

THE PENNSYLVANIA STATE UNIVERSITY  
SCHREYER HONORS COLLEGE

DEPARTMENT OF HEALTH POLICY AND ADMINISTRATION

THE EFFECT OF THE BALANCED BUDGET ACT OF 1997 ON FINANCIAL  
INDICATORS OF CRITICAL ACCESS HOSPITALS IN PENNSYLVANIA

SHANE FLICKINGER  
Spring 2010

A thesis  
submitted in partial fulfillment  
of the requirements  
for a baccalaureate degree in Health Policy and Administration  
with honors in Health Policy and Administration

Reviewed and approved\* by the following:

Dr. Diane Brannon  
Professor of Health Policy and Administration  
Thesis Supervisor

Dr. Pamela Short  
Professor of Health Policy and Administration  
Honors Advisor

\* Signatures are on file in the Schreyer Honors College

## Abstract

The Balanced Budget Act of 1997 allows qualified rural hospitals in the United States to convert to Critical Access Hospital (CAH) status. In order to aid Medicare reimbursement rates, CAHs receive cost-based reimbursement for Medicare patients. However, the overall improvement in financial indicators of CAHs remains unclear. Therefore, this analysis has three goals:

- *To compare the financial performance of Pennsylvania CAHs and rural hospitals.*
- *To assess the evidence of the effects of conversion on financial performance.*
- *To identify factors affecting financial performance.*

Rural hospitals are classified as rural hospitals that are not eligible to convert to CAH status or elected not to convert.

Prior research on CAHs is limited and focuses primarily on quality assessment and quality indicators. Additionally, no prior research examines the financial indicators of CAHs in Pennsylvania. As a result of this analysis, rural hospitals in Pennsylvania considering a conversion to CAH status will be able to project likely financial impacts. Policymakers will also be able to compare the financial indicators of CAHs to other rural hospitals in Pennsylvania to determine if the Balanced Budget Act of 1997 is achieving its desired impact in Pennsylvania.

Descriptive statistics are utilized to assess the financial performance of hospitals and the effects of conversion by examining the change in financial indicators in the two years before and after conversion. A repeated measures analysis of variance identifies factors associated with the financial indicators of CAHs in Pennsylvania compared to rural hospitals before and after conversion to CAH status. Using a general linear model, this analysis examines the effect of adjacency to a metropolitan county and net patient revenue on financial performance.

## TABLE OF CONTENTS

LIST OF TABLES.....	iv
LIST OF FIGURES.....	v
ACKNOWLEDGEMENTS.....	vi
Chapter 1 Introduction and Background.....	1
Motivation and question to be addressed.....	1
Prior research.....	3
Framework and hypothesis.....	7
Chapter 2 Research Methods.....	11
Data .....	12
Analysis plans.....	16
Limitations.....	18
Chapter 3 Findings.....	21
Descriptive statistics.....	21
General linear model.....	23
Chapter 4 Conclusion and Recommendation.....	36
References.....	38
Appendix A Mean and Standard Errors of Financial Indicators.....	40
Appendix B Net Patient Revenue.....	41
Appendix C Total Operating Expenses.....	42
Appendix D Total Margin.....	43
Appendix E Medical Assistance Share of Net Patient Revenue.....	44
Appendix F Medicare Share of Net Patient Revenue.....	45

**LIST OF TABLES**

Table 2-1- Conceptual Design of the Overall Comparison

Table 2-2- Non-Metropolitan Counties Classified by Beale Code

Table 2-3- Financial Indicators of Interest

Table 2-4- Interpretation of Significant Main Effects and Interactions

## **LIST OF FIGURES**

Figure 1-1- Conceptual Framework

Figure 3-1- Mean Net Patient Revenue by Facility Type

Figure 3-2- Mean Net Patient Revenue by Adjacency

Figure 3-3- Mean Total Operating Expenses by Facility Type

Figure 3-4- Mean Total Operating Expenses by Adjacency

Figure 3-5- Mean Total Margin by Facility Type

Figure 3-6- Mean Total Margin by Adjacency

Figure 3-7- Mean Total Medical Assistance Share of Net Patient Revenue by Facility Type

Figure 3-8- Mean Total Medical Assistance Share of Net Patient Revenue by Adjacency

Figure 3-9- Mean Medicare Share of Net Patient Revenue by Facility Type

Figure 3-10- Mean Medicare Share of Net Patient Revenue by Adjacency

## Acknowledgements

I am forever indebted to the faculty and staff of the Department of Health Policy and Administration (HPA) at The Pennsylvania State University for their ongoing support and devotion to my education throughout my college career. Specifically, Dr. Diane Brannon, Dr. Pamela Short, Dr. Peter Kemper, Dr. Joseph Vasey, Dr. Jami DelliFraine, and Mr. Tom Knarr provided me with the resources and expertise I needed to complete my thesis. I would also like to thank Ms. Susan Sanders for her continual support and guidance.

I would also like to thank Mr. Larry Baronner, Pennsylvania Critical Access Hospital Coordinator at the Pennsylvania Office of Rural Health, for providing me with the opportunity to complete an internship and work at a nearby Critical Access Hospital. He provided me with critical resources for my research and the opportunity to gain first-hand experience of the unique challenges faced by rural health care organizations.

Lastly, my success in college would not have been possible without the ongoing support of my family and friends. They have provided me with the drive and inspiration to make a difference in the lives of others through the health care field. Undoubtedly, our nation will face significant challenges moving forward in health care. It is my hope that my research will create awareness among current and future health care leaders of the unique challenges facing rural health care organizations.

## Chapter 1

### Introduction and Background

The lack of revenue generated from Medicare patients is straining the financial health of rural hospitals throughout the United States. Acting as a remedy, the Balanced Budget Act of 1997 allows qualified rural hospitals to convert to Critical Access Hospital (CAH) status. Given a rural hospital meets requirements for conversion, the hospital will receive increased reimbursement for treating Medicare patients (Scalise, 2004). However, existing research fails to examine the impact of conversion on financial indicators of Pennsylvania CAHs. Therefore, the purpose of this analysis is to describe the financial performance of Pennsylvania CAHs and rural hospitals to assess evidence of the effect of conversion on financial performance, and identify factors affecting financial performance. Rural hospitals are classified as rural hospitals that are ineligible for CAH conversion or elected not to convert,

#### Motivation and question to be addressed

Rural hospitals are a vital part of the economy in Pennsylvania, generating \$77 billion for the economy and providing an additional \$3.9 billion of community benefits. Approximately 563,000 citizens of Pennsylvania are employed directly by hospitals or companies linked to the industry (Hospital and Healthsystem Association of Pennsylvania, 2007). Furthermore, “91 percent of rural hospitals are among the top three largest employers in their community . . . 36 percent of rural hospitals are the top employer” (Hospital and Healthsystem Association of Pennsylvania, 2007, p. 3).

The economic benefits of rural hospitals extend well beyond employment rates and financial contributions. Rural hospitals are primarily responsible for the development of health

care in the community. Without the hospital industry, these communities would not be able to persuade doctors and citizens to move to the area (Hall, Owens, & Shinogle, 2006).

A large proportion of rural hospital patients are Medicare beneficiaries; therefore, insufficient Medicare reimbursement may be detrimental to the financial health of rural hospitals. Given that health care utilization increases and the willingness of citizens to travel to large urban hospitals decreases with age, large elderly populations in rural communities greatly increase the proportion of patients at a rural hospital with Medicare (Hall et al., 2006). As a result, the financial status of many rural hospitals in Pennsylvania is weakening (Pennsylvania Health Care Cost Containment Council, 2007).

Addressing this problem, the Balanced Budget Act of 1997 was passed to allow states to create a State Medicare Rural Hospital Flexibility Program (Flex Program) to grant Critical Access Hospital (CAH) status to rural hospitals. The following requirements exist for a rural hospital to be eligible: be in a state with a flex program; be a rural hospital or urban hospital classified as rural by the state; provide 24-hour emergency care; have fewer than 25 inpatient beds and less than a 96-hour average length of stay; and be located 25 miles from the nearest hospital or CAH or 15 miles in mountainous areas (Medicare Learning Network, 2007). States are permitted to establish provisions eliminating the distance requirement. Initially, if a hospital was not a rural hospital but was facing financial struggles, the state could declare it a “necessary provider” to permit conversion to CAH status; however, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 reversed the ruling and it was no longer permitted after January 1, 2006 (MedPac, 2007a).

Medicare reimburses rural hospitals on a fee-for-service prospective payment system (PPS). Under the PPS, payments to health care providers are based on predetermined costs.



Similar procedures for clinical conditions are placed into diagnosis-related groups (DRGs), and price estimates are determined based on the average costs of the procedure. Adjustments account for differing strengths of the economy in various areas. Additionally, coverage is provided for up to 90 days of care per illness. Even if health care providers incur costs above the reimbursement level set by the PPS, they will not receive additional payment. As a result, the costs incurred by a health care provider from the treatment of Medicare patients may exceed the revenues (MedPac, 2007b).

Conversely, the Balanced Budget Act of 1997 provides CAHs with cost-based reimbursement at 101 percent for outpatient, inpatient, laboratory, therapy services, and post-acute care for Medicare patients (MedPac, 2007a). This reimbursement rate is intended to improve the financial indicators of CAHs; however, gaps exist in the current literature examining the effects of the Balanced Budget Act of 1997 on the financial indicators of CAHs.

Multiple stakeholders will be interested in this analysis. Hospital administrators examining the effects of CAH conversion on the financial indicators of their facilities, as well as administrators considering conversion, will benefit from the research. Additionally, the analysis will help legislators evaluating the effectiveness of the Balanced Budget Act of 1997 in improving the financial indicators of CAHs in Pennsylvania and those examining different types of Medicare reimbursement.

### **Prior research**

Currently, a gap exists in the research examining the effects of the Balanced Budget Act of 1997 on the financial indicators of CAHs. Within the existing literature, the few studies that examine financial indicators have several limitations that threaten internal validity. First, the studies analyze the effects using financial projections or one year of financial data collected

during the first year after conversion that may miss the effects of conversion on financial indicators that are small but increase over time. Second, changes in financial performance may also be related to factors other than CAH conversion given the study only uses one year of financial data. Additionally, the financial indicators of CAHs have not been compared to rural hospitals. As a result, the studies may not capture the effects of economic factors impacting the financial performance of all hospitals. Lastly, one study assumes rural hospitals will convert to CAH status based on patient census; however, some hospitals may not have converted to CAH status and thus the analysis is an inaccurate representation of the impact of conversion.

A study by Pink, Holmes, Alpe, et al. (2006) did not examine effects of the Balanced Budget Act of 1997 on the financial indicators of CAHs; however, it identified the CAH financial indicators most likely to be affected by the legislation. Pink et al. (2006) contend, “The reimbursement and organizational differences between CAHs and other small hospitals make it important for CAHs to have financial indicators specific to their own circumstances for performance assessment” (2006, p. 229). By examining peer-reviewed journals, industry publications and practitioner journals, Pink et al. (2006) determined the most common financial ratios utilized by CAHs and divided them into six categories: profitability, liquidity, capital structure, revenue, cost, and utilization.

Pink, Holmes, Thompson, & Slifkin (2007) conducted a follow-up study to determine if differences were found in financial indicators among groups of CAHs. The financial indicators were divided into four groups based on the characteristics of CAHs, which were “. . . the most commonly cited hospital characteristics that significantly affect financial ratios” (Pink et al., 2007, p. 300). The researchers divided CAHs into groups based on net patient revenue, government ownership, provision of long-term care, and operation of a rural health clinic. The

most statistically significant differences occur among CAHs grouped by net patient revenue; however, some significant differences were noted among the other three groups. Therefore, accounting for the differences among CAHs will strengthen the internal validity of studies examining the financial indicators of CAHs (Pink et al., 2007).

Stensland, Moscovice, & Christianson (2002) simulate the financial status of rural hospitals in the United States from 1999-2004. Specifically, the study examines the effect of Medicare reimbursement on total profit margins by adjusting for changes in Medicare payments due to the Balanced Budget Act of 1997, Balanced Budget Refinement Act of 1999, and the Benefits Improvement and Protection Act of 1999. Estimates of the total profit margins of rural hospitals for the years 1999-2004 are made by adjusting cost report data from 1996, 1997, and 1998, according to the reimbursement specifications in the Balanced Budget Act of 1997, Balanced Budget Refinement Act of 1999, and Benefits Improvement and Protection Act of 1999. The researchers also assumed rural hospitals with a census of fewer than 15 patients will convert to CAH status and those with a census of more than 15 patients will not. The results of the study show that “[d]espite the benefits of CAH conversion, 21 to 32 percent of CAHs are projected to suffer significant losses in 2004 unless they increase private-payer prices or reduce operating costs” (Stensland, Moscovice, & Christianson, 2002, p. 185). The study suggests the Balanced Budget Act of 1997 may not improve the financial health of CAHs; however, internal validity is threatened because financial projections are analyzed as opposed to financial data collected after conversion. Additionally, the assumption of conversion to CAH status based on patient census further threatens the internal validity of the study. The financial projections may be higher or lower than actual financial performance and may not accurately reflect the effect of

conversion. Furthermore, hospitals projected to convert based on patient census may not convert and provide an inaccurate representation of the total number of CAHs and financial performance.

Lawler, Doeksen, & Schott's (2003) study examining the effects of the Balanced Budget Act of 1997 on the financial status of CAHs in Oklahoma is similar to the proposed study. The purpose of their study was to determine the effects of the Balanced Budget Act of 1997 on the financial status of CAHs by analyzing financial data collected through a telephone interview for the first year after conversion. Lawler et al. (2003) analyzed "[d]ata collected . . . on staffing and census; payroll; annual loss or gain; ancillary services provided, such as clinic, home health, nursing home, and emergency medical services; and number of physicians in the medical service area" (p. 136). The results indicate a significant improvement in the operating margins of CAHs in Oklahoma in the first-year post-conversion. However, out of the 15 CAHs examined in the study, only five broke even or made a profit, indicating that hospitals converting to CAH status should not expect to make a profit in the year following conversion (Lawler, Doeksen, & Schott, 2003). Lawler et al. (2003) listed limitations to the study, including that the study lacked a rural hospital control group. As a result, changes in the financial status of CAHs cannot be solely attributed to conversion. Additionally, five hospitals used financial projections due to incomplete financial data. Furthermore, the study examined financial health; however, it only examined operating margin and one year of financial data obtained from the year post-conversion, threatening the internal validity.

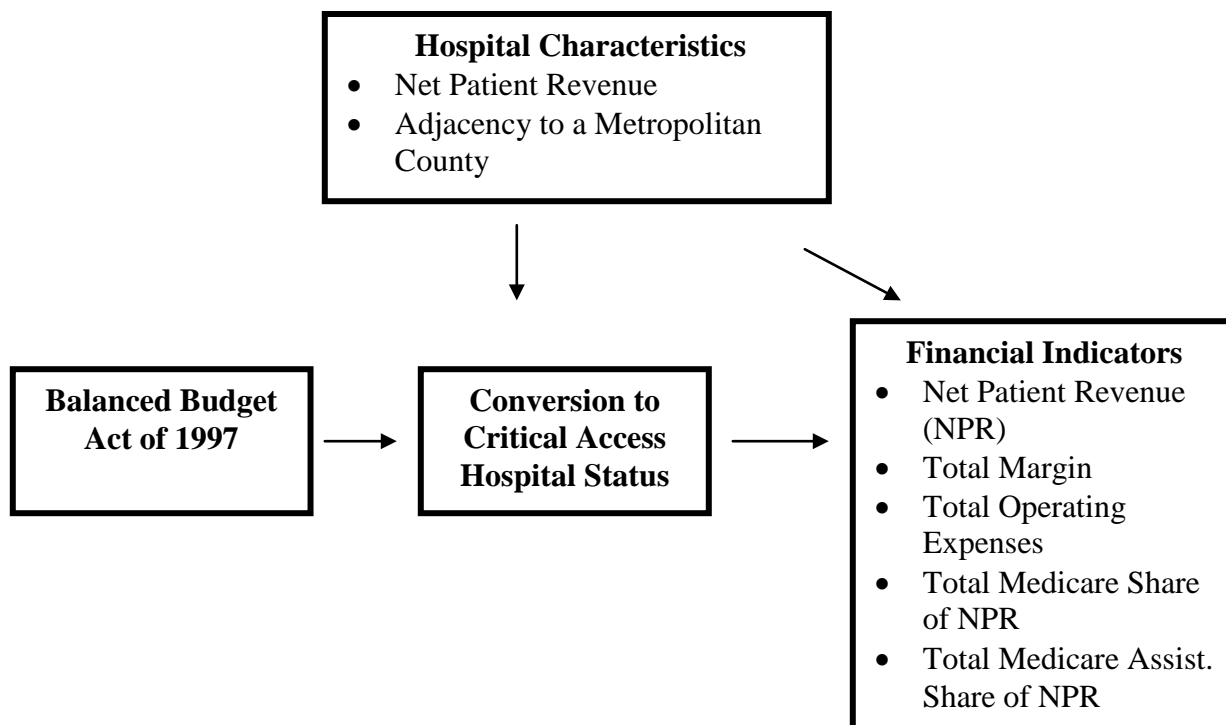
The analysis will eliminate the gaps in existing literature by examining the financial indicators of CAHs in Pennsylvania before and after conversion compared to rural hospitals in Pennsylvania. Additionally, five financial indicators are analyzed using panel data before and after CAH conversion. Utilizing a comparison group and panel data, as well as analyzing five

financial indicators, increases the validity of the study; therefore, the analysis will better estimate the pre-post conversion changes in financial performance.

### ***Framework and hypothesis***

The conceptual framework illustrated in Figure 1-1 identifies the factors influencing the financial indicators of CAHs. First, the Balanced Budget Act of 1997 affects the decision of a rural hospital in Pennsylvania to convert to CAH status. The conversion of a rural hospital to a CAH will then influence the financial indicators, including net patient revenue, total margin, total operating expenses, total Medicare share of net patient revenue, and total Medical Assistance share of net patient revenue. Also affecting the decision of a rural hospital to convert to CAH status and financial indicators are the following hospital characteristics: net patient revenue and adjacency to a metropolitan county.

Figure 1-1: *Conceptual Framework*



The Balanced Budget Act of 1997 establishes criteria that must be met by a rural hospital in order to be eligible for CAH status. If rural hospitals do not meet all of the criteria, they will not be able to convert to CAH status; however, hospitals may restructure in order to be eligible. For example, rural hospitals may have more than the maximum number of 25 acute care beds but average a census well below 25. Therefore, rural hospitals may consider eliminating beds in order to meet the requirements for conversion.

Conversion to CAH status through the Balanced Budget Act of 1997 changes the Medicare reimbursement system that applies to the hospital. Conversion impacts financial indicators because Medicare reimbursement changes from a fee-for-service prospective payment system (PPS) to a cost-based reimbursement system. Prior to conversion, rural hospitals only receive reimbursement for services provided to Medicare patients based on predetermined average costs for the diagnosis-related group (DRG). Any additional costs the hospital may have incurred from the services provided to the patient would not be reimbursed. As a result, the costs from the treatment of Medicare patients may exceed the revenues. However, CAH conversion provides cost-reimbursement plus 1 percent for care provided to Medicare patients. Therefore, because Medicare reimbursements are guaranteed to cover Medicare costs, the conversion of a rural hospital to CAH status may affect its financial indicators.

Lastly, the characteristics of a hospital, as well as the financial indicators of the CAH, may influence the hospital administration's decision to convert to CAH status. As indicated by Pink et al. (2007), the following hospital characteristics impact financial performance: net patient revenue, operation of a rural health clinic, provision of long-term care, and government ownership. For the purposes of this analysis, variations in financial indicators will be analyzed by controlling for differences in net patient revenue consistent with the Pink et al. (2007) study.

Additionally, rural hospitals often lose potential patient volume to urban hospitals (Longo, Hewett, Ge, & Schubert, 2007); therefore, rural hospitals in a non-metropolitan county adjacent to a metropolitan county may have a higher outmigration rate for care, thereby negatively impacting financial performance. The analysis will also control for differences in financial indicators according to adjacency to a metropolitan county.

According to Pink et al. (2007), CAHs with more net patient revenue also had higher total margins. Conversely, the Medicare outpatient cost to charge ratio was lower for CAHs with lower net patient revenues (Pink et al., 2007). Pink et al. (2007) explain, “[P]ossible reasons why CAHs with higher net patient revenues were more profitable, more liquid, and could carry more debt include: outpatient services, charges and costs, payer mix, and patient volume” (p. 303). Medicare revenue per day was also higher for hospitals with greater net patient revenue based on “. . . an intensive care unit or other specialty service, or higher wage rates in nearby larger communities” (Pink et al., 2007, p. 303). As a result of increased costs to deliver specialty services, CAHs with specialty services had lower salaries to total expenses (Pink et al., 2007).

Based on the conceptual framework and the proposed research question, the goals of the analysis are as follows:

*-To describe the financial performance of Pennsylvania CAHs two years before conversion and two years after conversion in comparison to rural hospitals.*

*-To assess the evidence of the effect of conversion on the financial performance of Pennsylvania CAHs by comparing the average change in financial performance before and after conversion to the average change in financial performance of rural hospitals over the same time period.*

*-To identify and quantify factors affecting the financial performance of Pennsylvania CAHs and rural hospitals over time utilizing a general linear model.*

The unit of analysis for the proposed study is the hospital. A more comprehensive analysis of the financial performance of CAHs in comparison to rural hospitals is desirable, such as a nonequivalent, no treatment control group time series design; however, the sample size and data set limitations did not support such an approach for this analysis.



## Chapter 2

### Research Methods

Basic descriptive statistics are calculated for Pennsylvania CAHs and rural hospitals that describe the financial performance of CAHs in comparison to rural hospital and assess the evidence of the effect of conversion on financial performance. A repeated measures analysis of variance is also utilized to identify and quantify factors affecting financial performance. As illustrated in Table 2-1, the analysis examines the financial indicators of Critical Access Hospitals (CAHs) in Pennsylvania before and after conversion through the Balanced Budget Act of 1997 compared to the financial indicators of rural hospitals.

The repeated measures analysis of variance consists of one comparison group (rural hospitals) and one intervention group (CAHs). Five CAHs converted in 2001, one in 2002, two in 2004, three in 2005, and one in 2006. One additional CAH converted in 2007; however, only one year of financial data post-conversion to CAH status is available, so it is assumed this CAH converted in 2006 for the purposes of the analysis (L. Baronner, personal communication, October 20, 2009).

Self-selection bias threatens the internal validity of the analysis as a hospital that is eligible for CAH status may elect or not elect to convert. Therefore, rural hospitals cannot be treated as an equivalent control group that accounts for all differences in financial indicators after conversion that were not attributable to the Balanced Budget Act of 1997.

Table 2-1: *Conceptual Design of the Overall Comparison*

	<b>Before</b>	<b>Policy Implementation</b>	<b>After</b>
<i>Critical Access Hospitals in Pennsylvania</i>	$Y_{it}$ are the financial indicators	$X_{it} = 1$ for rural hospitals that gained CAH status through the Balanced Budget Act of 1997	$Y_{it}$ are the financial indicators
<i>Rural Hospitals in Pennsylvania (ineligible for CAH status)</i>	$Y_{it}$ are the financial indicators	$X_{it} = 0$ for rural hospitals that do not have CAH status through the Balanced Budget Act of 1997	$Y_{it}$ are the financial indicators

### **Data**

The Pennsylvania Health Care Cost Containment Council (PHC4) provided the data set used for this study. The PHC4 monitors health care costs, quality, and access in Pennsylvania. It is an administrative records database containing information on Pennsylvania hospitals collected by a quarterly survey. Financial data is provided for each hospital in Pennsylvania. The data set is divided by facility type: General Acute Care (>100 beds), General Acute Care (<=100 beds), Specialty General Acute Care, Rehabilitation, Psychiatric, State Psychiatric, Long-Term Acute Care, Specialty, and Ambulatory Surgery Center (Pennsylvania Health Care Cost Containment Council, 2000). The data set contains financial information on facilities in Pennsylvania from fiscal year 1997 to 2008, facilitating a substantial analysis of financial indicators before and after a rural hospital converts to Critical Access Hospital (CAH) status.

For the purpose of this study, the data set was limited to General Acute Care (>100 beds) and General Acute Care (<=100 beds) facilities. Additionally, only five years of financial data, two years pre-intervention, intervention year, and two years post-intervention, per financial indicator for each hospital were included in the analysis. Utilizing the 2003 Area Resource File provided by the Health Resources and Services Administration of the U.S. Department of Health

and Human Services, general acute care facilities were classified by county as metropolitan or non-metropolitan counties. General acute care facilities in a metropolitan county were eliminated from the data set, excluding five CAHs in metropolitan counties. CAHs in a metropolitan county were classified as adjacent to a metropolitan county for the purposes of the study. The adjusted data set contained financial information for 13 CAHs and 35 rural hospitals. Missing values were estimated using regression analysis. The classifications of non-metropolitan counties by Beale Code are listed in Table 2-2.

Table 2-2: *Non-Metropolitan Counties Classified by Beale Code*

<b>Beale Code by County</b>	<b>Description</b>
4	Urban population of 20,000 or more, adjacent to a metropolitan area
5	Urban population of 20,000 or more, not adjacent to a metropolitan area
6	Urban population of 2,500-19,999, adjacent to a metropolitan area
7	Urban population of 2,500-19,999, not adjacent to a metropolitan area
8	Completely rural or less than 2,500 urban population, adjacent to a metropolitan area
9	Completely rural or less than 2,500 urban population, not adjacent to a metropolitan area

Note: Taken from the Area Resource File (2003).

The variables of interest in the analysis were the financial indicators of CAHs and rural hospitals in Pennsylvania. The following five financial indicators were used: total margin, net patient revenue, total operating expenses, total Medicare share of net patient revenue, and total Medical Assistance share of net patient revenue. Financial indicators are included in the PHC4 data set and classified by indicator type according to a study by Pink et al. (2006) that identified the financial indicators most commonly used by CAHs.

Several of the financial indicators identified by Pink et al. (2006) are not included in the PHC4 data set; therefore, similar indicators were substituted. Specifically, total Medicare share of net patient revenue from the PHC4 data set was substituted for Medicare inpatient payer mix.

Additionally, total operating expenses are substituted for salaries to total expenses (Pennsylvania Health Care Cost Containment Council, 2000). Total margin, selected from the PHC4 data set, is included in the analysis based on the Pink et al. (2006) study.

Two additional financial indicators were included in the study: net patient revenue and total Medical Assistance share of net patient revenue (Pennsylvania Health Care Cost Containment Council, 2000). Given CAHs receive 101% cost-based Medicare reimbursement (Scalise, 2004), the net patient revenue expectedly will be impacted by conversion to CAH status. Smith, Piland, & Funk (1992) indicate that the average income of residents in rural areas is lower than urban areas; therefore, the total Medical Assistance share of net patient revenue may be significant for rural hospitals and CAHs.

The financial indicators can be classified into three types of measures: profitability, revenue, and cost (Pink, Slifkin, & Holmes, n.d.). As defined by Pink et al. (n.d.), “Profitability indicators measure the ability to generate the financial return required to replace assets, meet increase in service demands, and compensate investors” (slide 5). Revenue indicators “. . . measure the amount and mix of different sources of revenue” (slide 6). Cost indicators “. . . measure the amount and mix of different types of costs” (slide 7).

Total margin is classified as a profitability measure. Total margin indicates revenues in comparison to expenses (Pink et al., n.d.). Net patient revenue, total Medicare share of net patient revenue, and total Medical Assistance share of net patient revenue are classified as revenue indicators. Net patient revenue examines revenue from patient care only and excludes revenue from the cafeteria, parking, rent, research, and educational activity. It also excludes reimbursement for charitable care and adjustments for bad debt (Pennsylvania Health Care Cost Containment Council [PHC4], 2000). Medicare share of net patient revenue is calculated by

taking the total Medicare percentage of total net patient revenue. Total Medical Assistance share of net patient revenue examines Medical Assistance revenue as a percentage of total net patient revenue (PHC4, 2000). Lastly, total operating expenses are classified as a cost measure. Total operating expenses includes salaries, professional fees, supplies, depreciation, interest, insurance, and bad debt (PHC4, 2000). Table 2-3 contains information on each of the financial indicators listed.

Table 2-3: *Financial Indicators of Interest*

<b>Financial Indicators</b>	<b>Calculation</b>	<b>Improvement</b>
<i>Profitability Measures</i>		
Total Margin	$\frac{\text{Revenue over Expenses}}{\text{Total Revenue}}$	Increase
<i>Revenue Measures</i>		
Net Patient Revenue	<ul style="list-style-type: none"> <li>• Patient care</li> <li>• Excludes revenue from cafeteria, parking, rent, research, and educational activities</li> <li>• Excludes charitable care and bad debt adjustments</li> </ul>	Increase
Total Medicare Share of Net Patient Revenue	$\frac{\text{Total Medicare Revenue}}{\text{Net Patient Revenue}}$	Increase
Total Medical Assistance Share of Net Patient Revenue	$\frac{\text{Total Medical Assistance Revenue}}{\text{Net Patient Revenue}}$	Decrease
<i>Cost</i>		
Total Operating Expenses	<ul style="list-style-type: none"> <li>• Salaries, professional fees, supplies, depreciation, interest, insurance, bad debts</li> </ul>	Decrease

- All financial indicators taken from Pennsylvania Health Care Cost Containment Council (2000). *Financial, utilization and payor data: Fiscal year 2000 data notes*. Harrisburg, PA. Financial indicators classified according to Pink, G.H., Slifkin, R.T., Holmes, G.M. (n.d.). CAH financial indicators presentation (PowerPoint). North Carolina Rural Health Research and Policy Analysis Center. Retrieved March 1, 2008, from [www.porh.psu.edu/cah/flex/index.html](http://www.porh.psu.edu/cah/flex/index.html).

## Analysis plans

Descriptive statistics are calculated for Pennsylvania CAHs and rural hospitals to show financial performance in each of the two years before and after conversion. The financial performance in the two years before and after conversion was calculated by taking an average of the financial indicators for CAHs and rural hospitals. The descriptive statistics describe the financial performance of CAHs in comparison to rural hospitals. The calculated change in CAH financial indicators values compared to rural hospitals assesses the evidence of the impact of conversion on financial performance.

The analysis is a repeated measures analysis of variance design. The analysis identifies and quantifies factors that affect the financial performance over time of CAHs and rural hospitals in Pennsylvania. The model consists of two between-subjects components and one within-subjects repeated measures component:

- *Type-of-Facility Effect*: There are two groups of hospitals: one group of 13 hospitals that converted to CAH status and a second group of 35 rural hospitals. Facility type is a between-subjects effect.
- *Adjacency Effect*: This component represents the effect of being adjacent or not adjacent to a metropolitan county. Adjacency is a between-subjects effect.
- *Time*: Five annual measures of financial performance were obtained for each hospital. Time is a within-subjects effect.

Table 2.4 shows the interpretation of significant interaction and main effects in the model.

### *Significant Time and Facility Type Interaction*

A time and facility interaction is expected if conversion to CAH status had an effect on financial performance. The financial performance of the two groups of hospital, CAHs and rural

hospitals, would be expected to change differently over time. If CAH conversion had no effect on financial performance, then an interaction effect would not be expected.

*No Significant Time and Facility Type Interaction*

The main effects for facility type, adjacency, or time might be observed if there is no interaction between time and facility type. A time effect in the absence of an interaction would indicate that financial performance changed over time in a similar manner for CAHs and rural hospitals. Similarly, an adjacency effect without a significant time and adjacency interaction would indicate that the performance of adjacent and non-adjacent hospitals changed over time in a similar manner. Significant main effects for facility type and adjacency without a significant interaction indicates that the pattern of change in financial performance based on these groupings differ significantly in a similar pattern over time.

Table 2-4: *Interpretation of Significant Main Effects and Interactions*

<b>Effect and Significance</b>	<b>Interpretation</b>
<i>Time and Facility Interaction Significant</i>	Financial performance of CAH and rural hospitals change over time in different manners.
<i>Time and Facility Interaction Not Significant</i>	The pattern of change in financial performance over time is similar for both groups. CAH conversion did not affect financial performance.
<ul style="list-style-type: none"> <li>• <i>Time and Facility Significant</i></li> </ul>	Financial performance of both groups changes in a similar manner over time, but not in the level of performance.
<ul style="list-style-type: none"> <li>• <i>Time Significant</i></li> </ul>	Financial performance of both groups changes in a similar manner over time and in the level of performance. It is inferred that CAH conversion had no effect on financial performance.
<ul style="list-style-type: none"> <li>• <i>Facility Significant</i></li> </ul>	Financial performance of both groups does not change over time but differ in the level of performance by groups.
<ul style="list-style-type: none"> <li>• <i>Neither Time or Facility Significant</i></li> </ul>	Financial performance of both groups does not change over time and the groups do not differ in the level of performance.

Two control variables are accounted for in the subject effect: net patient revenue and adjacency to a metropolitan county. CAHs and rural hospitals are classified as either adjacent to or not adjacent to a metropolitan county. Furthermore, CAHs and rural hospitals are also classified according to net patient revenue. There are three classifications for net patient revenue: less than \$5 million, between \$5 and \$10 million, and greater than \$10 million. Given net patient revenue remains relatively stable for all hospitals over the five year time period, the analysis only controls for net patient revenue in the year prior to conversion where time equals two. Differences in the subject effect according to adjacency to a metropolitan county are included in the final analysis.

Pennsylvania CAHs converted in the following years: five in 2001, one in 2002, two in 2004, one in 2005, one in 2006, and one in 2007 (L. Baronner, personal communication, October, 20, 2009). General linear models are calculated for each of the following financial indicators to identify and quantify factors affecting financial performance: net patient revenue, total margin, total operating expenses, total Medicare share of net patient revenue, and total Medical Assistance share of net patient revenue.

The repeated measures analysis of variance is used to test the hypothesis by analyzing F-value, p-value, and effect of each of the variables included in the general linear model listed in Table 2-4. The magnitude of the effect is determined by examining the p-value, significant at  $p \leq .05$  and  $p \leq .10$ .

### ***Limitations***

Small sample size threatens the statistical power of the analysis and increases the standard error. Furthermore, the differences in financial performance before and after conversion must be large in order to conclude that the differences are attributable to conversion



with statistical confidence. However, the analysis uses five years of financial panel data collected from 1997 to 2008. Therefore, the amount of data being analyzed increases and financial trends of rural hospitals and CAHs before and after conversion is examined. The increased amount of data increases the power of the proposed study and reduces standard error.

It is assumed that trends in the financial performance of Pennsylvania rural hospitals are a reasonable indicator of the financial performance CAHs would have experienced if the hospitals did not convert. Internal validity is threatened because the data set does not account for economic variables that may differentially affect the financial indicators of CAHs and rural hospitals. Additionally, individual market characteristics vary for CAHs and rural hospitals across Pennsylvania. For example, demographic changes, business closures, hospital closures, changes in physician supply, changes in the uninsured population, and others may impact the financial health of CAHs and rural hospitals. However, economic conditions will affect both CAHs and rural hospitals. In order for the effects of changing economic conditions to impact only the financial indicators of CAHs, the changes in the economy must be coincidental with the treatment.

Given the data set only contains financial data on Pennsylvania rural hospitals, external validity is threatened and thereby the generalizability of the study is limited. The results of the study cannot be generalized to other states throughout the country. However, it may spur and inform similar studies throughout the United States and benefit CAH hospital administrators, evaluating their financial performance in comparison to other CAHs and rural hospitals. Additionally, it may benefit hospital administrators considering CAH conversion, as well as legislators evaluating the effects of Medicare reimbursement on the financial health of rural hospitals.

The PHC4 data set is a secondary data set; therefore, it is subject to reporting error because submission of financial information is voluntary. This may threaten the internal validity of the analysis if the errors differentially affect the data for CAH and other rural hospitals. However, no evidence indicates that the reporting error would vary between CAHs and rural hospitals; therefore, inaccurate data would not threaten the internal validity of the study but would make it harder to detect the actual effects of conversion on financial performance.

One limitation of a repeated measures analysis of variance is delayed effects. The effects of the Balanced Budget Act of 1997 may not be noticeable immediately after conversion. Analysis of financial data extending beyond 2008 may be required to determine the total impact. However, using panel data allows for an analysis of financial trends over several years, increasing the probability of capturing the effects of the Balanced Budget Act of 1997 on the financial indicators of CAHs in Pennsylvania.

In addition to delayed effects, the operations of several CAHs were more severely impacted by conversion to CAH status than others. For example, several of the hospitals operated with nearly 25 beds prior to conversion, while others had to significantly reduce the number of beds to meet the requirements for conversion. Therefore, hospitals that had to significantly decrease the number of beds may have experienced a decrease in net patient revenue in comparison to CAHs that were already operating nearly 25 beds (L. Baronner, personal communication, January 21, 2010). This may affect the average of financial indicators in the first few years after conversion to CAH status. Future financial analysis should extend beyond two years after CAH conversion.

## **Chapter 3**

### **Findings**

The analysis consists of two parts. Descriptive statistics are utilized to describe the financial performance of Pennsylvania CAHs in comparison to rural hospitals and to assess the evidence of the effect of conversion on financial performance. The second part utilizes general linear models to identify and quantify factors affecting financial performance.

#### **Descriptive statistics**

The descriptive statistics for each financial indicator for Pennsylvania CAHs and rural hospitals are illustrated in Appendix A. Overall, Pennsylvania CAHs operate at a financial disadvantage in comparison to rural hospitals. Specifically, CAHs adjacent to a metropolitan county had an average net patient revenue of \$10.8 million and CAHs not adjacent \$23.0 million in the two years after conversion. In comparison, rural hospitals adjacent to a metropolitan county had an average net patient revenue of \$60.7 million and rural hospitals not adjacent \$33.0 million. CAHs adjacent to a metropolitan county also operated with an average total margin of -0.3% and those not adjacent -3.5%. Rural hospitals adjacent to a metropolitan county operated with an average total margin of 1.0% and those not adjacent -0.4%. CAHs operated with a higher Medical Assistance share of net patient revenue (16.2% adjacent, 9.4% not adjacent) than rural hospitals (7.7% adjacent, 10.9% not adjacent). However, CAHs operated with approximately the same Medicare share of net patient revenue (47.0% adjacent, 45.0% not adjacent) as rural hospitals (47.0% adjacent, 46.0% not adjacent).

CAH average net patient revenue increased in the two years after conversion by \$2.2 million; however, net patient revenue for rural hospitals increased by \$10.9 for a difference of \$8.7 million. It appears conversion to CAH status improved average net patient revenue, but

rural hospitals experienced faster growth and CAHs may have experienced growth without conversion.

CAH average total operating expenses increased in the two years after conversion by \$2.3 million compared to \$10.5 million for rural hospitals for a difference of \$8.2 million. Financial performance indicates that conversion to CAH status may have had a moderate impact on slowing the growth of total operating expenses, but it is likely that conversion did not significantly impact total operating expenses.

CAHs experienced an increase in average total margin of 1.8% in the two years after conversion. Rural hospitals experienced a 2.3% decrease in total margin for a difference of -4.1%. Analysis of financial performance indicates that conversion to CAH status contributed to the increase in total margin and CAHs may have experienced a decline in total margin without conversion.

CAHs average Medical Assistance share of net patient revenue decreased -0.4% in the two years after conversion. Rural hospitals experienced a 0.1% increase in Medical Assistance share of net patient revenue for a difference of 0.5%. It appears that conversion to CAH status had little to no impact on the Medical Assistance share of net patient revenue.

CAH average Medicare share of net patient revenue increased 2.0% in the two years after conversion in comparison to a decrease of 2.0% for rural hospitals, a difference of 4.0%. The impact of conversion on Medicare share of net patient revenue is small; however, it appears that CAHs may have experience a decline without conversion. It is expected that the Medicare share of net patient revenue of CAHs would increase as a result of cost-based Medicare reimbursement.

## **General linear model**

The small sample size in the analysis adversely affects the observed power of the statistical analyses of within-subject contrasts and between-subjects effects. As a result, statistically significant differences may be stronger than indicated by the power, and differences not found to be statistically significant may be significant with a larger sample size. Within-subjects contrasts examine the impact of time on differences in financial indicators and between-subjects effects examine averages of financial indicators over time. The financial indicators are evaluated at the  $p \leq .05$  and  $p \leq .10$  levels of statistical significance. P-values moderately above .10 may be significant, but the difference is not detected due to small sample size. The analysis identifies and quantifies factors affecting financial performance for each of the financial indicators for Pennsylvania CAHs and rural hospitals. The statistics for each of the financial indicators are reported in Appendices B through F.

### ***Net Patient Revenue***

Refer to Appendix B for tables outlining the statistical analysis discussed below.

#### ***Mean Values***

The mean net patient revenue for Pennsylvania CAHs is approximately \$15.77 million in comparison to \$41.71 million for rural hospitals. The mean net patient revenue for Pennsylvania CAHs not adjacent to or located in a metropolitan county is \$21.64 million in comparison to \$9.9 million for CAHs adjacent to or located in a metropolitan county. The mean net patient revenue for Pennsylvania rural hospitals not adjacent to a metropolitan county is \$28.52 in comparison to \$54.9 for rural hospitals adjacent to a metropolitan county.

As illustrated in Figure 3-1, the mean net patient revenue of rural hospitals steadily increased over the five-year period, while the mean net patient revenue for CAHs remained

relatively stable. Mean net patient revenues of rural hospitals adjacent to a metropolitan area increased over the five-year period at a faster rate than hospitals not adjacent to a metropolitan county, as shown in Figure 3-2.

Figure 3-1: *Mean Net Patient Revenue by Facility Type*

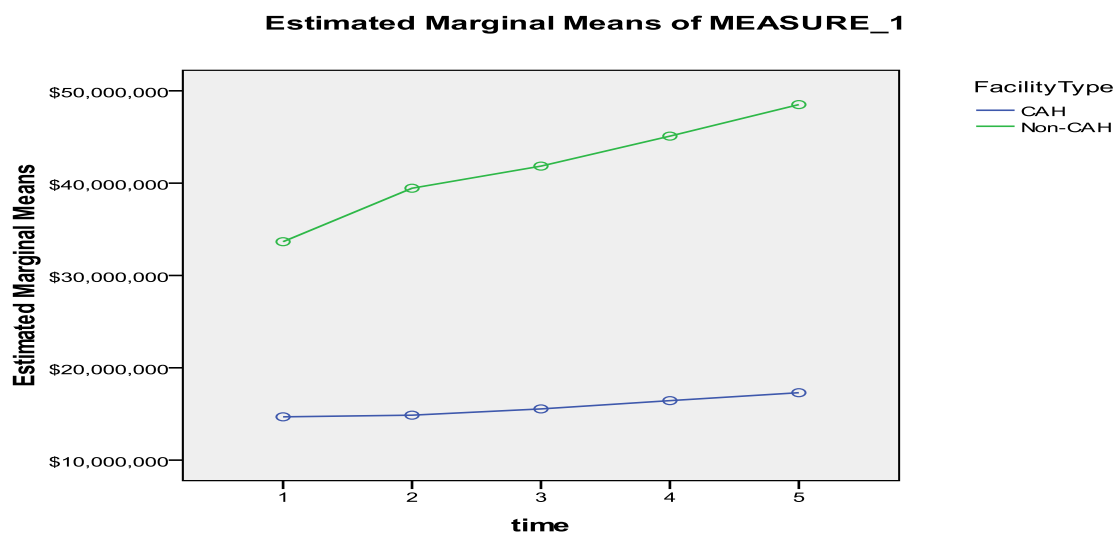
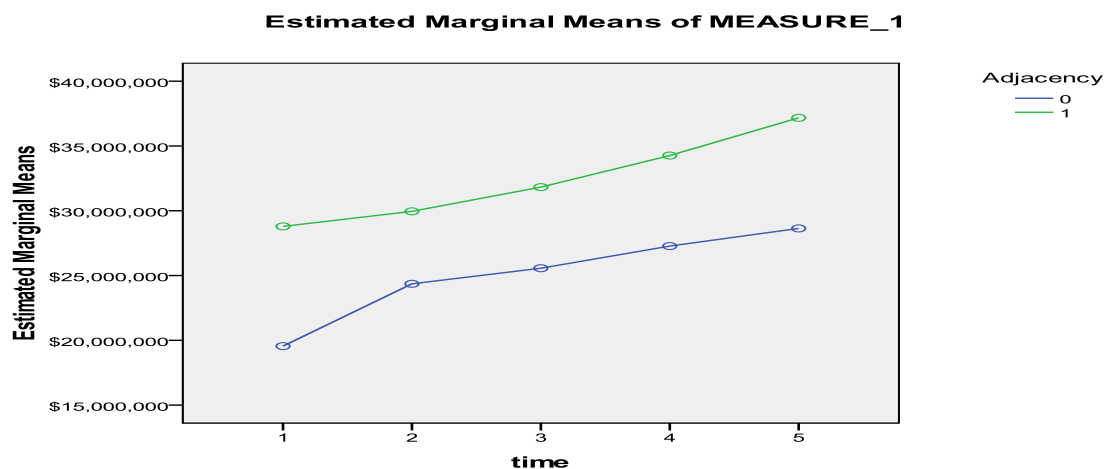


Figure 3-2: *Mean Net Patient Revenue by Adjacency*



Note: "0" denotes "Not Adjacent" and "1" denotes "Adjacent"

*Within-subjects effects*

Differences in net patient revenue based on the interaction of time, facility type, and adjacency are not statistically significant with a p-value of .799. Differences based on the interaction of time and adjacency are also not statistically significant with a p-value of .999. However, differences based on the interaction of time and facility type are statistically significant at the .10 level of significance with a p-value of .085. Lastly, changes based on time are statistically significant at the .05 level with a p-value of .013.

*Between-subjects effects*

Differences in average net patient revenue based on facility type are not statistically significant with a p-value of .110; however, the small sample size reduces the observed power. Differences based on adjacency are not statistically significant with a p-value of .648. Lastly, differences based on the interaction of facility type and adjacency are not statistically significant with a p-value of .237.

*Conclusion*

The differences in net patient revenue based on the interaction of time and facility type is statistically significant. Therefore, net revenue changes over time for Pennsylvania CAHs and rural hospitals but in different manners. Based on the means and linear models in Figures 3-1 and 3-2, the mean net patient revenue for Pennsylvania CAHs and rural hospitals increased over time and net patient revenue is higher for rural hospitals. It can be inferred that CAH conversion increased the net patient revenue of CAHs.

### *Total Operating Expenses*

Refer to Appendix C for tables outlining the statistical analysis discussed below.

#### *Mean Values*

The mean total operating expenses for Pennsylvania CAHs is approximately \$16.98 million in comparison to \$43.14 million for rural hospitals. The mean net patient revenue for Pennsylvania CAHs not adjacent to a metropolitan county is \$23.06 million in comparison to \$10.89 million for CAHs adjacent to or located in a metropolitan county. The mean total operating expenses for Pennsylvania rural hospitals not adjacent to a metropolitan county is \$29.76 million in comparison to \$56.52 for rural hospitals adjacent to a metropolitan county.

As illustrated in Figure 3-3, mean total operating expenses for rural hospitals increased at a faster rate over the five-year period than CAHs. Mean total operating expenses increased at approximately the same rate for hospitals adjacent to or not adjacent to a metropolitan county as shown in Figure 3-4.

Figure 3-3: *Mean Total Operating Expenses by Facility Type*

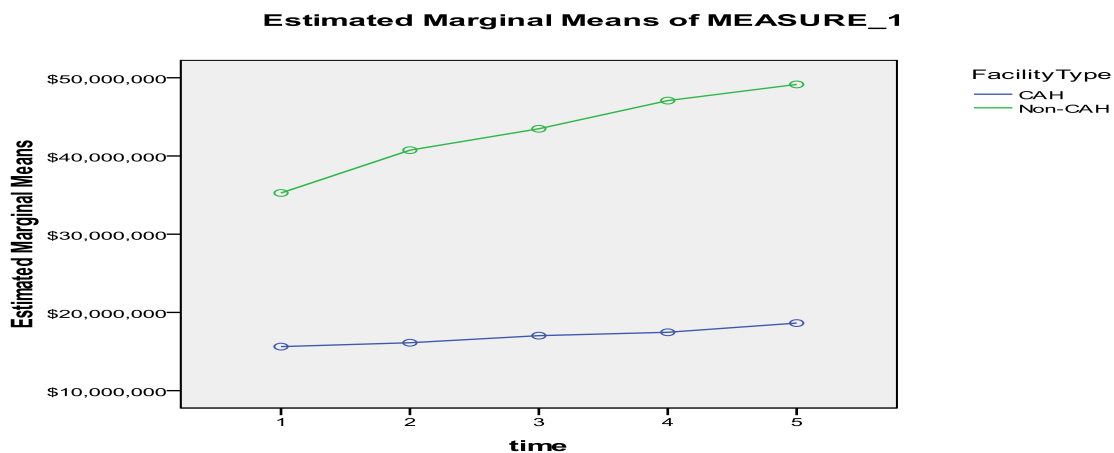
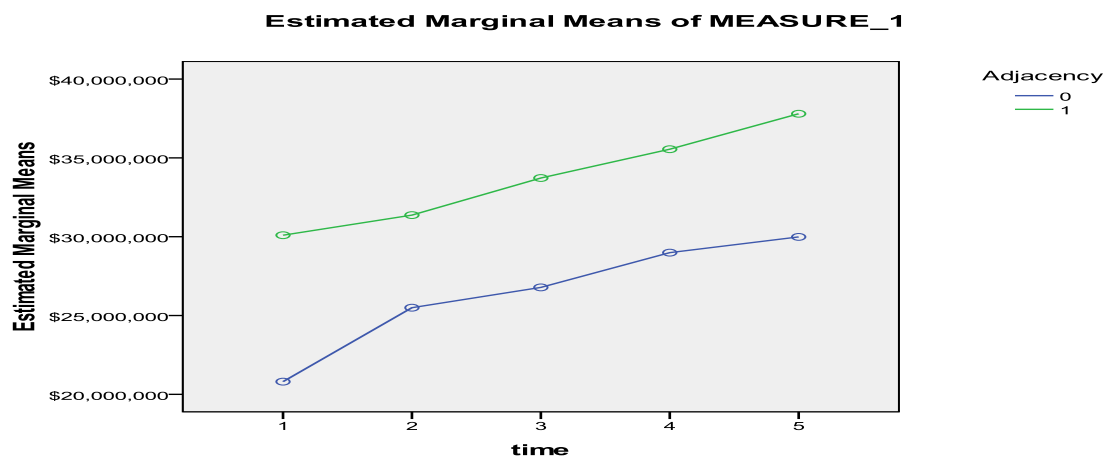




Figure 3-4: Mean Total Operating Expenses by Adjacency



Note: “0” denotes “Not Adjacent” and “1” denotes “Adjacent”

#### *Within-subjects contrasts*

Differences in total operating expenses based on the interaction of time, facility type, and adjacency are not statistically significant with a p-value of .835. Differences based on the interaction of time and adjacency are also not statistically significant with a p-value of .891. Differences based on the interaction of time and facility type are not statistically significant with a p-value of .113; however, the small sample size reduces the observed power. Lastly, changes based on time are statistically significant at the .05 level with a p-value of .016.

#### *Between-subjects effects*

Differences in total operating expenses based on facility type are not statistically significant with a p-value of .123; however, the small sample size reduces the observed power. Differences based on adjacency are not statistically significant with a p-value of .663. Lastly, differences based on the interaction of facility type and adjacency are not statistically significant with a p-value of .249.

### *Conclusion*

Changes in total operating expenses based on time are statistically significant. Therefore, total operating expenses changed over time for both Pennsylvania CAHs and rural hospitals, but the level of financial performance remained relatively the same. Based on the means and linear models in Figures 3-3 and 3-4, total operating expenses increased for both Pennsylvania rural hospitals and CAHs. It can be inferred that CAH conversion did not have an impact on the total operating expenses of CAHs.

### ***Total Margin***

Refer to Appendix D for tables outlining the statistical analysis discussed below.

### *Mean Values*

The mean total margin of Pennsylvania CAHs is -2.9% in comparison to 1.5% for rural hospitals. The mean total margin of Pennsylvania CAHs not adjacent to or located in a metropolitan county is -2.9% compared to -3.0% for CAHs adjacent to or located in a metropolitan county. The mean total margin of Pennsylvania rural hospitals not adjacent to a metropolitan county is .9% in comparison to 2.1% for rural hospitals adjacent to a metropolitan county.

As illustrated in Figure 3-5, mean total margin for rural hospitals decreased from years one to four with a slight increase from years four to five. Mean total margin for CAHs increased from years one to four with a slight decrease from years four to five. As illustrated in Figure 3-6, mean total margin increased overall for hospitals adjacent to a metropolitan county with a decrease from year four to five. For hospitals not adjacent to a metropolitan county, mean total margin decreased over five years.

Figure 3-5: Mean Total Margin by Facility Type

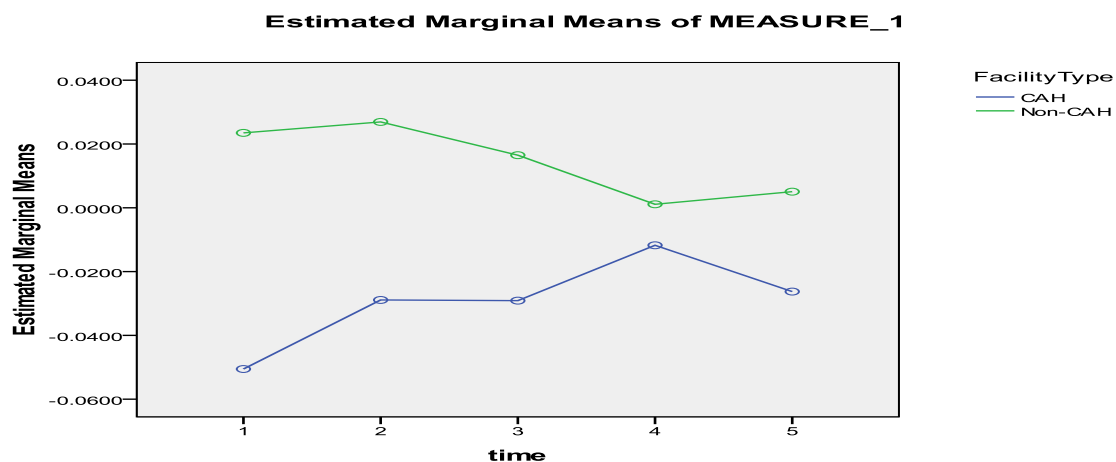
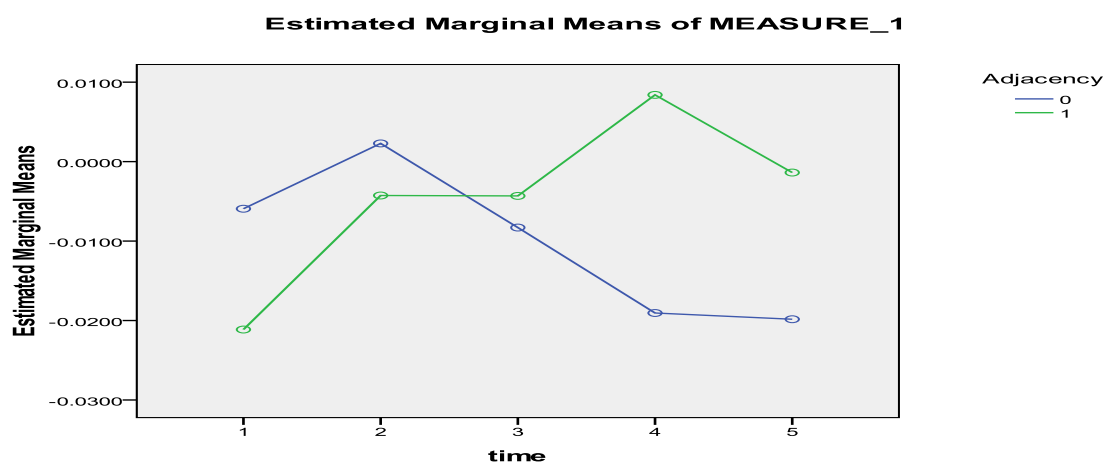


Figure 3-6: Mean Total Margin by Adjacency



Note: “0” denotes “Not Adjacent” and “1” denotes “Adjacent”

#### *Within-subjects contrasts*

Differences in total margin based on the interaction of time, facility type, and adjacency are not statistically significant with a p-value of .151; however, small sample size reduces the observed power. This is also true for differences in total margin based on the interaction of time and adjacency with a p-value of .172. Differences based on the interaction of time and facility

type are statistically significant at the .10 level of significance with a p-value of .086. Lastly, changes based on time are not statistically significant with a p-value of .967.

#### *Between-subjects effects*

Differences in total margin based on facility type are statistically significant at the .10 level with a p-value of .002. Differences based on adjacency are not statistically significant with a p-value of .675. Lastly, differences based on the interaction of facility type and adjacency are not statistically significant with a p-value of .645.

#### *Conclusion*

Differences in total margin based on the interaction of time and facility type are statistically significant. Therefore, the total margin of CAHs and rural hospitals changed over time but in different manners. Based on the means and linear models in Figures 3-5 and 3-6, total margin decreased for Pennsylvania rural hospitals and increased for CAHs. It can be inferred that CAH conversion improved the total margin of CAHs.

### ***Medical Assistance Share of Net Patient Revenue***

Refer to Appendix E for tables outlining the statistical analysis discussed below.

#### *Mean Values*

The mean Medical Assistance share of net patient revenue for Pennsylvania CAHs is 13.0% in comparison to 9% for rural hospitals. The mean for Pennsylvania CAHs not adjacent to a metropolitan county is 10.3% in comparison to 15.7% for CAHs adjacent to or located in a metropolitan county. The mean for Pennsylvania rural hospitals not adjacent to a metropolitan county is 10.3% in comparison to 7.7% for rural hospitals adjacent to a metropolitan county.

As illustrated in Figure 3-7, mean Medical Assistance share of net patient revenue fluctuated for CAHs over five years with an overall decrease. Mean Medical Assistance share of

net patient increased from years one to two, decreasing from years two to three, and stabilizing from years three to five. As illustrated in Figure 3-8, mean Medical Assistance share of net patient revenue increased over five years for hospitals adjacent to a metropolitan county. For hospitals not adjacent to a metropolitan county, Medical Assistance share of net patient revenue increased from years one to three and decreased from years three to five.

Figure 3-7: *Mean Medical Assistance Share of Net Patient Revenue by Facility Type*

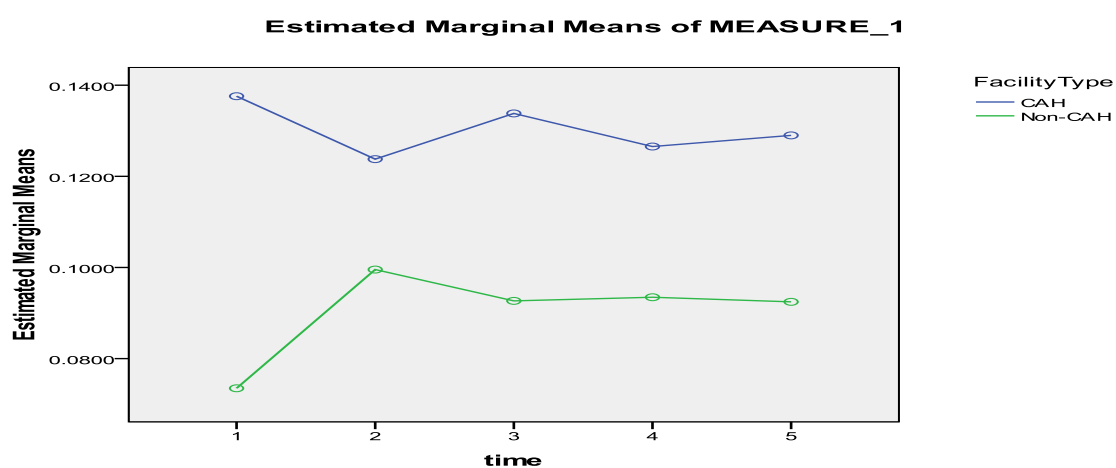
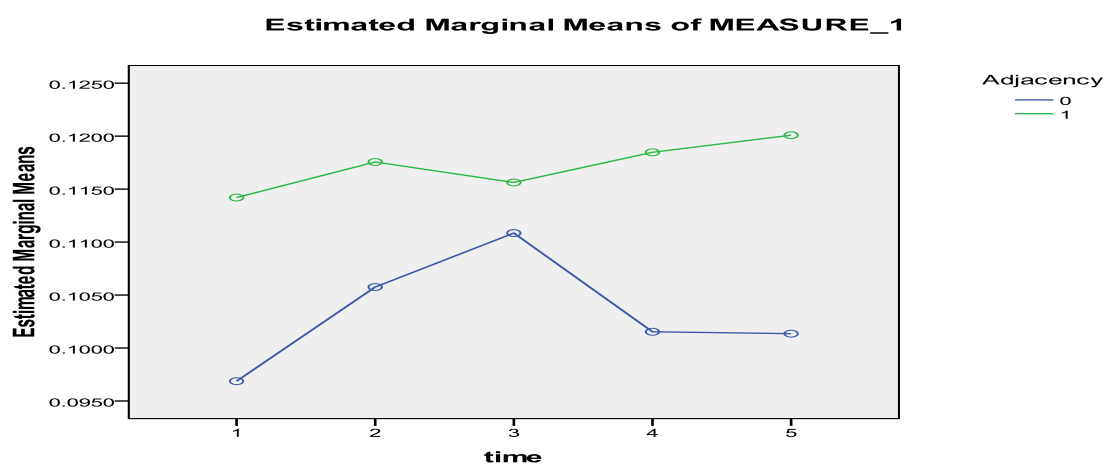


Figure 3-8: *Mean Medical Assistance Share of Net Patient Revenue by Adjacency*



Note: "0" denotes "Not Adjacent" and "1" denotes "Adjacent"

*Within-subjects contrasts*

Differences in Medical Assistance share of net patient revenue based on the interaction of time, facility type, and adjacency is statistically significant at the .10 level with a p-value of .071. Differences based on the interaction of time and adjacency are not statistically significant with a p-value of .826. Differences based on the interaction of time and facility type are also not statistically significant with a p-value of .204. Lastly, changes based on time are not statistically significant with a p-value of .629.

*Between-subjects effects*

Differences in Medical Assistance share of net patient revenue based on facility type are statistically significant at the .10 level with a p-value of .099. Differences based on adjacency are not statistically significant with a p-value of .559. Lastly, differences based on the interaction of facility type and adjacency are statistically significant at the .10 level with a p-value of .10.

*Conclusion*

Differences in Medical Assistance share of net patient revenue based on facility type are statistically significant. Therefore, Medical Assistance share of net patient revenue does not change over time, but CAHs and rural hospitals do differ in the level of financial performance. Medical Assistance share of net patient revenue also differs based on the interaction of facility type and adjacency. Based on the means and linear models in Figures 3-7 and 3-8, Medical Assistance share of net patient revenue decreased for Pennsylvania rural hospitals and increased for CAHs. It can be inferred that CAH conversion did not have an effect on Medical Assistance share of net patient revenue.

### *Medicare Share of Net Patient Revenue*

Refer to Appendix F for tables outlining the statistical analysis discussed below.

#### *Mean Values*

The mean Medicare share of net patient revenue for Pennsylvania CAHs is 44.5% in comparison to 48.1% for rural hospitals. The mean for Pennsylvania CAHs not adjacent to a metropolitan county is equal to 44.4% in comparison to 44.7% for CAHs adjacent to or located in a metropolitan county. The mean for Pennsylvania rural hospitals not adjacent to a metropolitan county is 48.9% in comparison to 47.3% for rural hospitals adjacent to a metropolitan county.

As illustrated in Figure 3-9, the mean Medicare share of net patient revenue for CAHs increased over five years with a decrease from years four to five. The mean for rural hospitals decreased over five years. As illustrated in Figure 3-10, the mean Medicare share of net patient revenue for hospitals not adjacent to a metropolitan county decreased from years four to five. For hospitals adjacent to a metropolitan county, the mean increased over five years with a decrease from years three to five.

Figure 3-9: *Mean Medicare Share of Net Patient Revenue by Facility Type*

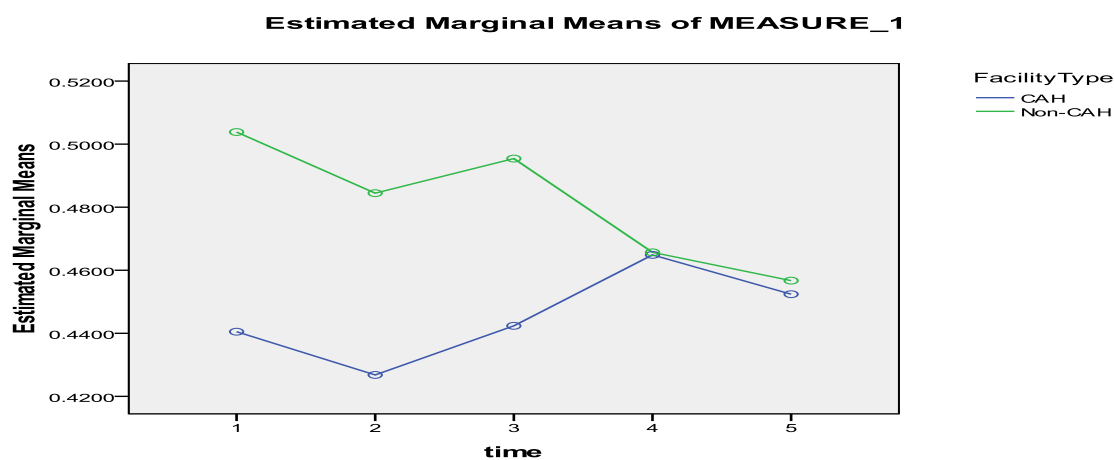
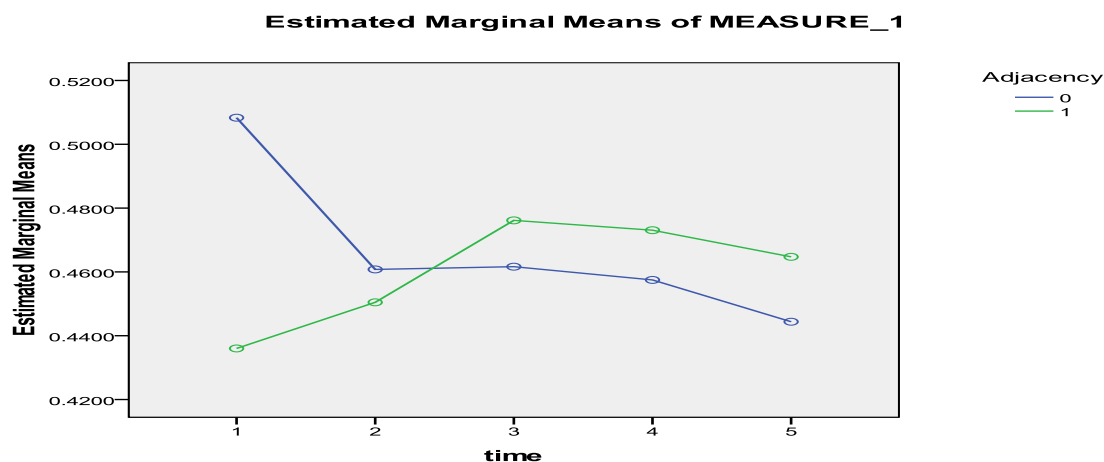


Figure 3-10: *Mean Medicare Share of Net Patient Revenue by Adjacency*

Note: “0” denotes “Not Adjacent” and “1” denotes “Adjacent”

#### *Within-subjects contrasts*

Differences in Medicare share of net patient revenue based on the interaction of time, facility type, and adjacency are not statistically significant with a p-value of .525. Differences based on the interaction of time and adjacency are statistically significant at the .10 level with a p-value of .10. Differences based on the interaction of time and facility type are statistically significant at the .05 level with a p-value of .030. Lastly, changes based on time are not statistically significant with a p-value of .517.

#### *Between-subjects effects*

Differences in Medicare share of net patient revenue based on facility type are not statistically significant with a p-value of .250. Differences based on adjacency are not statistically significant with a p-value of .835. Lastly, differences based on the interaction of facility type and adjacency are not statistically significant with a p-value of .756.

#### *Conclusion*

Differences in Medicare share of net patient revenue based on the interaction of time and facility type are statistically significant. Therefore, Medicare share of net patient revenue



changed over time for both CAHs and rural hospitals but in different manners. Additionally, changes are statistically significant based on the interaction of time and adjacency. Based on the means and linear models in Figures 3-9 and 3-10, Medicare share of net patient revenue decreased for Pennsylvania rural hospitals and increased for CAHs. It can be inferred that CAH conversion increased Medicare share of net patient revenue for CAHs.

## Chapter 4

### Conclusion and Recommendation

Rural hospitals, by providing substantial economic activity, serving as a major employer, and bringing critical health care services to the area, are an integral part of communities throughout Pennsylvania (Hospital and Healthsystem Association of Pennsylvania, 2007, p.3). This analysis revealed substantial financial disparities between rural hospitals and CAHs in Pennsylvania. The financial disparities are areas of concern for both administrators and policymakers.

Evidence from the analysis suggests that conversion improved the net patient revenue and total margin of CAHs; however, CAHs may have experienced growth in net patient revenue without conversion as rural hospitals also experienced growth. Conversion also had little to no impact on total operating expenses and Medical Assistance share of net patient revenue. Medicare share of net patient revenue increased as expected as CAHs receive cost-based reimbursement for Medicare services. As a result of the comparison of financial indicators of CAHs and rural hospitals, it is recommended CAH administrators focus on reducing total operating expenses and total Medical Assistance share of net patient revenue to improve the financial sustainability of the organization.

While the statistical power of the analysis is challenged by the small sample size, several managerial implications arise for rural hospital administrators and policymakers. Mean financial indicator values indicate significant disparities between Pennsylvania CAHs and other rural hospitals, specifically net patient revenue, total margin, and total Medical Assistance share of net patient revenue. Pennsylvania CAHs experience lower net patient revenue and total margin, as well as a higher total Medical Assistance share of net patient revenue that threaten future

financial sustainability of CAHs. A potential area of focus for policy makers is to provide further financial assistance to CAHs with a high total Medical Assistance share of net patient revenue. An additional challenge is for CAH administrators to manage a high total Medical Assistance share of net patient revenue to maintain a positive total margin.

CAHs adjacent to or located in a metropolitan county have higher average net patient revenue than CAHs not adjacent to a metropolitan county. This may be attributed to a higher population in the service areas of CAHs adjacent to or located in a metropolitan county (L. Baronner, personal communication, January 21, 2010). However, CAHs adjacent to or located in a metropolitan county had a lower total Medical Assistance share of net patient revenue; therefore, administrators of CAHs not adjacent to a metropolitan county must be aware of the potential impact of a higher total Medical Assistance share of net patient revenue on operations. Policy makers may focus on providing additional financial aid to CAHs not adjacent to a metropolitan county with a higher total Medical Assistance share of net patient revenue.

Future analyses of financial indicators of CAHs should extend beyond two years after CAH conversion to provide an estimate of the effects of the Balanced Budget Act of 1997 with greater statistical power. This may include analyzing additional years of financial data beyond two years after conversion to CAH status, as well as an examining the financial performance of rural hospitals and CAHs from several states. Future analyses should also include more CAHs from other states to provide a more accurate estimate of the effect of conversion on financial indicators using a nonequivalent no-treatment control group time series utilizing rural hospitals as a comparison group. Additionally, financial disparities between rural hospitals and CAHs can be further examined to aid in the allocation of financial resources to ensure the financial sustainability of CAHs.

## References

- Hall, M.J., Owings, M.F., Shinogle, J.A. (2006). Inpatient care in rural hospitals at the beginning of the 21st century. *Journal of Rural Health*, 22(4), 331-38.
- Hospital & Healthsystem Association of Pennsylvania. (2007). *The economic and social role of Pennsylvania's hospitals*. Retrieved March 1, 2008 from [http://www.haponline.org/downloads/The\\_Economic\\_and\\_Social\\_Role\\_of\\_PA\\_Hospitals\\_HAP\\_Fall2007.pdf](http://www.haponline.org/downloads/The_Economic_and_Social_Role_of_PA_Hospitals_HAP_Fall2007.pdf).
- Lawler, M.K., Doeksen, G.A., Schott, V. (2003). Impact of conversion to critical access hospital status for Oklahoma's rural hospitals. *Journal of Rural Health*, 19(2), 135-38.
- Longo, D.R., Hewett, J.E., Ge, B., Schubert, S. (2007). Rural hospital patient safety systems implementation in two states. *Journal of Rural Health* 23(3), 189-197.
- Medicare Learning Network. (2007, March). *Critical access hospital fact sheet*. Retrieved March 1, 2008 from <http://www.cms.hhs.gov/MLNProducts/downloads/CritAccessHosp07fctsht.pdf>
- MedPAC. (2007a, October 5). *Critical access hospitals payment system*. Retrieved March 1, 2008, from [http://www.medpac.gov/documents/MedPAC\\_Payment\\_Basics\\_07CAH.pdf](http://www.medpac.gov/documents/MedPAC_Payment_Basics_07CAH.pdf).
- MedPAC. (2007b, October 5). *Hospital acute inpatient services payment system*. Retrieved March 1, 2008, from [http://www.medpac.gov/documents/MedPAC\\_Payment\\_Basics\\_07\\_hospital.pdf](http://www.medpac.gov/documents/MedPAC_Payment_Basics_07_hospital.pdf).
- Pennsylvania Health Care Cost Containment Council. (2000). *Financial, utilization and payor data: Fiscal year 2000 data notes*. Harrisburg, PA.
- Pennsylvania Health Care Cost Containment Council. (2007, October). *The state of health care in Pennsylvania*. Retrieved March 1, 2008 from <http://www.phc4.org/reports/sos/07/docs/>

sos2007report.pdf

Pink, G.H., Holmes, G.M., Alpe, C., Strunk, L.A., McGee, P., Slifkin, R.T. (2006).

Financial indicators for critical access hospitals. *Journal of Rural Health*, 22(3), 229-36.

Pink, G.H., Holmes, G.M., Thompson, R.E., Slifkin, R.T. (2007). Variations in financial

performance among peer groups of critical access hospitals. *Journal of Rural Health*, 23(4), 299-305.

Pink, G.H., Slifkin, R.T., Holmes, G.M. (n.d.). CAH financial indicators presentation

(PowerPoint). North Carolina Rural Health Research and Policy Analysis Center.

Retrieved March 1, 2008 from [www.porh.psu.edu/cah/flex/index.html](http://www.porh.psu.edu/cah/flex/index.html).

Scalise, Dagmara. (2004, August). Critical access hospitals. *Hospitals & Health Networks*, 78(8), 51-5.

Smith, H.L., Piland, N.F., Funk, M.J. (1992). Strategic planning in rural health care organizations. *Health Care Management Review*, 17(3), 63-80.

Stensland, J., Moscovice, I., Christianson, J. (2002). Future financial viability of rural hospitals. *Health Care Financing Review*, 23(4), 175-88.

United States Department of Health and Human Services. *Area resource file* [Data file].

Available from <http://arf.hrsa.gov/>.

## Appendix A

### Means and Standard Errors of Financial Indicators

Indicators of financial performance	Critical Access Hospitals			Other Rural Hospitals			Difference in change
	Baseline*	Follow up*	Change	Baseline*	Follow up*	Change	
Net patient revenue (\$ millions)	Mean (s.e.)	Mean (s.e.)					
All	\$15.2 (\$11.8)	\$17.4 (\$14.7)	\$2.2 (\$2.9)	\$46.6 (\$41.6)	\$57.5 (\$54.6)	\$10.9 (\$13.0)	\$8.7 (\$10.1)
Adjacent	\$9.2 (\$4.3)	\$10.8 (\$5.5)	\$1.6 (\$1.2)	\$49.6 (\$43.1)	\$60.7 (\$57.1)	\$11.1 (\$14.0)	\$9.5 (\$12.8)
Not adjacent	\$20.4 (\$13.9)	\$23.0 (\$12.7)	\$2.6 (-\$1.2)	\$23.6 (\$15.8)	\$33.0 (\$16.4)	\$9.4 (\$0.6)	\$6.8 (\$1.8)
Total operating expense (\$ millions)							
All	\$16.3 (\$12.1)	\$18.6 (\$13.3)	\$2.3 (\$1.2)	\$48.2 (\$43.1)	\$58.7 (\$56.5)	\$10.5 (\$13.4)	\$8.2 (\$12.2)
Adjacent	\$10.3 (\$44.6)	\$11.5 (\$5.4)	\$1.2 (-\$39.2)	\$51.2 (\$44.6)	\$61.9 (\$59.1)	\$10.7 (\$14.5)	\$9.5 (\$53.7)
Not adjacent	\$21.5 (\$14.3)	\$24.6 (\$15.4)	\$3.1 (\$1.1)	\$24.8 (\$15.9)	\$34.4 (\$17.6)	\$9.6 (\$1.7)	\$6.5 (\$0.6)
Total margin (%)							
All	-3.8% (6.3%)	-2.0% (7.1%)	1.8% (0.8%)	3.1% (5.1%)	0.8% (4.7%)	-2.3% (-0.4%)	-4.1% (-1.2%)
Adjacent	-5.9% (6.3%)	-0.3% (5.6%)	5.6% (-0.7%)	3.3% (5.2%)	1.0% (4.9%)	-2.3% (-0.3%)	-7.9% (0.4%)
Not adjacent	-2.1% (5.9%)	-3.5% (8.1%)	-1.4% (2.2%)	1.7% (4.1%)	-0.4% (2.4%)	-2.1% (-1.7%)	-0.7% (-3.9%)
Medical assistance share of net patient revenue (%)							
All	12.9% (10.1%)	12.5% (10.7%)	-0.4% (0.6%)	8.0% (5.6%)	8.1% (4.3%)	0.1% (-1.3%)	0.5% (-1.9%)
Adjacent	15.3% (12.1%)	16.2% (12.4%)	0.9% (0.3%)	7.9% (5.7%)	7.7% (4.2%)	-0.2% (-1.5%)	-1.1% (-1.8%)
Not adjacent	10.8% (8.4%)	9.4% (8.6%)	-1.4% (0.2%)	9.5% (4.6%)	10.9% (4.7%)	1.4% (0.1%)	2.8% (-0.1%)
Medicare share of net patient revenue (%)							
All	4.4% (10.6%)	4.6% (11.5%)	0.2% (0.9%)	4.8% (11.0%)	4.6% (8.4%)	-0.2% (-2.6%)	-0.4% (-3.5%)
Adjacent	4.1% (8.4%)	4.7% (14.2%)	0.6% (5.8%)	4.8% (11.2%)	4.7% (8.8%)	-0.1% (-2.4%)	-0.7% (-8.2%)
Not adjacent	4.6% (12.2%)	4.5% (9.6%)	-0.1% (-2.6%)	5.1% (8.0%)	4.6% (5.3%)	-0.5% (-2.7%)	-0.4% (-0.1%)

\*Baseline and follow-up periods for Critical Access Hospitals are the two years before conversion and the two years following conversion. Averages were calculated for each of the financial indicators for the baseline and follow-up periods.

**Appendix B**  
**Net Patient Revenue**

**Net Patient Revenue**

<b>Variable Name</b>	<b>F-Value</b>	<b>P-Value</b>	<b>Power</b>
<i>Within-Subjects</i>			
Time	6.762	.013	.720
Time * Facility Type	3.101	.085	.406
Time * Adjacency	.000	.999	.050
Time * Facility Type * Adjacency	.066	.799	.057
<i>Between-Subjects</i>			
Intercept	13.045	.001	.942
Facility Type	2.657	.110	.358
Adjacency	.212	.648	.074
Facility Type * Adjacency	1.434	.237	.216

**Mean Net Patient Revenue by Facility Type**

<b>Facility Type</b>	<b>Mean</b>	<b>Standard Error</b>
CAH	\$15,768,945	\$11,509,300
Rural Hospitals	\$41,709,812	\$10,990,692

**Mean Net Patient Revenue by Facility Type and Adjacency**

<b>Facility Type</b>	<b>Mean</b>	<b>Standard Error</b>
CAH Non-Adjacent	\$21,636,862	\$15,638,059
CAH Adjacent	\$9,901,028	\$16,891,034
Rural Hospitals Non-Adjacent	\$28,518,667	\$20,687,208
Rural Hospitals Adjacent	\$54,900,957	\$7,431,064

## Appendix C

## Total Operating Expenses

## Total Operating Expenses

Variable Name	F-Value	P-Value	Power
<i>Within-Subjects</i>			
Time	6.300	.016	.690
Time * Facility Type	2.622	.113	.354
Time * Adjacency	.019	.891	.052
Time * Facility Type * Adjacency	.044	.835	.055
<i>Between-Subjects</i>			
Intercept	13.034	.001	.942
Facility Type	2.469	.123	.336
Adjacency	.192	.663	.071
Facility Type * Adjacency	1.366	.249	.208

## Mean Total Operating Expenses by Facility Type

Facility Type	Mean	Standard Error
CAH	\$16,976,211	\$12,042,976
Rural Hospitals	\$43,142,803	\$11,500,321

## Mean Total Operating Expenses by Facility Type and Adjacency

Facility Type	Mean	Standard Error
CAH Non-Adjacent	\$23,060,924	\$16,363,182
CAH Adjacent	\$10,891,498	\$17,674,256
Rural Hospitals Non-Adjacent	\$29,763,053	\$21,646,455
Rural Hospitals Adjacent	\$56,522,553	\$7,775,636



## Appendix D

### Total Margin

#### Total Margin

Variable Name	F-Value	P-Value	Power
<i>Within-Subjects</i>			
Time	.002	.967	.050
Time * Facility Type	3.094	.086	.406
Time * Adjacency	1.928	.172	.274
Time * Facility Type * Adjacency	2.132	.151	.298
<i>Between-Subjects</i>			
Intercept	1.218	.276	.190
Facility Type	10.864	.002	.897
Adjacency	.178	.675	.070
Facility Type * Adjacency	.215	.645	.074

#### Mean Total Margin by Facility Type

Facility Type	Mean	Standard Error
CAH	-2.9%	1%
Rural Hospitals	1.5%	.9%

#### Mean Total Margin by Facility Type and Adjacency

Facility Type	Mean	Standard Error
CAH Non-Adjacent	-2.9%	1.3%
CAH Adjacent	-3.0%	1.4%
Rural Hospitals Non-Adjacent	.9%	1.7%
Rural Hospitals Adjacent	2.1%	.6%

## Appendix E

### Medical Assistance Share of Net Patient Revenue

#### Medical Assistance Percentage of Net Patient Revenue

Variable Name	F-Value	P-Value	Power
<i>Within-Subjects</i>			
Time	.236	.629	.076
Time * Facility Type	1.665	.204	.243
Time * Adjacency	.049	.826	.055
Time * Facility Type * Adjacency	3.416	.071	.440
<i>Between-Subjects</i>			
Intercept	86.870	.000	1.000
Facility Type	2.833	.099	.377
Adjacency	.346	.559	.089
Facility Type * Adjacency	2.826	.100	.376

#### Mean Medical Assistance Share of Net Patient Revenue by Facility Type

Facility Type	Mean	Standard Error
CAH	13.0%	1.7%
Rural Hospitals	9.0%	1.6%

#### Mean Medical Assistance Share of Net Patient Revenue by Facility Type & Adjacency

Facility Type	Mean	Standard Error
CAH Non-Adjacent	10.3%	2.3%
CAH Adjacent	15.7%	2.5%
Rural Hospitals Non-Adjacent	10.3%	3.1%
Rural Hospitals Adjacent	7.7%	1.1%

## Appendix F

### Medicare Share of Net Patient Revenue

#### Medicare Share of Net Patient Revenue

Variable Name	F-Value	P-Value	Power
<i>Within-Subjects</i>			
Time	.428	.517	.098
Time * Facility Type	4.999	.030	.590
Time * Adjacency	7.292	.010	.752
Time * Facility Type * Adjacency	.411	.525	.096
<i>Between-Subjects</i>			
Intercept	908.647	.000	1.000
Facility Type	1.359	.250	.207
Adjacency	.044	.835	.055
Facility Type * Adjacency	.098	.756	.061

#### Mean Medicare Share of Net Patient Revenue by Facility Type

Facility Type	Mean	Standard Error
CAH	44.5%	2.2%
Rural Hospitals	48.1%	2.1%

#### Mean Medicare Share of Net Patient Revenue by Facility Type and Adjacency

Facility Type	Mean	Standard Error
CAH Non-Adjacent	44.4%	3.0%
CAH Adjacent	44.7%	3.3%
Rural Hospitals Non-Adjacent	48.9%	4.0%
Rural Hospitals Adjacent	47.3%	1.4%

**Shane D. Flickinger**

320 E. Beaver Ave., Apt. 604 • State College, PA 16801  
717.989.2568 • flickingershane@gmail.com

---

*Education*

The Pennsylvania State University, University Park, PA, May 2010  
Bachelor of Science Degree in Health Policy and Administration  
Master of Health Administration  
Honors in Health Policy and Administration  
Thesis Title: The Effect of the Balanced Budget Act of 1997 on Financial Indicators of  
Critical Access Hospitals in Pennsylvania  
Thesis Supervisor: Dr. Diane Brannon

*Related Experience*

Pennsylvania Office of Rural Health, Administrative Intern, University Park, PA  
Supervisor: Mr. Larry Baronner, Critical Access Hospital Coordinator  
August 2008 – May 2010

Virtua, Administrative Intern, Marlton, NJ  
Supervisor: Mr. Robert Hockel, Vice President of Operations  
May 2009 – July 2009

Penn State Milton S. Hershey Medical Center, Administrative Intern, Hershey, PA  
Supervisor: Mr. James Rohacek, Administrator Support Service Integration  
May 2008 – July 2008

*Honors and Awards*

USA Today Student Leadership Award  
Ernest F. and Kay Frantz Salvino “Discovery” Scholarship  
Trustmark’s Ralph J. Eckert College Scholarship  
The President’s Freshman Award  
Dean’s List

*Activities*

American College of Healthcare Executives  
Master of Health Administration Association  
Health Policy and Administration Club