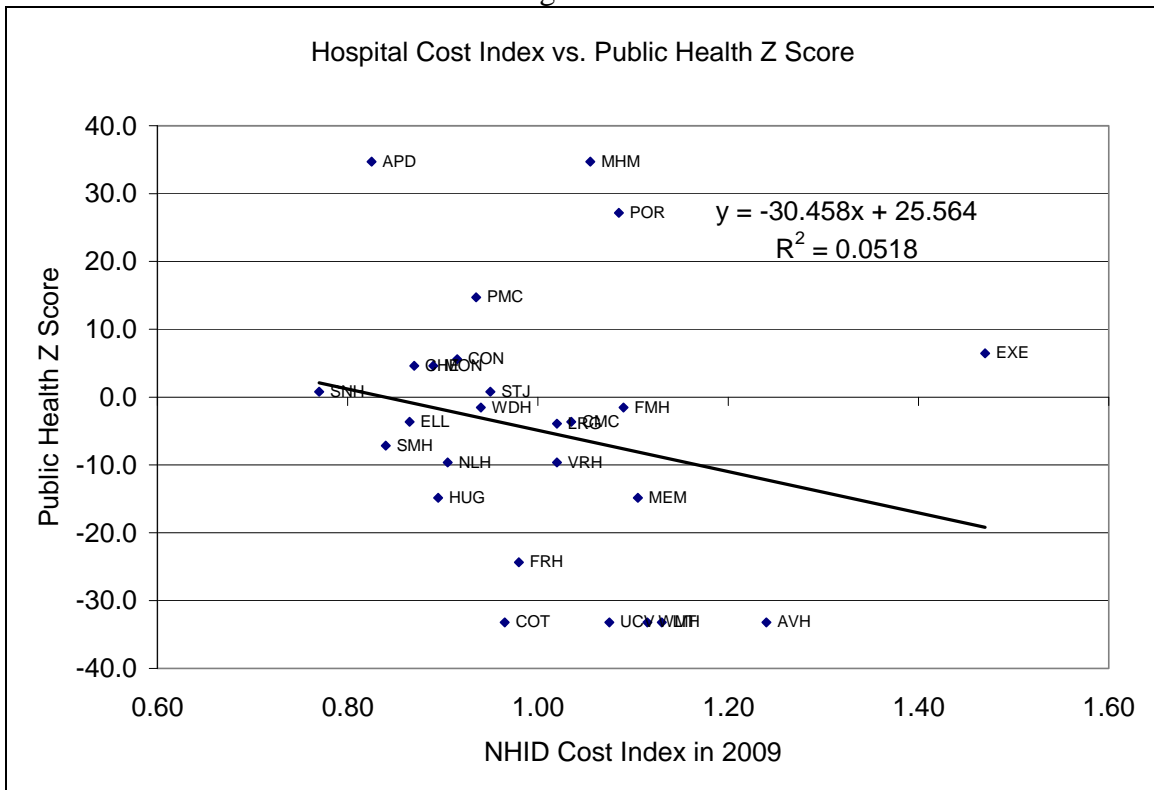
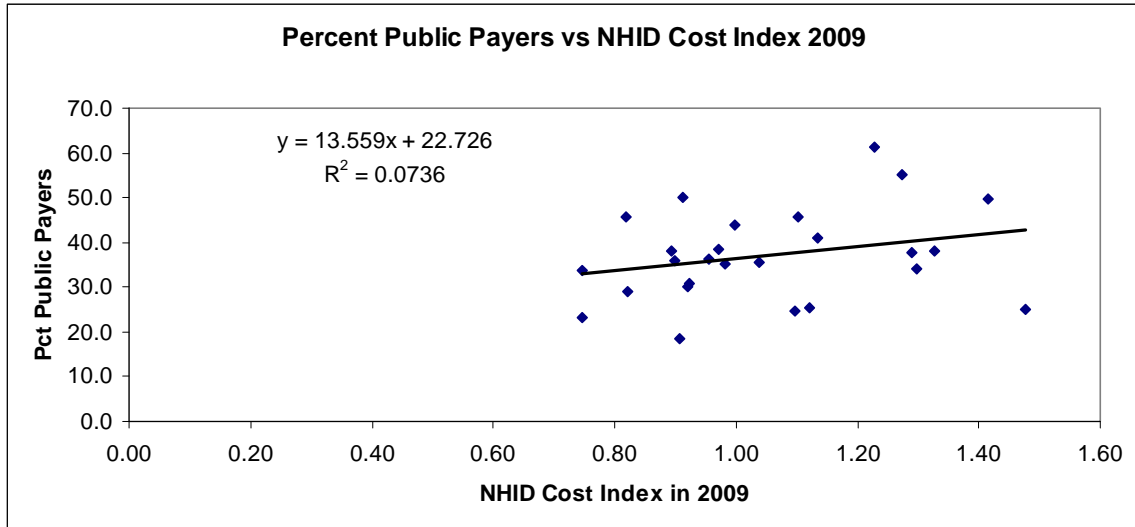


Figure B-3



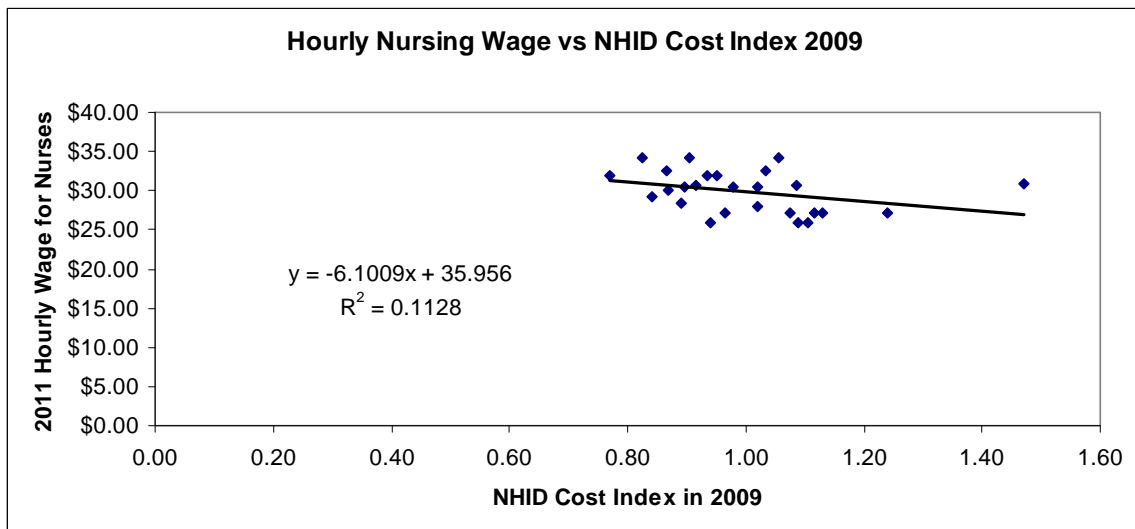
**Measuring against the relative proportion of patients on Medicare or Medicaid that are served by the health care provider**

Figure B-4



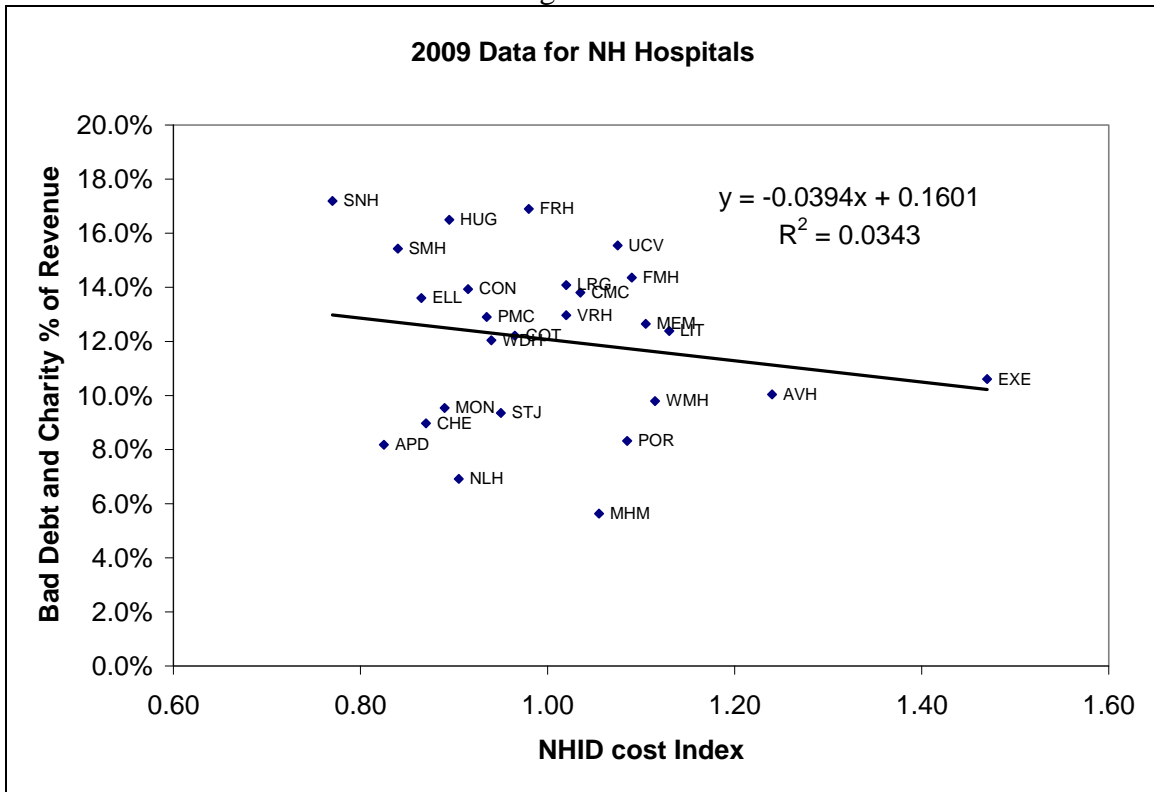
**Measuring against the cost to the health care provider of delivering the service (regional nursing wage as a proxy for regional differences in the cost to serve)**

Figure B-5



**Measuring against the relative proportion of free or reduced care provided to the uninsured.**

Figure B-6



The following regression attempts to answer the questions posed by SB0392. Specifically the NHID cost index (DOIcostindex), which measures the variation in the price insurance companies pay to hospitals over the period 2005 to 2009, is the dependent variable. Independent variables are the percentage of Medicare and Medicaid payers in the hospital patient mix (PctRevPublic), the portion of hospital expenditures devoted to charity care (CharityPct), the complexity of the population served (PublicHealthZ) and the relative cost of doing business (MarketWageIndex).



```
lm(formula = DOIcostindex ~ PctRevPublic + CharityPct +
    PublicHealthZ +
    MarketWageIndex, data = hospitalnoid)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-0.24789	-0.10088	-0.01725	0.06678	0.51336

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	1.581025	0.189731	8.333	1.2e-13	***
PctRevPublic	-0.002511	0.001893	-1.327	0.18698	
CharityPct	-0.012619	0.004430	-2.848	0.00514	**
PublicHealthZ	-0.001314	0.001095	-1.200	0.23222	
MarketWageIndex	-0.372941	0.184222	-2.024	0.04506	*

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1369 on 125 degrees of freedom  
 Multiple R-squared: 0.1133, Adjusted R-squared: 0.08491  
 F-statistic: 3.992 on 4 and 125 DF, p-value: 0.004406

Note that the measure of fit in the above regression (the Adjusted R-squared) is very low. Most of the dependent variables have the wrong sign. For example, one would expect that a higher portion of charity care would increase the prices that insurance companies pay to hospitals, because of cost shifting. Instead the CharityPct variable coefficient is negative, indicating that increased charity care would decrease prices paid by insurance companies for hospital services. Finally, the t-values indicate little explanatory power.

We conclude then that the variance in the prices insurance companies pay to hospitals for health care is not related to the sickness or the complexity of the population served, the relative proportion of patients on Medicare or Medicaid that are served by the health care provider, the cost to the health care provider of delivering the service, or the relative proportion of free or reduced care provided to the uninsured.

Data sets for all of the Center's statistical analysis are available upon request.