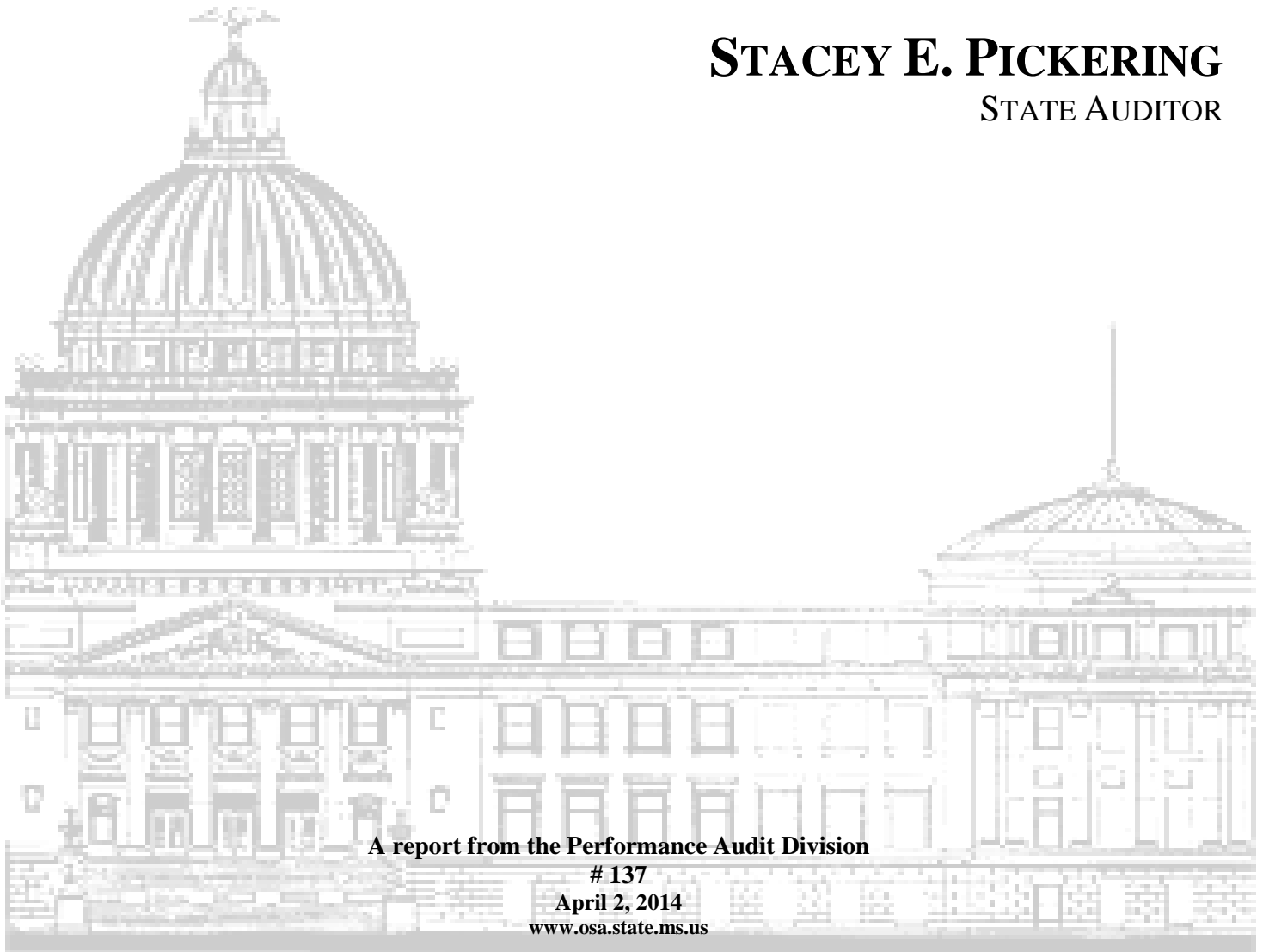


THE FINANCIAL HEALTH OF PUBLICLY OWNED RURAL MISSISSIPPI HOSPITALS



STACEY E. PICKERING
STATE AUDITOR



A report from the Performance Audit Division

137

April 2, 2014

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MISSISSIPPI OFFICE OF THE STATE AUDITOR

STACEY E. PICKERING
STATE AUDITOR

Performance Audit Division Report #137:
The Financial Health of Publicly Owned Rural Mississippi Hospitals
April 2, 2014

EXECUTIVE SUMMARY

By now, many Mississippians have realized that our health care landscape and its inherent opportunities are changing dramatically. Not since the influx of money for hospital construction and expansion from the Hill-Burton Act, and the heavy reliance since then that Mississippi has had on federal Medicare and Medicaid reimbursements, have rural Mississippians faced so much change in healthcare options. Today's changes may not be oriented toward hospital growth like those from the Hill-Burton Act, but they are still significant. While this study seems to provide the very good news that most of Mississippi's rural, publicly owned hospitals appear to be well managed financially, there are some that face downward financial pressures, including the federal government's cuts in the reimbursement payments for medical services.

Today, many Mississippians are focused on changes related to the federal Affordable Care Act (ACA) and all of its implications. However, Mississippians should be aware of the other structural changes that, in conjunction with changes in the ACA, may place tremendous pressure on an important local resource: Mississippi's publicly owned, rural hospitals. Changes in federal rules, regulations, and definitions, changes in Medicare and Medicaid reimbursements, changes in health care delivery systems, the rising number of uninsured individuals, and the economy are all having impacts on these important institutions.

The Hill-Burton Act and other federal laws created a system of rural hospitals that quickly became dependent on Medicare and Medicaid reimbursement payments. As those payments decline, new management and funding models need to be examined, developed, and/or modified. This study is intended to be a step along that road to successful change.

The Office of the State Auditor (OSA) undertook this project to provide policymakers with important information that may be used to make changes in State and local laws, policies, and regulations and to provide them with a better understanding of where Mississippi's rural hospitals are financially positioned from a statewide and national perspective.

The population for this study consists of all 25 hospitals in Mississippi that meet the following conditions:

- They qualify as rural under the Office of Rural Health Policy's definition;
- They are publicly owned, general medical/surgical facilities according to the Mississippi State Department of Health; and
- They are not leased or owned by another hospital.

Eight additional Mississippi hospitals met the first two criteria but were owned or leased by another hospital. Five of those eight were not included in the study because their parent hospitals were not rural; the remaining three were subsidiaries of larger rural public hospitals and were thus indirectly included as aspects of the financial operation of their parent organizations.

Further, this study only examines current financial well-being and is not intended to be predictive of future financial strength or weakness. OSA's work is designed to rate hospitals' financial performance on a broad set of relevant measures; in doing so, study results should help focus attention toward those hospitals in the population with the most financial need.

Information from this study should also prompt questions about the reasons behind both high and low financial performance levels. Again, it is important to stress that this study is not intended to predict failure and

Of the 25 rural, publicly owned hospitals studied, 15 were above the national average for financial strength, and four were placed on a dual method financial watch list.



its results should not be construed as doing so. Nor is it intended, by itself, to make any claims about the reasons for a given hospital's financial performance.

One important outcome of this study has been the creation of a watch list of those hospitals whose finances are most in need of attention. There are four hospitals on this study's final combined watch list: Montfort Jones Memorial Hospital in Attala County, Natchez Regional Medical Center, Tallahatchie County General Hospital, and Tippah County General Hospital.

This study combined two different methods of assessing hospital financial well-being. The first, the Financial Strength Index[®] or FSI[®], is a proprietary method developed specifically for hospitals by William O. Cleverley. It aggregates measurements of profitability, liquidity, capital structure, and age of facilities into a single number.

- Profitability, in the general sense, is a matter of how much money a business makes;
- Liquidity is a matter of how easily a business can convert its assets into cash. It is thus also a matter of how easily the business can meet likely short-term financial obligations, since those are typically paid in cash.
- Capital structure is a measure of how much of a business is financed by debt.
- Age of facilities is, obviously enough, a proxy measure of the actual age of a business' facilities.

The number generated by the FSI[®] has no minimum or maximum, but is based on simplified medians taken from the population of all U.S. hospitals; the theoretical national median FSI[®] score is 0. A hospital with a final FSI[®] score over 3 is considered to be in excellent financial health; one whose FSI[®] is between 0 and 3 is in good financial health; one with FSI[®] between -2 and 0 is in fair condition financially; and one whose FSI[®] is below -2 is in poor shape financially. In general, the lower the score, the more reason there is to investigate more closely.

There were four hospitals from this population whose mean FSI[®] score was below -2: Montfort Jones Memorial Hospital in Attala County, Natchez Regional Medical Center, Tallahatchie County General Hospital, and Tippah County General Hospital. Interestingly, OSA's work also showed that 15 of Mississippi's rural, publicly owned hospitals fell above the national average for financial strength. For the complete results on this measure, see Graph/Table 1 on page iv.

All data for this study were gathered from audited financial reports for the years 2009-2012; the literature generally agrees that such a report is the gold standard of financial information for hospitals, and that three to five years is a sufficient number to control for anomalies. No report for any hospital in the population during the period of study was missing. Additional methodology is provided in the body of the report.

The second assessment method is original to this study. It combines measurements of 12 financial indicators grouped into four categories—profitability, liquidity, capital structure, and solvency—into a single number that rates a hospital's financial well-being relative to the rest of the population of the study. The first three categories are defined the same as they were for FSI[®]; the fourth, solvency, is in the general sense a measure of a business' ability to meet its long-term financial obligations.

The maximum possible score by this method is 12; in order to achieve such a score, a hospital would have to have performed better on every individual measure of financial health than every other hospital in the population, every year of the study. The minimum possible score is 0; in order to achieve that score, a hospital would have to have performed worse on every individual measure of financial health than every other hospital in the population, every year of the study. No hospital in this study made scores on either extreme.

The bottom quartile border of mean (average) scores across all years of the study was 4.88; in other words, 25% of the population scored below that border. The watch list for this method was set at that border, so that the quarter of the population with the lowest overall ratings across many broad measures of financial health fell onto the watch list.

There were six hospitals in the bottom quartile of population according to the OSA designed assessment technique: Hardy Wilson Memorial Hospital in Copiah County, Montfort Jones Memorial Hospital in Attala County, Natchez Regional Medical Center, Noxubee County General Critical Access Hospital, Tallahatchie General Hospital, and Tippah County Hospital. See Graph 2/Table 2 on page v for the scores of each hospital in the population on this measure.

This study's overall watch list was generated by conjoining the standards of the FSI[®] and the OSA calculation; in other words, to make this study's final watch list, it was necessary both to have an FSI[®] score below -2 and to rank in the bottom quarter of the population on the OSA measure of financial health. As such, the overall measure is intentionally more conservative about assigning watch list status than either of its components. As mentioned above, there were four hospitals on this final watch list: Montfort Jones Memorial Hospital, Natchez Regional Medical Center, Tallahatchie General Hospital, and Tippah General Hospital.

Coincidentally, the research for this project was conducted in December 2013 and on February 11, 2014, House Bill 1449 was introduced in the House and to the Local and Private Committee. The bill, which would allow Natchez Regional Medical Center to file for



bankruptcy, passed the Legislature and was signed by the Governor on March 4, 2014.¹

The scores generated by the FSI® and the OSA-designed assessment technique used in this study produce very similar results. As such, future studies could very likely make do by using only one or the other technique. The fact that the watch list generated by the OSA technique was larger than that generated by the FSI® is perhaps not surprising, given that the median performance of the hospitals in this population was superior to the simplified national median performance used by the FSI®. In other words, the average rural Mississippi public hospital performed better than the average American hospital according to the FSI®, a finding that is itself of some interest.

Future research might focus on the reasons for overall high or low performance. This study lays some groundwork for such future research by providing readily accessible and comparable numbers for the components of its original evaluation method; for hospital scores on profitability, liquidity, capital structure, and solvency, see graphs and tables 3 through 6, on pages vi through viii. The scores in these tables could also be used to construct robust alternative watch lists using different benchmarks, depending on the particular policy needs of a given researcher. For instance, if one wanted to study the methods of the top 10 percent of the most profitable hospitals in the population, it would be extremely easy to isolate those hospitals using the information provided herein.

Determining why a given hospital's profitability (for instance) is low—as opposed to simply determining that it is low—is likely to require closer individual attention than was within the scope of this study. This study does lay some groundwork in that respect, by identifying some variables that do not correlate, either positively or negatively, with watch list status, FSI® score, or OSA's assessment score. For instance, several peer group markers frequently used in studies of hospital financial health (e.g., teaching status, ownership status, and status as a rural or urban hospital) were simply irrelevant to this study, as every hospital in the current population fell into a single peer group by those standards. Several other frequent peer group markers (number of beds, net patient service revenue, total revenue, Critical Access Hospital status) proved to have no significant correlation with any

of the summary measures used in this study. As such, wherever the explanation for a particular hospital's financial status lies, we can conclude that in this population, it does not lie with those variables.

Obviously, there are some differences in hospitals that lead to differences in financial performance; the only question is whether those differences are purely idiosyncratic or can be captured by some set of subgroups. Future research might very productively focus on a more detailed investigation of such possible peer group effects. This research might be carried out in a number of different ways: for instance, by selecting variables thought to be important to financial health and testing for such an association, or by studying *de facto* peer groups organized according to financial health and determining what relevant variables actually distinguish those groups.

Some examples of more detailed research might look at the number of beds continuously occupied monthly, the bed turnover rate, management styles, experience of hospital boards and the management of the hospital, or the distribution of payer types (private insurance, federal or state reimbursement, cash payments, etc.).

This assessment of the financial well-being of publicly owned rural Mississippi hospitals gives policymakers a new tool related to the provision of healthcare in our rural communities. These hospitals play a vital role in securing healthcare access for Mississippi's rural population, and the State has an overriding interest in doing just that. Because the healthcare marketplace is currently in a state of flux, valid and reliable information about hospital finances can help Mississippi negotiate that flux while meeting its financial and public-health obligations.

The next six pages show the summary tables and graphs mentioned in the report. They are placed behind the Executive Summary for easy access.

Natchez hospital bankruptcy bill filed

The bill that will allow Natchez Regional Medical Center to file for bankruptcy has been filed with the Mississippi House.

Sponsored by several lawmakers, House Bill 1449 is short, fewer than 170 words including its digest and section headers.

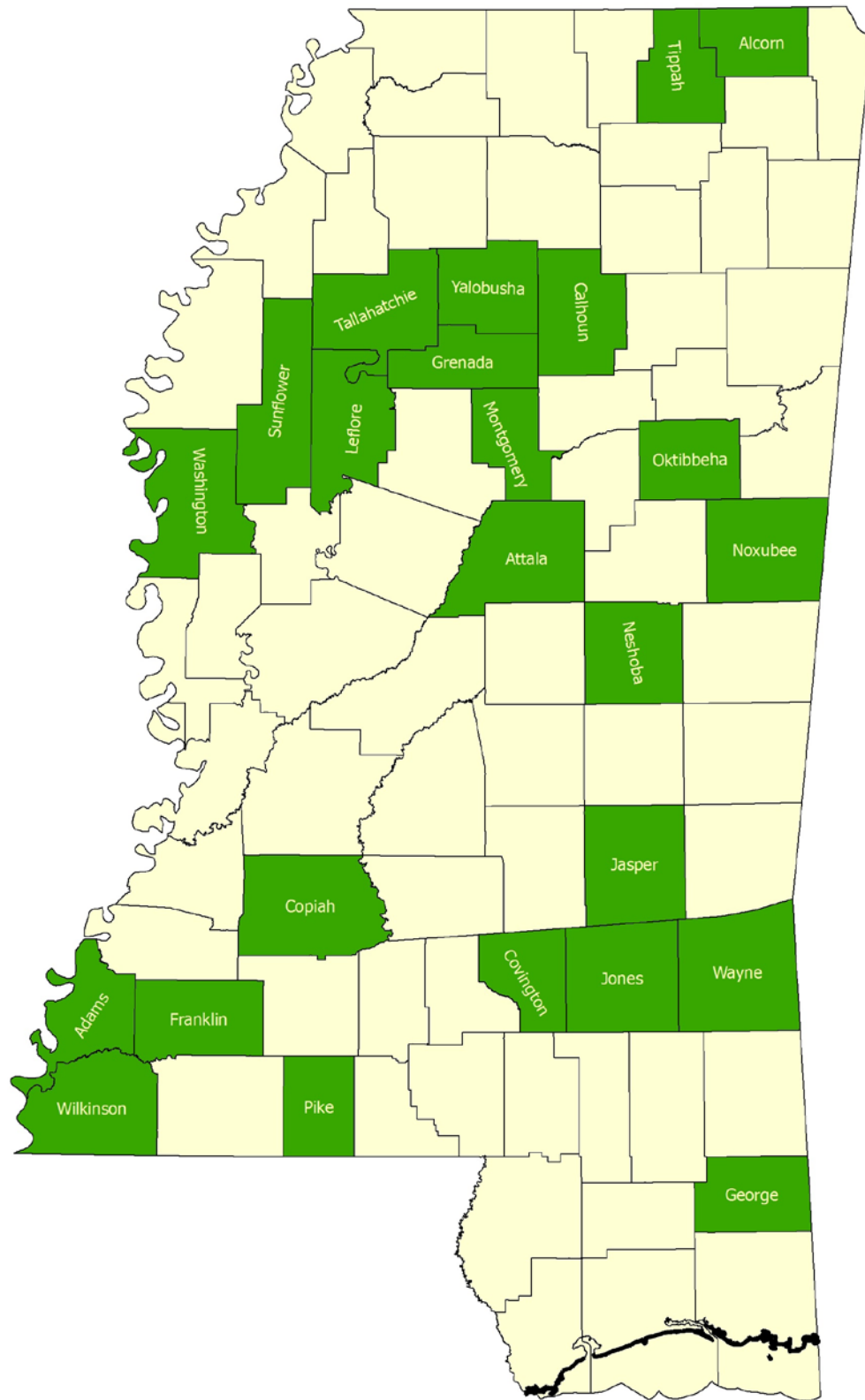
The bill was referred to the local and private legislation committee after it was filed Tuesday. It will have to pass the House and Senate and receive the governor's signature before the county-owned hospital can officially file for bankruptcy.

— Staff, wire reports

¹ Associated Press. (2014, February 13). Natchez hospital bankruptcy bill filed. *Clarion-Ledger*, p. 10A.

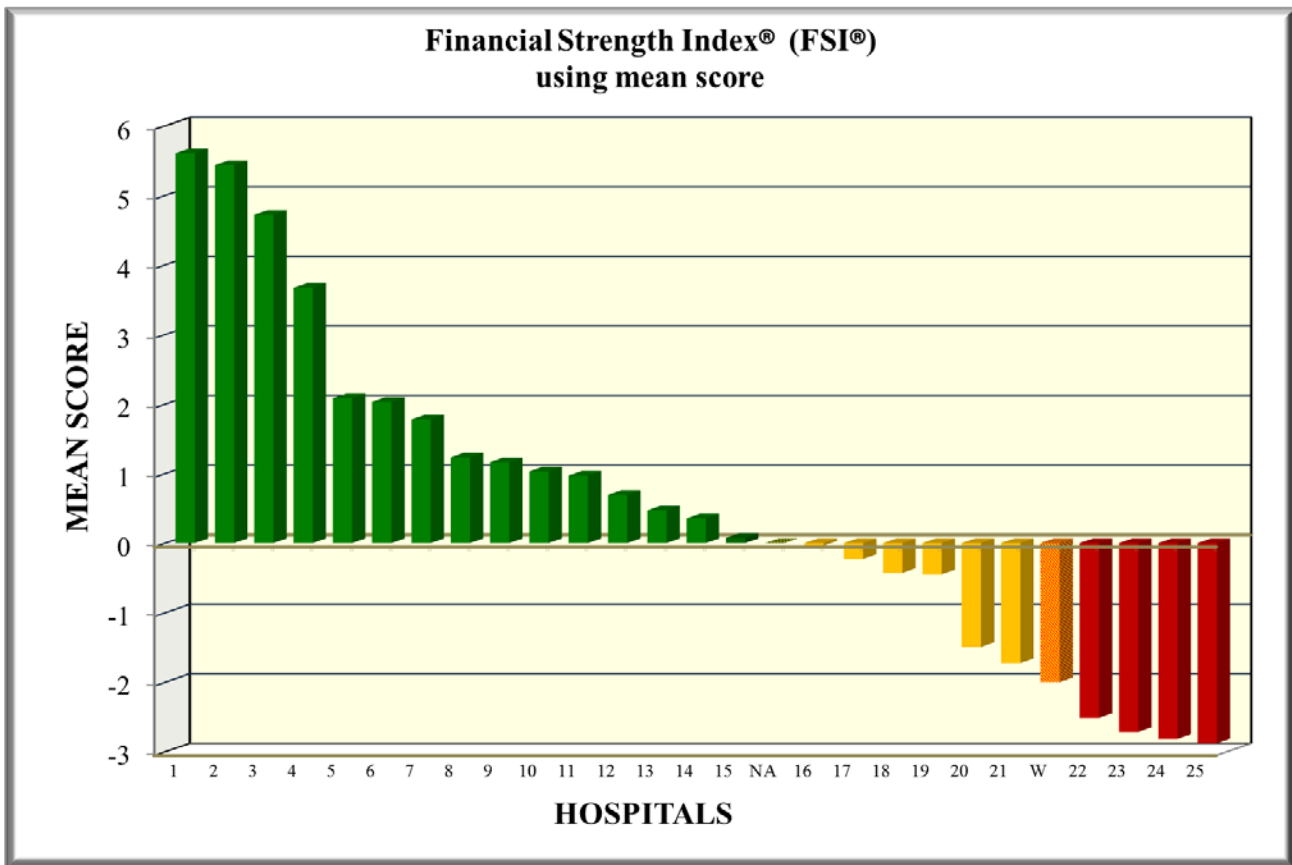
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Counties with Rural, Publicly Owned Hospitals



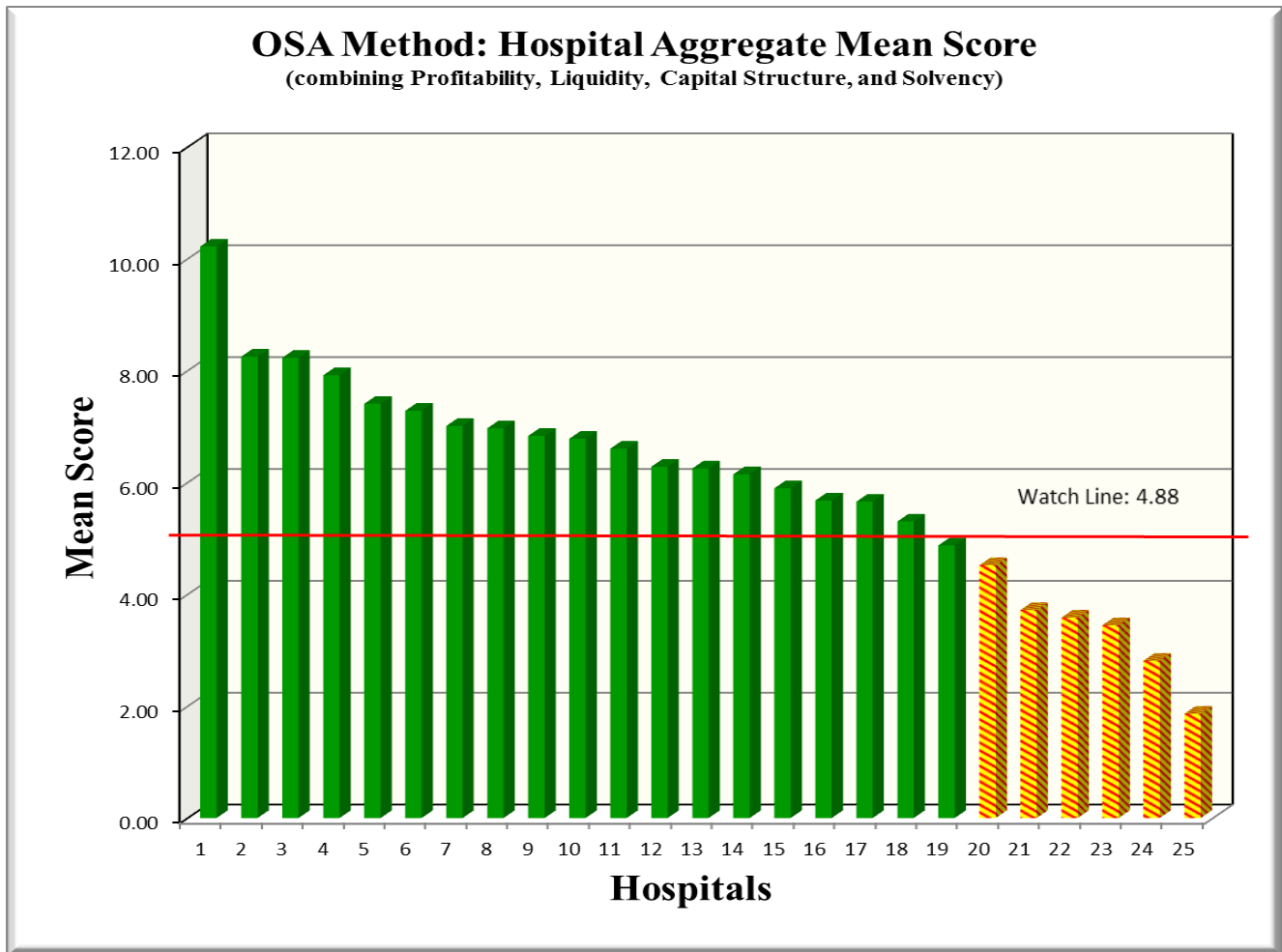
GRAPHS AND TABLES

Graph/Table 1: Financial Strength Index® (FSI®) scores from 2009 through 2012



Financial Strength Index® (FSI®)						
* "National Average" score = 0; No minimum or maximum score; based on existing model/formula						
	Public Hospital	2009	2010	2011	2012	Mean
1	Neshoba County General Hospital	8.60	2.47	4.58	6.77	5.60
2	North Sunflower Medical Center (Sunflower County)	4.18	10.08	3.50	3.98	5.44
3	Tyler Holmes Memorial Hospital (Montgomery County)	6.59	3.80	4.39	4.09	4.72
4	Jasper County General Hospital	4.44	2.46	4.30	3.48	3.67
5	Hardy Wilson Memorial Hospital (Copiah County)	5.86	3.58	1.07	-2.18	2.08
6	Covington County Hospital	7.59	3.81	-1.74	-1.54	2.03
7	George County Regional Hospital	4.26	1.52	0.58	0.75	1.78
8	Magnolia Regional Health Center (Alcorn County)	0.44	1.61	1.97	0.91	1.23
9	Yalobusha County General Hospital	0.06	-0.26	2.07	2.80	1.16
10	South Central Regional Medical Center (Jones County)	1.79	1.50	0.73	0.10	1.03
11	South Sunflower County Hospital	-1.98	1.76	3.58	0.52	0.97
12	Grenada Lake Medical Center (Grenada County) [bought by UMMC]	1.91	0.11	0.73	0.02	0.69
13	Calhoun County Health Services	0.22	-1.27	0.28	2.65	0.47
14	Southwest MS Regional Medical Center (Pike County)	0.26	0.93	0.38	-0.14	0.36
15	Field Memorial Community Hospital (Wilkinson County)	0.85	0.31	-0.33	-0.52	0.08
NA	National Average					0.00
16	Wayne County General Hospital	-1.35	-0.62	1.92	-0.10	-0.04
17	Greenwood Leflore Hospital (Leflore County)	-0.47	-0.41	0.39	-0.40	-0.23
18	OCH Regional Medical Center (Oktibbeha County)	-1.42	-0.31	-0.47	0.49	-0.43
19	Delta Regional Medical Center (Washington County)	-0.16	-0.48	-0.95	-0.21	-0.45
20	Franklin County Memorial Hospital	0.30	-0.86	-3.57	-1.84	-1.49
21	Noxubee County General Critical Access Hospital	-1.12	-3.53	-0.70	-1.56	-1.73
W	WATCHLINE	-2	-2	-2	-2	-2
22	Tippah County Hospital	-1.35	-3.61	-2.13	-2.97	-2.51
23	Tallahatchie County General Hospital	-3.66	-3.38	-2.18	-1.66	-2.72
24	Natchez Regional Medical Center (Adams County)	-2.48	-2.74	-2.58	-3.46	-2.82
25	Montfort Jones Memorial Hospital (Attala County)	0.14	-4.80	-3.36	-3.49	-2.88

Graph/Table 2: Aggregate Scores for Profitability, Liquidity, and Capital Structure (2009 – 2012)
 (No national average to measure against)

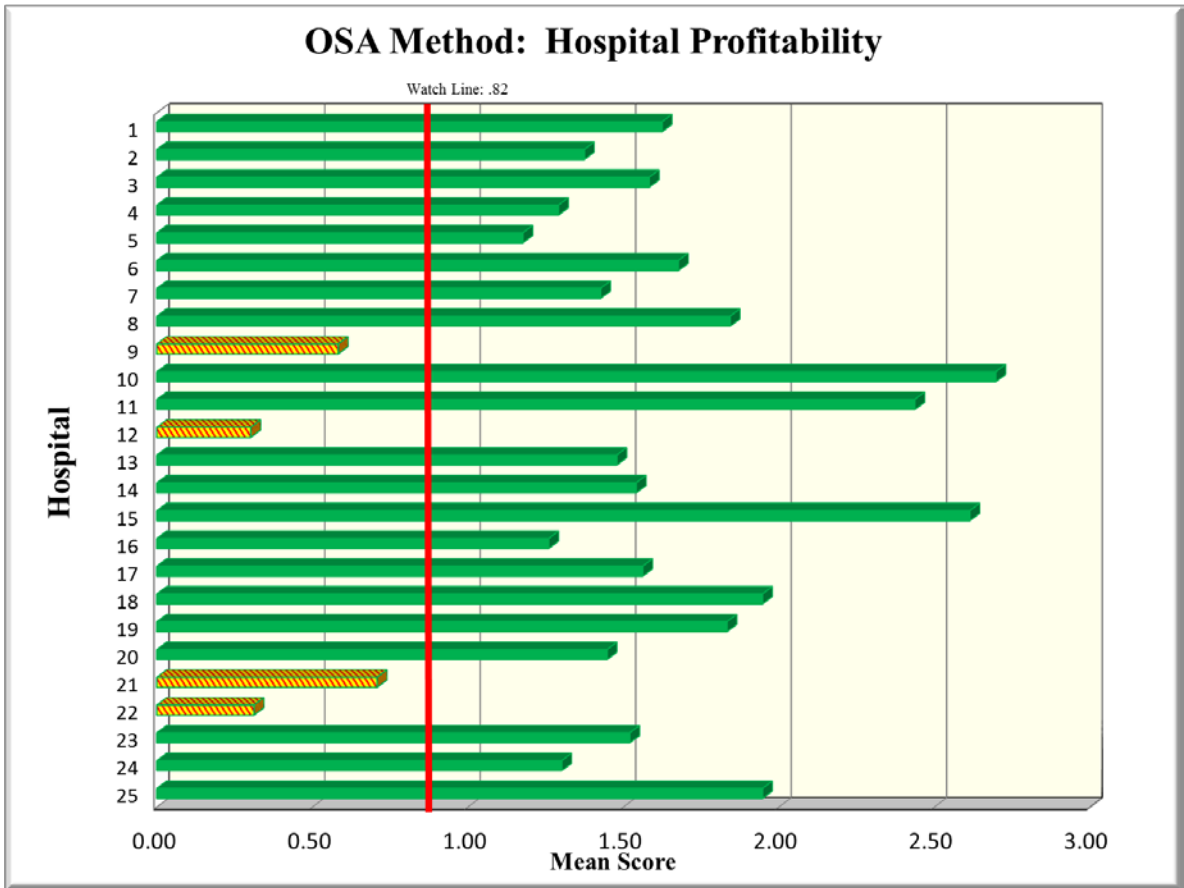


	Hospital	OSA Method: Aggregate Mean Score		Hospital	OSA Method: Aggregate Mean Score
1	Jasper County General Hospital	10.22	14	Southwest MS Regional Medical Center (Pike County)	6.15
2	South Sunflower County Hospital	8.25	15	Grenada Lake Medical Center (Grenada County)	5.90
3	Tyler Holmes Memorial Hospital (Montgomery County)	8.23	16	Delta Regional Medical Center (Washington County)	5.68
4	North Sunflower Medical Center (Sunflower County)	7.92	17	Covington County Hospital	5.66
5	Neshoba County General Hospital	7.41	18	OCH Regional Medical Center (Oktibbeha County)	5.30
6	Field Memorial Community Hospital (Wilkinson County)	7.28	19	Franklin County Memorial Hospital	4.88
7	Calhoun County Health Services	7.01	20	Hardy Wilson Memorial Hospital (Copiah County)	4.52
8	George County Regional Hospital	6.97	21	Noxubee County General Critical Access Hospital	3.72
9	Magnolia Regional Health Center (Alcorn County)	6.83	22	Natchez Regional Medical Center (Adams County)	3.58
10	Wayne County General Hospital	6.78	23	Montfort Jones Memorial Hospital (Attala County)	3.45
11	Yalobusha County General Hospital	6.60	24	Tippah County Hospital	2.81
12	South Central Regional Medical Center (Jones County)	6.28	25	Tallahatchie County General Hospital	1.86
13	Greenwood Leflore Hospital (Leflore County)	6.25			

The following table should be used with the graphs on the next three pages. The numbers next to the hospital name correspond to the numbers on the bar graphs.

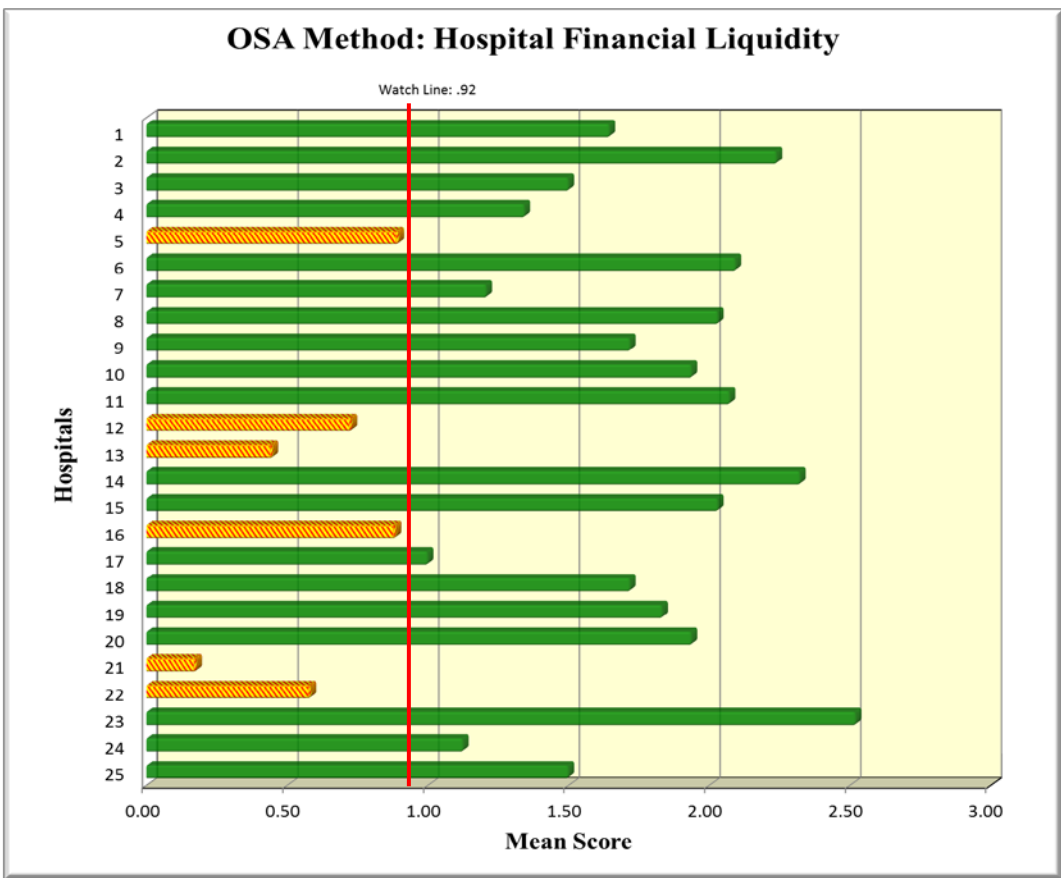
Legend for Graphs and Tables			
1	Calhoun County Health Services	14	Neshoba County General Hospital
2	Covington County Hospital	15	North Sunflower Medical Center (Sunflower County)
3	Delta Regional Medical Center (Washington County)	16	Noxubee County General Critical Access Hospital
4	Field Memorial Community Hospital (Wilkinson County)	17	OCH Regional Medical Center (Oktibbeha County)
5	Franklin County Memorial Hospital	18	South Central Regional Medical Center (Jones County)
6	George County Regional Hospital	19	South Sunflower County Hospital
7	Greenwood Leflore Hospital (Leflore County)	20	Southwest MS Regional Medical Center (Pike County)
8	Grenada Lake Medical Center (Grenada County) [bought by UMMC]	21	Tallahatchie County General Hospital
9	Hardy Wilson Memorial Hospital (Copiah County)	22	Tippah County Hospital
10	Jasper County General Hospital	23	Tyler Holmes Memorial Hospital (Montgomery County)
11	Magnolia Regional Health Center (Alcorn County)	24	Wayne County General Hospital
12	Montfort Jones Memorial Hospital (Attala County)	25	Yalobusha County General Hospital
13	Natchez Regional Medical Center (Adams County)		

Graph/Table 3: Hospital Profitability (Using a four-year mean of data from 2009 – 2012)



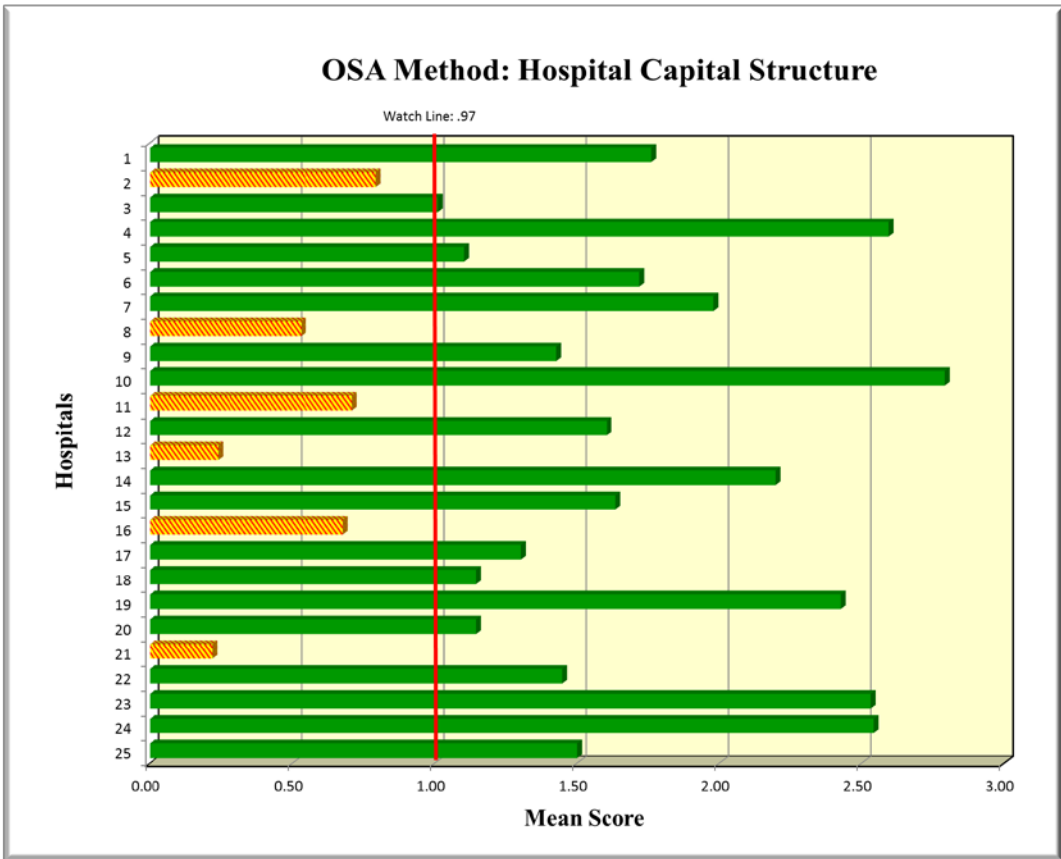
Hospital Profitability	
Hospital Number	Mean
1	1.63
2	1.38
3	1.58
4	1.29
5	1.18
6	1.68
7	1.43
8	1.84
9	0.58
10	2.70
11	2.44
12	0.30
13	1.48
14	1.54
15	2.61
16	1.26
17	1.56
18	1.95
19	1.83
20	1.45
21	0.71
22	0.31
23	1.52
24	1.30
25	1.95

Graph/Table 4: Hospital Financial Liquidity (Using a four-year mean of data from 2009 – 2012)



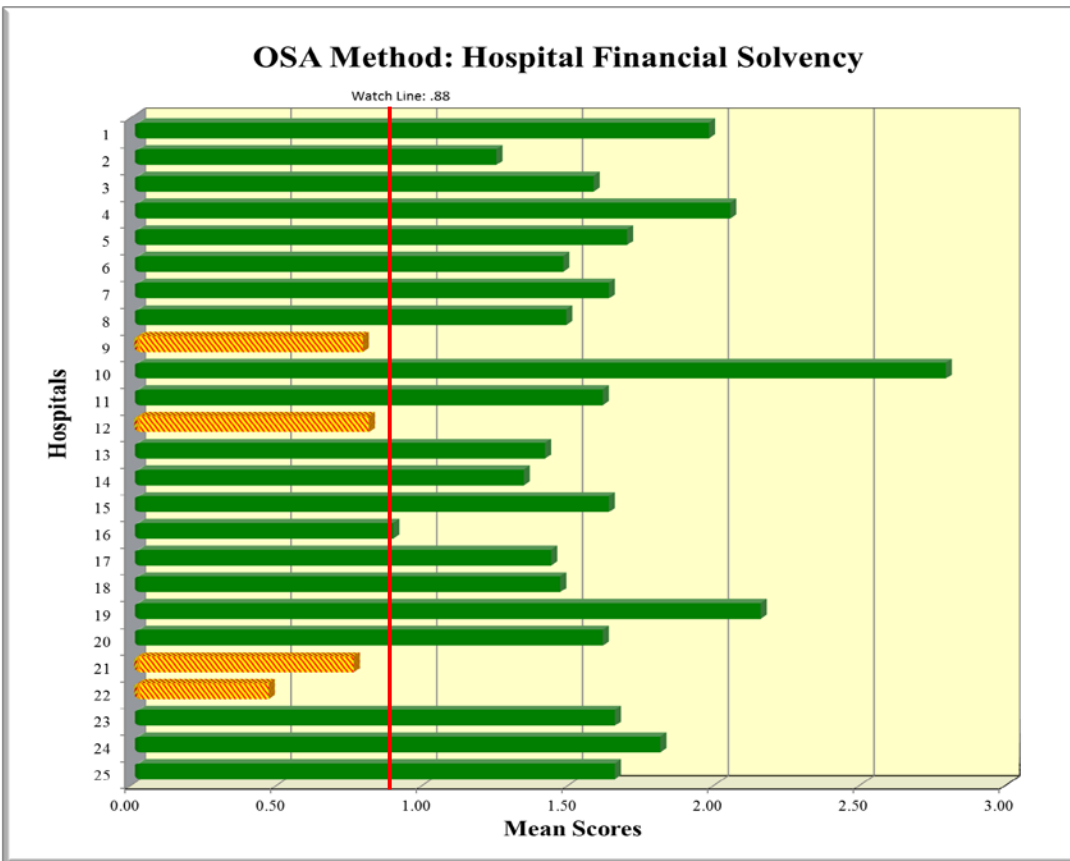
Hospital Liquidity	
Hospital Number	Mean
1	1.65
2	2.24
3	1.50
4	1.34
5	0.90
6	2.09
7	1.21
8	2.03
9	1.72
10	1.94
11	2.07
12	0.73
13	0.45
14	2.32
15	2.03
16	0.89
17	1.00
18	1.72
19	1.83
20	1.94
21	0.18
22	0.58
23	2.52
24	1.13
25	1.50

Graph/Table 5: Hospital Capital Structure (Using a four-year mean of data from 2009 – 2012)



Hospital Capital Structure	
Hospital Number	Mean
1	1.76
2	0.79
3	1.01
4	2.59
5	1.10
6	1.72
7	1.98
8	0.53
9	1.43
10	2.79
11	0.71
12	1.60
13	0.24
14	2.20
15	1.64
16	0.68
17	1.30
18	1.15
19	2.43
20	1.15
21	0.22
22	1.45
23	2.53
24	2.54
25	1.50

Graph/Table 6: Hospital Financial Solvency (Using a four-year mean of data from 2009 – 2012)



Hospital	Solvency
Hospital Number	Mean
1	1.98
2	1.25
3	1.58
4	2.05
5	1.70
6	1.48
7	1.64
8	1.49
9	0.79
10	2.79
11	1.61
12	0.81
13	1.42
14	1.34
15	1.64
16	0.90
17	1.44
18	1.47
19	2.16
20	1.61
21	0.76
22	0.47
23	1.66
24	1.81
25	1.66



MISSISSIPPI OFFICE OF THE STATE AUDITOR

STACEY E. PICKERING

STATE AUDITOR

TECHNICAL APPENDIX:

***The Financial Health of Publicly Owned Rural Mississippi Hospitals
Performance Audit Report #137***

Mississippi's large rural population is still dependent upon rural hospitals for much of their care.

These hospitals have a responsibility to taxpayers who help pay for their operations.

The financial well-being of rural public hospitals is important to the nation as a whole, but particularly to Mississippi. The USDA estimates that almost 55% of Mississippi's 2012 population is rural;² such rural populations face distinctive issues of access to and need for healthcare

Rural populations tend to be poorer³ and insured at lower rates⁴ than their urban counterparts; as such, rural hospitals must be financially situated so as to be able to appropriately absorb the costs of providing healthcare to an underinsured population. The rural population must travel farther, sometimes on less developed road systems, to get to a hospital;⁵ the continued capacity of those hospitals that do serve rural populations is thus particularly important. Compounding these problems, the rural population has distinctive needs for healthcare, with higher rates of morbidity and mortality from many causes than its urban counterpart.⁶ Thus, it is worth investigating the financial well-being of publicly owned, rural hospitals simply because the State has a stake in securing the overall health of rural communities and because they utilize tax dollars.

The financial climate in which rural hospitals exist has changed greatly over time, with both public and private forces playing a role in this change. Many rural hospitals were founded through money provided by the Hill-Burton Act, but that act no longer provides such funding.⁷ Medicaid, the Critical Access Hospital and Disproportionate Share Hospital designations, and the Patient Protection and Affordable Care Act have all changed the way that rural hospitals receive reimbursement. The federal government is changing how "rural" is defined and it is affecting certain other designations related to our rural hospitals.

² United States Department of Agriculture Economic Research Service (2014). *State Fact Sheets: Mississippi*. Retrieved from: <http://www.ers.usda.gov/data-products/state-fact-sheets/state-data.aspx?StateFIPS=28&StateName=Mississippi#.Ud79Pfm1HTo>

³ United States Department of Agriculture Economic Research Service (2014). *Rural Poverty & Well-Being: Geography of Poverty*. Retrieved from: <http://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty.aspx>

⁴ Lenardson, J. D., Ziller, E. C., Coburn, A. F., Anderson, N. J. (2009). *Profile of Rural Health Insurance Coverage: A Chartbook*. Portland: Rural Health Research and Policy Centers. Retrieved from: <http://muskie.usm.maine.edu/Publications/rural/Rural-Health-Insurance-Chartbook-2009.pdf>

⁵ Gamm, L. D., Hutchison, L. L., Dabney, B. J., and Dorsey, A. M, eds. (2003). *Rural Healthy People 2010: A Companion Document to Healthy People 2010. Volume 1*. College Station, Texas: The Texas A&M University System Health Science Center, School of Rural Public Health, Southwest Rural Health Research Center. Retrieved from: http://www.nap.edu/openbook.php?record_id=11140&page=R1

⁶ Ibid.

⁷ U. S. Department of Health and Human Services Health Resources and Services Administration. (n.d.). *Hill-Burton Free and Reduced-Cost Health Care*. Retrieved from: <http://www.hrsa.gov/getthehealthcare/affordable/hillburton/>



With the changing national healthcare climate, some of these hospitals may face increasing financial pressures.

This study assesses the financial well-being of publicly owned, rural hospitals.

It is not intended to predict financial failure.

It is designed to provide policymakers with information that may help them focus on hospitals most in need of attention.

After identifying all publicly owned hospitals statewide, OSA reduced the study group to only those classified as rural.

The United States is experiencing trends in hospital consolidation and privatization; these trends tend to affect small hospitals and those in precarious financial positions. It is worth understanding the present financial well-being of rural public hospitals in order to understand the effects of those trends on the state as a whole, and in order to form the best public policy for the future.

This study is designed as an assessment of the financial well-being of publicly owned rural Mississippi hospitals. It is not intended to predict failure, and its results should not be construed as doing so; it is also not designed to make any causal claims about the reasons behind any given hospital's financial performance. Rather, this study is designed to rate hospitals' financial performance on a broad set of measures relevant to financial well-being; in doing so, it should help focus policy toward those hospitals most in need of attention.

The following report explains the technical aspects and methodology of the work undertaken by the Office of the State Auditor to complete this project.

SELECTING THE HOSPITAL POPULATION

The first step in selecting the population for this study was to consult the Mississippi State Department of Health's *2012 Report on Hospitals*.⁸ The list of hospitals provided in that publication was reduced in size by eliminating all hospitals except those whose license numbers began with 11, the code for a general medical/surgical facility under state or local ownership.⁹

With a list of public hospitals thus secured, the next step was to remove non-rural providers. This step demanded a decision, in that there is no single definition of 'rural' in use for all public policy.^{10,11} The U.S. Census defines urban areas at the level of census block groups;¹² in order to qualify as urban, a census block group must contain a core area with a population density of at least 1,000 people per square mile and surrounding blocks with a population density of at least 500 people per square mile, and must have a total population of at least 2,500. Any census block that does not meet these criteria qualifies as rural. This definition is highly sensitive and fine-grained, but may over represent rural areas, since it classifies as rural a great deal of territory we might ordinarily think of as suburban.¹³ Furthermore, most federal healthcare grant programs concerned with rural status do not use this definition. So, OSA decided against its use out of desire for conformity with a rubric employed frequently in rural healthcare policy. Finally, at the time OSA staff were defining 'rural hospitals' for this study, most information on the U.S. Census website was unavailable due to a federal government shutdown—the Census Bureau blocked access to its website.

⁸ Mississippi State Department of Health, Division of Health Facilities Licensure and Certification. (2013). *2012 Report on Hospitals*. Jackson, MS: Author.

⁹ Ibid.

¹⁰ Coburn, A. F., MacKinney, A. C., McBride, T. D., Mueller, K. J., Slifkin, R. T., & Wakefield, M. K. (2007). *Choosing rural definitions: implications for health policy* (Issue Brief No. 2). Retrieved from: <http://www.rupri.org/Forms/RuralDefinitionsBrief.pdf>.

¹¹ Miller, K. (2009). *Rural Definitions*. Retrieved from: <http://www.rupri.org/Forms/RuralDefinitions.pdf>.

¹² Urban Area Criteria for the 2010 Census, 76 Fed. Reg. 53030 (2011).

¹³ U. S. Department of Health and Human Services Health Resources and Services Administration. (n.d.). *Defining the Rural Population*. Retrieved from: http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html.



OSA ultimately chose a definition of 'rural' from the Office of Rural Health Policy.

This definition along with information from the Missouri Rural Assistance Center helped narrow the final study population.

The U.S. Office of Management and Budget (OMB) divides the nation into Core Based Statistical Areas (CBSAs).¹⁴ According to this scheme, counties are conglomerated and classified into metropolitan, micropolitan, and noncore CBSAs, with the latter two often being thought of as rural. Delineation of a metropolitan area begins with a county containing a city of 50,000 or more; the entire county and any adjacent counties with high commuting flows count as a single metropolitan CBSA. However, this division at the county level means that many metropolitan areas contain smaller areas we might intuitively think of as rural, as acknowledged by the OMB itself;¹⁵ for instance, the Grand Canyon belongs to a metropolitan area according to this definition.¹⁶ Additionally, the CBSAs are intended for statistical purposes and not for the guidance of public policy,¹⁷ and thus their use was deemed inappropriate for this project.

There are a number of other such classification systems in place that use some variation of the Census Bureau or OMB methods;¹⁸ however, as many of those variations share the drawbacks mentioned above, they are not treated as separate options here. The major alternative to classification based on census block or county data is the method employed by the Office of Rural Health Policy (ORHP). This method employs a 33-level taxonomy of Rural-Urban Commuting Areas (RUCAs) defined at the level of census tracts. According to this method, all census tracts in a county designated as nonmetropolitan by the OMB qualify as rural; additionally, census tracts within a metropolitan county are assigned one of the aforementioned 33 codes based on traffic flow within or to urban areas. Codes above a certain mark qualify a tract as rural even if it is located within an otherwise urban county. This method attempts to correct for the undercount of the rural population by CBSAs; it is highly customizable for particular policy initiatives, simply by altering the RUCA code at which rural status is assigned; and it is already in use by several federal programs, including a number dedicated to healthcare grants. As such, the ORHP's RUCA-based definition of 'rural' was selected for this study; specifically, a RUCA code of 4 or higher was stipulated to mark a census tract as rural.

With a definition of 'rural' selected, the next step was to determine which of the initial population of hospitals fell under that definition. The University of Missouri's Rural Assistance Center provides a website which determines whether a given location falls under any of several specifiable definitions of 'rural';¹⁹ the addresses of the initial population were entered into this website, which enabled the elimination of several more hospitals from the population to be studied. The results of the Rural Assistance Center website were manually checked by using a different website²⁰ to find each hospital's census tract number, then checking that census tract against a list of RUCA-based rural counties and census tracts

¹⁴ 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas. 75 Fed. Reg. 37246 (2010).

¹⁵ Ibid.

¹⁶ U. S. Department of Health and Human Services Health Resources and Services Administration. (n.d.). *Defining the Rural Population*. Retrieved from: http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html.

¹⁷ 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas. 75 Fed. Reg. 37246 (2010).

¹⁸ Coburn, A. F., MacKinney, A. C., McBride, T. D., Mueller, K. J., Slifkin, R. T., & Wakefield, M. K. (2007). *Choosing rural definitions: implications for health policy* (Issue Brief No. 2). Retrieved from: <http://www.rupri.org/Forms/RuralDefinitionsBrief.pdf>.

¹⁹ Rural Assistance Center. (n.d.) *Am I Rural?* Retrieved from: <http://ims2.missouri.edu/rac/amirural/>.

²⁰ Federal Financial Institutions Examination Council. (n.d.) *Geocoding System*. Retrieved from: <http://www.ffiec.gov/Geocode/default.aspx>.



The final study group included 25 rural, publicly owned hospitals.

maintained by the Health Resources and Services Administration.²¹ No discrepancies between the results of the two methods were found; thus, it was concluded that the final list of hospitals was most likely a correct representation of Mississippi's population of rural county-owned hospitals.

Investigation²² revealed that eight hospitals in the remaining population had been leased to other hospitals or were owned by them outright, and were being operated as subsidiaries; these eight were removed from the list as well. Each such hospital's financial status was reported as part of its parent organization; thus, any particular subordinate hospital was de facto included in the list, or not, according to whether its parent hospital was included.

The final population for this study consisted of 25 hospitals.

DATA AND ANALYTIC TECHNIQUES

All data used in this study came from audited financial reports for the years 2009-2012.

All data for this study were gathered from audited financial reports for the years 2009-2012; the literature generally agrees that such a report is the gold standard of financial information for hospitals,²³ and that three to five years is a sufficient number to control for anomalies.²⁴ No reports for any hospital in the population during that period were missing. Discrepancies in figures reported for a given year were manually reconciled or checked by asking the authors of the report about the proper numbers; in three instances, it was impossible to reach the author of a report for such a check.²⁵

Because certain financial ratios used in this study²⁶ require some amount of debt as a denominator, and several hospitals in the population maintained no such relevant debt, this study adopted the convention of adding one cent to the current portion of long-term debt of any hospital with no total relevant debt. To fail to adopt some equivalent of this convention would render it impossible to produce those ratios, and thus would unacceptably skew the comparison among hospitals in the population.

The one-cent convention produces numbers for the relevant ratios with unnaturally large absolute values, but measures were taken to control for these outliers.²⁷ The rank orders and quartile memberships produced using this method is intuitively appropriate.²⁸ As such, this convention does not affect the outcome of the study.

²¹ U.S. Department of Health and Human Services Health Resources and Services Administration. (2013) *List of Rural Counties and Designated Eligible Census Tracts in Metropolitan Counties*. Retrieved from: <ftp://ftp.hrsa.gov/ruralhealth/eligibility2005.pdf>.

²² Prompted by Chris Leonard (personal communication, October 30, 2013).

²³ E.g., Kane, N. M., and Magnus, S. A. (2001) The Medicare Cost Report and the Limits of Hospital Accountability: Improving Financial Accounting Data. *Journal of Health Politics, Policy and Law*, 26 (1), 81-105. See also Medicare Payment Advisory Commission. (June 2004) *Report to the Congress: Sources of Financial Data on Medicare Providers*. Retrieved from: http://www.medpac.gov/documents/june04_990_DataNeeds.pdf.

²⁴ E.g., Lermack, H. B. (2003) *Steps to a Basic Company Financial Analysis*. Philadelphia: Author. Retrieved from: http://faculty.philau.edu/lermackh/financial_analysis.htm.

²⁵ These instances involved discrepancies in one hospital's reported long-term debt and bad debt expenses, and in another hospital's operating lease and rental expense. The accounting firm responsible for the audited financial statements in question was called for clarification, but did not return calls. After verifying that the discrepancies made no difference to any conclusion or any final or subsidiary ranking reported in this paper, including watchlist membership, FSI®, original measure score, and ratings for profitability, liquidity, capital structure, and solvency for any year of the study, the numbers more favorable to each hospital were used.

²⁶ These ratios are debt service coverage and total free cash flow, about which see section V.B.2.

²⁷ See section V.B.3.

²⁸ More precisely: If a hospital has a numerator that is positive to even a small degree for either debt service coverage or total free cash flow, then the values of those ratios will be a very large positive



Selecting and Developing Analytic Methods

While ideally, it would be nice to determine easily whether a business is succeeding or failing, there is no single definition for 'financial failure.'

To conduct this study, OSA examined various data analytic techniques in an attempt to create a “best fit” situation. Because hospitals are a unique type of business and can be private, non-profit, or even publicly owned (the subject of this study), OSA tried to determine other studies that might be relevant, and which analytic techniques might yield the most accurate results.

In an ideal world, one might be able to perform a measurement on a business and deliver a simple verdict: Either the business is succeeding, or, it is failing. Nonetheless, there is no single, universally accepted, empirically validated measurement that predicts success or failure for all business types.

For one thing, the definition of ‘failure’ is subject to some variation depending on the circumstances; some businesses might be considered to have failed when they go bankrupt, and others not until they close. However, small rural county-owned hospitals are funded by public money and may well serve as the only source of healthcare for their communities. As such, they may well continue to operate even under circumstances that would lead private business to bankruptcy. Indeed, if a hospital of this sort is truly vital to the health of its community, there may be no real threat of its closure even under the worst financial circumstances, assuming that there is no better alternative.

For another, there are few noncontroversial predictive measures of financial distress at all, even temporarily setting aside the issue of defining failure. The ideal would be a set of measures at least quasi-experimentally tested for the ability to predict financial failure, but such measures are rare. When a population consists of actual businesses in all their complexity, it is difficult to control for possible confounding variables.

Finance professor Edward Altman attempted to provide just this sort of measure with the design of his Z-Score in 1968.²⁹ His Z-Score was intended to predict the chance of business failure (defined as bankruptcy) of industrial corporations. His Z-Score was developed for a very different type of business than that of rural public hospitals,³⁰ and the appropriate values for financial indicators vary strongly across business types.³¹ This, along with the noted increase in false positive predictions due to the changed dynamics of the current

number; if, on the other hand, the numerators are negative, then the final values of the ratios will be a very large negative number. As such, a hospital with zero debt and a positive numerator for, say, debt service coverage will almost inevitably belong in the top quartile in the population for debt service coverage, and a hospital with zero debt and a negative numerator for debt service coverage will almost inevitably belong in the bottom quartile of the population. Those results, however, make sense. Debt service coverage is about the ratio of income to immediate debt; it might be described as an attempt to capture how much effort it would take a business to pay off its debt using its income. A business with no debt whatsoever requires, obviously, no effort whatsoever to pay off that debt, and is thus in a slightly better position in that regard than a business with any debt at all. Thus, such a business should almost inevitably be in the top quartile, the only exception being the odd case in which there are more businesses with no debt in the population than there are businesses in the top quartile. Even in such a case, a business with more income is in a better position than a business with less income, and the one-cent stipulation preserves this order. A business with negative income is in no position to pay off its debts at all, under any circumstances, and thus should be ranked very low; all things being equal, the greater negative income, the worse off a business is, and this ranking is also preserved. Similar reasoning applies to the total free cash flow ratio. The point is this: The one-cent stipulation preserves appropriate rankings, no matter how many entities in the population use it and how many do not.

²⁹ Altman, E. (1968) Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, 23 (4), 589-609.

³⁰ Altman, E. (1968) Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, 23 (4), 589-609.

³¹ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis, MN: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf

The first potential analytic method that OSA considered was the Altman Z-Score that was intended to predict the chances of business failure (defined as bankruptcy) for industrial corporations, but these are very different from hospitals, so OSA examined other methods.



world of business operations,³² the Z-Score was deemed inappropriate for this study. Finally and most decisively, even the Z-Score's variants developed for private hospitals employ measurements inappropriate to publicly owned hospitals. As such, it was not possible to use the Z-Score variants for this study either, and it would likely not have been wise to do so even if it had been possible.

However, OSA identified one model that appears to adequately estimate the financial health of hospitals. In addition, OSA developed its own model. These two models are explained below, but first, one must understand the idea behind the models used for this study.

An Analogy to the Study Approach

Another approach to assessing the financial health of a hospital is to take a representative set of measurements and compare them to benchmark values. In this sense, the traditional, noncurved academic grade scale (A through F), is a benchmark measure; in theory at least, students are evaluated based on how well they did on a particular assignment, and one student's performance has no intrinsic connection to that of any other student. It is possible, under the right conditions, for everyone taking a given test to fail, or to make an A. A letter grade on a given assignment is not necessarily intended to predict any particular outcome; rather, it measures the quality of a student's performance on that assignment and sorts the performance into one of several fixed categories. Similarly, we might measure appropriate aspects of hospital finance and then sort hospitals into categories according to benchmarks; intuitively, we might rate the financial health of a hospital as "excellent," "good," "fair," "poor," and "dangerous," for instance.

The appeal of this sort of strategy is clear: Benchmarks, like traditional letter grades, are familiar, unambiguous, and (in theory at least) consistent across populations. However, a certain level of caution is appropriate when using benchmarked measures. Deciding which measurements to use for benchmarks and where to set the benchmarks may prove difficult. The most typical approach seems to be to rely on expert opinion on both subjects.³³ While expert opinion alone may be quite reliable, it is not easily verifiable without an accompanying explicit argument (which would, of course, remove it from the realm of expert opinion and place it into the realm of argument proper). This lack of verifiability poses a problem for the researcher.

The levels for benchmarks of financial performance might also be derived from characteristics of some actual or abstracted population. The Z-Score's approach, described earlier, is at least to try to find just such a benchmark, derived from the point at which failure can reasonably be predicted. The difficulties with such an approach have already been mentioned, but one need not try for predictive value to use such an approach to benchmarking; one might instead derive benchmarks by partitioning off quantiles or standard deviations of an abstract or reference population, for instance.

Of course, the danger of taking this last approach is that the reference population may ignore or misrepresent characteristics of the actual population being evaluated. For instance, imagine a population that is being evaluated on a hundred-point scale. One might, with good intentions, set a benchmark for

OSA found one model and designed a model to work in tandem to provide high levels of assurance for the study results' accuracy.

This study seeks to describe rather than predict a hospital's financial position.

The two descriptive models used in this study can be compared to the grading systems using a curve and those not using a curve:

- *A system of grading that doesn't employ a curve tests how well an individual does, independent of all other individuals in a group.*
- *A curved grading system grades an individual compared to all others in a group.*

³² Altman, E. (2000) *Predicting Financial Distress of Companies: Revisiting the Z-Score and Zeta® Models*. Retrieved from: <http://people.stern.nyu.edu/ealtman/PredFnclDistr.pdf>.

³³ Pink, G., Holmes, G., Slifkin, R., & Thompson, R. (2009) Developing Financial Benchmarks for Critical Access Hospitals. *Health Care Financing Review*, 30 (3). 55-69.



The first method of examining hospital financial health is the Financial Strength Index®.

It employs a set of benchmarks that, at least in theory, apply to all hospitals; thus, it fills the role of the uncurved grade standard.

The second method is original to this study. Its standard is population-relative; it ranks hospitals on overall financial performance as defined by a range of financial characteristics. As such, it fills the role of the curved grade standard.

The final financial “watch list” results when hospitals fell into both methods’ watch lists.

A hospital is considered to be on the final watch list if it is both in the FSI®’s danger zone and in the lowest range of scores on the OSA model.

concern at 25%, on the idea that anyone who scores in the bottom quartile of possible scores merits our attention. But if the scale is based on scores on a true-false test, for instance, the range of possible scores is unlikely to reflect the range of actual scores. In such a case, the 25% benchmark is inappropriate.

Out of concern for precisely such mismatches between benchmark and population, we might decide to make our hospital study rubric explicitly relative to our actual population, rather than to an abstract or reference population. To return to the grading analogy, this strategy is familiar from the curved grade scale. Curved grades are consciously and explicitly population-relative; rather than making an A by getting a certain number of questions right, on a curved exam, a student makes an A by scoring better than the rest of the class to a certain degree.

This approach has benefits and drawbacks: Whereas, given a well-designed test and no confounding factors, one might say of an uncurved-A student that he or she had mastered the material, one should say of a curved-A student only that he or she is among the best in the class. Since the class as a whole might have done quite badly, it is possible that a student could make a curved A and still know next to nothing about the material. On the other hand, a student’s position relative to the rest of the class is a matter of objective mathematical fact, whereas the numerous factors that can cause a test score to fail to represent mastery of the test’s subject matter can make it fairer in many respects to grade on a curve.

In consideration of all these points, this study employed two different methods of assessing hospitals’ financial health, each with distinct rubrics and measurements. Both are described in the next section. The study’s first method used to examine hospital financial health is the Financial Strength Index®. It employs a set of benchmarks that, at least in theory, apply to all hospitals; thus, it fills the role of the uncurved grade standard.

The second method is original to this study. Its standard is population-relative; it ranks hospitals on overall financial performance as defined by a range of financial characteristics. As such, it fills the role of the curved grade standard.

This study’s final hospital watch list is generated by the conjunction of the results of both measures; that is, a hospital is considered to be on the watch list if it is both in the FSI®’s danger zone and in the lowest range of scores on the OSA developed model. This methodological triangulation is intended to compensate for the difficulties mentioned above, notably the prohibitive difficulty of obtaining accurate information about the reliability of either measure alone, or indeed of rigorously defining the phenomenon to be predicted. Even if it is impossible to make precise predictions or establish false-positive and false-negative rates, using a conjunction of two standards effectively produces a new standard that is at least as stringent as the more stringent of the two component standards. As such, this study is intentionally quite conservative with regards to the membership of its final watch list.

This approach is analogous to that used by a pit viper in seeking prey by using both heat- and motion-detection. A moving object may or may not be food, and a warm object may or may not be food, but by seeking out objects that are both warm and moving, the snake tends to find itself trying to eat fewer nonfood objects than would be the case by leaning on either indicator by itself.³⁴

³⁴ This passage involves a slight oversimplification of the logic of the pit viper case, but the complexities aren’t relevant; the pit viper analogy really is just an analogy, as methodological triangulation does not have exactly the same logical structure as multiple testing for a particular phenomenon. John Daugman’s *Biometric Decision Landscapes* (University of Cambridge Computer Laboratory Technical Report No. 482), retrieved from <http://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-482.pdf>, offers a short summary of the probabilities involved in the latter, for those who wish to find a more precise description of the epistemic gains and losses involved in the pit viper’s strategy.



USING THE MEASUREMENTS

The Financial Strength Index®

The Financial Strength Index® (FSI®) is a proprietary measure of hospital financial health

The FSI® is calculated using four ratios:

- *total margin,*
- *days cash on hand,*
- *debt financing, and*
- *depreciation expense.*

Total margin is the percentage of revenues kept as profit.

Days cash on hand is the number of days a business could continue to operate without collecting any additional cash.

Debt financing is the percentage of a business' assets financed by debt; it is a measure of capital structure.

Depreciation expense is an indirect measure of the age of a hospital's physical facilities.

The Financial Strength Index® (FSI®) is a proprietary measure of hospital financial health. Developed by William O. Cleverley of Cleverley + Associates, a group of financial consultants to the hospital industry, the FSI® is an attempt to present everything that one would want to know about a hospital's financial health in a single number, while also giving a benchmark value for that final number that tells whether a hospital is in financial danger.

The FSI® is calculated as the sum of normalized values of four ratios: total margin, days cash on hand, debt financing, and depreciation expense. The values for each ratio are normalized around slightly simplified national medians, that is, medians taken from the population of all U.S. hospitals.³⁵ As such, while there is no theoretical minimum or maximum FSI® score, the nominal national median score is 0. A hospital with a final FSI® score over 3 is considered to be in excellent financial health; one whose FSI® is between 0 and 3 is in good financial health; one with FSI® between -2 and 0 is in fair condition financially; and one whose FSI® is below -2 is in poor shape financially.³⁶ In general, the lower the score, the more reason there is to investigate more closely.

Total margin, the first ratio used to calculate FSI®, is the percentage of revenues kept as profit. A business with a 10 percent total margin retains 10 cents as profit for every dollar in revenue. It is calculated by dividing a business' net income by its total revenues.³⁷

Days cash on hand, the second ratio, is the number of days a business could continue to operate without collecting any additional cash. It is a measure of liquidity, or the ability to pay short-term debts. A business with 10 days of cash on hand, clearly enough, could operate for 10 days without collecting any additional revenue. It is calculated by taking cash plus unrestricted investments as the numerator, and total expenses minus bad debt expenses and depreciation, divided by 365, as the denominator.³⁸

Debt financing, the third ratio, is the percentage of a business' assets financed by debt; it is a measure of capital structure. A business with 50% debt financing has exactly half of its assets financed by debt. Debt financing is calculated by subtracting net assets from total assets, then dividing by total assets.³⁹

Depreciation expense, the fourth ratio used in calculating FSI®, is an indirect measure of the age of a hospital's physical facilities. A business with 50% depreciation expense in a given year has lost half of the gross value of its physical plant to depreciation. It is calculated by dividing accumulated depreciation by gross property and equipment value.⁴⁰

³⁵ Cleverley, W. O. (2007) How to Determine Your Organization's Overall Financial Health. *Strategic Financial Planning*, 2(3), 1-4.

³⁶ Price, C. A., Cameron, A. E., and Price D. L. (2005) Distress Detectors: Measures for Predicting Financial Trouble in Hospitals. *Healthcare Financial Management*, 59(8), 74-80.

³⁷ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis, MN: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.

³⁸ Medicare Payment Advisory Commission. (June 2004) *Report to the Congress: Sources of Financial Data on Medicare Providers*. Retrieved from:

http://www.medpac.gov/documents/june04_990_DataNeeds.pdf.

³⁹ Cleverley, W. O. (2008) *Metrics that Work*. Worthington: Author. Retrieved from:

<http://www.cleverleyassociates.com/Library/MetricsThatWork.pdf>.

⁴⁰ Ibid.



The FSI[®] makes the assumption that if a hospital is unprofitable, illiquid, heavily financed by debt, and in possession of old facilities is probably in trouble.

- The FSI[®] advantages:*
- *It is very simple to use and to interpret;*
 - *it was created specifically for hospitals, using a great deal of data; and*
 - *it encompasses a range of appropriate data.*

Using the FSI[®] alone was disadvantageous for this study, so OSA designed its own approach.

While the work of the Critical Access Hospitals (CAH) Financial Indicator Report uses 20 financial measurements, it is very specialized to critical access hospitals, and since all CAHs may be rural, not all rural hospitals are CAHs.

Thus, the FSI[®] makes the *prima facie*, quite reasonable assumption that a hospital that is unprofitable, illiquid, heavily financed by debt, and in possession of old facilities is probably in trouble. It does allow that good condition in one or more of those areas can compensate to some degree for bad condition in the others. Thus, the final number generated by the FSI[®] reflects the combination of profitability, liquidity, capital structure, and age of facilities.

The FSI[®] score has several advantages as a mechanism for assessing the financial well-being of a hospital. It is very simple both to use and to interpret; it was created specifically for hospitals, on the basis of a great deal of data; and it encompasses a range of data that is intuitively appropriate for its purpose. Furthermore, the FSI[®] is at least intended as a predictive measure; specifically, it is intended to predict hospital closure.⁴¹

However, for purposes of this study it would have been dangerous to have relied on the FSI[®] alone as a measure of financial health. First, the FSI[®] is not as empirically validated as might ideally be preferred. While Cleverley + Associates staff indicated in personal communication⁴² that there were rigorous controlled studies of the FSI[®]'s predictive power, and requests to obtain such studies were made, no such studies were provided, and none were found upon independent research. Such studies may well exist, but may be proprietary or otherwise unavailable; the results of this study certainly tend to lend confidence to the FSI[®]. However, trust after an independent test is a different matter from trust beforehand.

Furthermore, as mentioned before, the appropriate benchmarks for financial performance are highly industry- and population-relative, and it is not obvious *a priori* that rural public Mississippi hospitals are sufficiently similar to U.S. hospitals as a whole to enable fair evaluation of the former by standards developed for the latter. Indeed, one might think just the opposite.

Thus, this study employed the FSI[®], but also employed another set of original measurements to assess the financial well-being of the hospitals in its population.

OSA Designed Assessment Method

Choice of Measurements

The first step in developing an appropriate comparative measure of hospital financial health was to study the literature on the subject. OSA used the Critical Access Hospitals Financial Indicator Report (CAHFIR) as a starting point.⁴³ The Flex Monitoring Team—composed of the Rural Health Research Centers at the University of Minnesota, the University of North Carolina at Chapel Hill, and the University of Southern Maine—is under federal contract to monitor the federal program that oversees Critical Access Hospitals (CAHs). These CAHs are, by definition, rural, among other requirements, and thus have significant overlap with the population of interest in this study; nine of the 25 hospitals in this study's population are CAHs.⁴⁴

The CAHFIR takes 20 measurements across six broad categories. Researchers selected these indicators based on an understanding of commonly accepted hospital related financial analysis tools and confirmed through their

⁴¹ Cleverley, W. O. (2007) How to Determine Your Organization's Overall Financial Health. *Strategic Financial Planning*, 2(3), 1-4.

⁴² Cleverley, W. O. and Gardner, S. (personal communication, October 23, 2013).

⁴³ The development of this report is described in Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis: Author. Retrieved from:

http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.

⁴⁴ Flex Monitoring Team (2013). *CAH List in States Beginning with Mississippi*. Retrieved from: <http://www.flexmonitoring.org/cahlistRA.cgi?state=Mississippi>.



OSA designed this study to measure profitability, liquidity, capital structure, and financial solvency.

For this study, OSA wanted to have the same number of indicators in each of the four categories to ensure that each had equal weight,

literature review. Additional refinements were made through advice from an expert panel.⁴⁵ For purposes of this study, one indicator used in the CAH Financial Indicator Report—revenue—was inappropriate, since CAHs and non-CAHs have different revenue structures and are thus not directly comparable on that axis.⁴⁶ That is, while CAHs are reimbursed by Medicare based on costs incurred, other hospital classifications are reimbursed based on a calculation ultimately tied to patient volume. As such, a CAH's revenue should always at least meet its costs, while other types of hospitals have no such guarantee. While meeting costs may be a sign of financial success in a non-CAH, for a CAH it is simply expected. Ignoring revenue, all other categories of indicators agreed upon by both the literature review and the expert panel were adopted for this study. Thus, this study set out to measure indicators of profitability, liquidity, and capital structure.⁴⁷

Given the overall aim of this study, a fourth category of indicators was added: that of solvency. This category included indicators more forward-looking than those in the other three categories, intended to enable better assessment of a hospital's financial well-being by considering the ability to meet long-term as well as short-term needs.

The CAHFIR employs four ratios as indicators of profitability: total margin, cash flow margin, return on equity, and operating margin. For this study, OSA staff wanted to have the same number of indicators in each category, in order to standardize the mechanism for aggregating scores and avoid arbitrarily privileging one category over another in the final score. While total margin is an excellent indicator of profit,^{48,49,50} it was already used in calculating FSI[®]; since the point of using two different measurements would be blunted if those measurements overlapped more than minimally necessary, total margin was not included in this study's set of profitability indicators.

Thus, this study employed the cash flow margin, return on equity, and operating margin ratios as measurements of profitability. Further validating the choice of these three measures, one study has shown that operating margin captures the majority of the information provided by a wide variety of measures of profitability, across all temporal settings and hospital working environments.⁵¹ Thus, in theory, it would be possible to use operating margin alone as a measure of profitability. However, relevant extra information is helpful for more detailed investigation into particular hospitals and for a small measure of redundancy in case of anomalies in particular data.

The CAHFIR uses three ratios as indicators of liquidity: current ratio, days cash on hand, and days revenue in accounts receivable. Days cash on hand is correlated with other measures of liquidity in the same respect as operating

⁴⁵ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis, MN: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.

⁴⁶ Holmes, G. M, Pink, G. H., Friedman, S. A., and Howard, H. A. (August 2010). *A Comparison of Rural Hospitals with Special Medicare Payment Provisions to Urban and Rural Hospitals Paid under Prospective Payment* (Final Report No. 98). Chapel Hill: Office of Rural Health Policy. Retrieved from: <http://www.shepscenter.unc.edu/rural/pubs/report/FR98.pdf>.

⁴⁷ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.

⁴⁸ Ibid.

⁴⁹ Medicare Payment Advisory Commission. (June 2004) *Report to the Congress: Sources of Financial Data on Medicare Providers*. Retrieved from: http://www.medpac.gov/documents/june04_990_DataNeeds.pdf.

⁵⁰ Zeller, T. L., Stanko, B. B., & Cleverley, W. O. (1996). A Revised Classification Pattern of Hospital Financial Ratios. *Journal of Accounting and Public Policy*, 15, 161-182.

⁵¹ Ibid.



Profitability Measures included:

- cash flow margin,
- return on equity, and
- operating margin ratios

Cash flow margin measures cash flow before certain costs are considered.

Return on equity is calculated by dividing net income by net assets. It describes how hard a company's existing assets are being put to work to generate a profit.

Operating margin is calculated by dividing net operating income by total operating revenue. It is the percentage of operating activities kept as profit; it is concerns only profit from the hospital's most central activities.

margin is with measures of profit.⁵² Similar to the argument for the use of the operating margin alone, it might theoretically have been sufficient as a liquidity measure. Again, OSA researchers believed it was desirable to have more than one measurement for each category of financial performance. Some sources in the literature consider operating cash flow margin a superior measurement of liquidity to some used by the CAHFIR study;^{53,54} as such, and given the built-in redundancy provided by measuring days cash on hand, this study chose to employ current ratio, operating cash flow, and days cash on hand.

The CAHFIR uses three ratios as indicators of capital structure: equity financing, debt service coverage, and long-term debt to capitalization. Of these, equity financing is correlated with a wide variety of measures of capital structure in the same fashion as operating margin and days cash on hand are correlated with many indicators in their categories.⁵⁵ The literature surveyed for this study did not provide any significant arguments against measures of capital structure; thus, the CAHFIR measures were adopted without change.

As mentioned above, the CAHFIR does not take any measures of solvency. For this study, three such measures were added: total free cash flow ratio, cash to total debt ratio, and cash to capital expenditure ratio. These measures were chosen because they are endorsed in the literature,^{56,57} because they are relatively forward-looking, and because they are readily taken from the financial data available for this study.

Definition of Measurements

PROFITABILITY

Profitability, in the general sense, is a matter of how much money a business makes. In this study, the three ratios used in formulating a measure of profitability were cash flow margin, return on equity, and operating margin.

The first measure of profitability for this study—cash flow margin—is a measure of cash flow before certain costs; it is similar to total margin, but larger.⁵⁸ It is calculated as the sum of net income, interest, depreciation, and amortization, divided by total revenues. Expressed as a percentage, it measures how much income is kept as cash before expenses; a cash flow margin of .05 or 5% indicates that every dollar of revenue generates five cents of cash flow before interest and depreciation expense.

The second measure of profitability—return on equity—is calculated by dividing net income by net assets.⁵⁹ It is a measure of profit expressed as a percentage of assets, or roughly speaking how hard a company's existing assets are being put to work to generate a profit. A return on equity of .05 or 5%

⁵² Ibid.

⁵³ Mills, J. R. and Yamamura, J. H. (1998). The Power of Cash Flow Ratios. *Journal of Accountancy*, 186(4), 53-62. Retrieved from Journal of Accountancy website: <http://www.journalofaccountancy.com/Issues/1998/Oct/mills.htm>.

⁵⁴ Price, C. A., Cameron, A. E., and Price D. L. (2005) Distress Detectors: Measures for Predicting Financial Trouble in Hospitals. *Healthcare Financial Management*, 59(8), 74-80.

⁵⁵ Zeller, T. L., Stanko, B. B., & Cleverley, W. O. (1996). A Revised Classification Pattern of Hospital Financial Ratios. *Journal of Accounting and Public Policy*, 15, 161-182.

⁵⁶ Price, C. A., Cameron, A. E., and Price D. L. (2005) Distress Detectors: Measures for Predicting Financial Trouble in Hospitals. *Healthcare Financial Management*, 59(8), 74-80.

⁵⁷ Mills, J. R. and Yamamura, J. H. (1998). The Power of Cash Flow Ratios. *Journal of Accountancy*, 186(4), 53-62. Retrieved from: <http://www.journalofaccountancy.com/Issues/1998/Oct/mills.htm>.

⁵⁸ Gapenski, Louis C. (2011). *Healthcare Finance: An Introduction to Accounting and Financial Management, Online Appendix A*. Washington: Health Administration Press. Retrieved from:

http://www.ache.org/pubs/hap_companion/gapenski_finance5/HP5Online%20Appendix%20A.pdf.

⁵⁹ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.



indicates that for every dollar of net assets, a company keeps five cents of net income.

The third measure of profitability—operating margin—is calculated by dividing net operating income by total operating revenue.⁶⁰ It is the percentage of operating activities kept as profit; it is similar to the other measures of profit discussed above, except that it concerns only profit from the hospital’s most central activities. An operating margin of .05 or 5% indicates that for every dollar of operating income, a business keeps five cents as net income.

LIQUIDITY

Liquidity, in the general sense, is a matter of how easily a business can convert its assets into cash; it is thus also a matter of how easily the business can meet likely short-term financial obligations, since those are typically paid in cash. In this study, the current ratio, operating cash flow ratio, and days cash on hand ratio were used to measure liquidity.

The first liquidity measure—current ratio—is calculated by dividing current assets by current liabilities.⁶¹ Thus, it measures the number of times a hospital’s immediate resources cover its immediate financial needs. A ratio of less than one indicates that the hospital is not capable of fully meeting its short-term needs with its current assets; a ratio higher than one just is the number of times over it could meet those needs.

The second measure of hospital liquidity—operating cash flow—is calculated by dividing cash flow from operations by current liabilities.⁶² It is similar to the current ratio because it measures the number of times short-term obligations can be paid, but in this case by generating cash from operations. An operating cash flow ratio of 2 would indicate that a hospital generates enough cash from operating activities to pay its short-term obligations twice over.

The third liquidity measure used for this study—days cash on hand—is the number of days a hospital could continue to operate without collecting any additional cash. It is a measure of a hospital’s ability to pay short-term debts. A hospital with 10 days of cash on hand could operate for 10 days without collecting any additional revenue. It is calculated by taking cash plus unrestricted investments as the numerator, and total expenses minus bad debt expenses and depreciation, divided by 365, as the denominator.⁶³

CAPITAL STRUCTURE

Capital structure, in general, is a measure of how much of a business is financed by debt. In this study, equity financing, debt service coverage, and long-term debt to capitalization ratios measure capital structure.

The first measure of capital structure—the equity financing ratio—is calculated by dividing net assets by total assets.⁶⁴ It is a measure of the proportion of a business’ assets financed by equity; indirectly, it is also a measure of the proportion of a business’ assets financed by debt, which is the complement of the equity financing ratio. Therefore, an equity financing ratio of 0.5 or 50%

⁶⁰ Lane, S. G., Longstreth, E., and Nixon, V. (2001). *A Community Leader’s Guide to Hospital Finance: Evaluating How a Hospital Gets and Spends its Money*. Boston: The Access Project. Retrieved from: http://www.accessproject.org/downloads/Hospital_Finance.pdf.

⁶¹ Ibid.

⁶² Price, C. A., Cameron, A. E., and Price D. L. (2005) Distress Detectors: Measures for Predicting Financial Trouble in Hospitals. *Healthcare Financial Management*, 59(8), 74-80.

⁶³ Medicare Payment Advisory Commission. (June 2004) *Report to the Congress: Sources of Financial Data on Medicare Providers*. Retrieved from: http://www.medpac.gov/documents/june04_990_DataNeeds.pdf.

⁶⁴ Gapenski, Louis C. (2011). *Healthcare Finance: An Introduction to Accounting and Financial Management, Online Appendix A*. Washington: Health Administration Press. Retrieved from: http://www.ache.org/pubs/hap_companion/gapenski_finance5/HE5Online%20Appendix%20A.pdf.

Liquidity describes how easily a hospital can convert assets into cash. Liquidity Measures included:

- current ratio,
- operating cash flow ratio, and
- days cash on hand

Current ratio is calculated by dividing current assets by current liabilities. It measures the number of times a hospital’s immediate resources cover its immediate financial needs.

Operating cash flow is calculated by dividing operations cash flow by current liabilities. It measures the number of times short-term obligations can be met through cash generation.

Days cash on hand is the number of days a hospital could continue to operate without collecting any additional cash. It is a measure of a hospital’s ability to pay short-term debt.



Capital Structure measures how much of a business is financed by debt. Its component measures included:

- equity financing,
- debt service coverage ratio, and
- long-term debt to capitalization ratio

Equity Financing is calculated by dividing net assets by total assets. It measures the proportion of a business' assets financed by equity.

Debt service coverage ratio is the ratio of income to immediate debt.

Long-term debt to capitalization ratio describes the relationship between debt and total financing.

Solvency measures a hospital's ability to meet its long-term financial obligations. Its component measures included:

- total free cash flow,
- cash flow to total debt ratio, and
- cash to capital expenditure ratio

would indicate a business whose assets were financed exactly half by equity, half by debt; an equity financing ratio of 0.3 or 30% would indicate a business financed 30% by equity, 70% by debt.

The second measure of capital structure—debt service coverage ratio—is the ratio of income to immediate debt; a business with a debt service coverage ratio of 1.1 would generate enough income to pay the entirety of its yearly debts, plus 10 percent over that amount. Conversely, a business with a debt service coverage ratio of 0.5 would generate only half the income needed to pay its yearly debts. The numerator of the debt service coverage ratio is calculated by adding depreciation and interest expense to net income; the denominator is the current portion of long-term debt plus interest expense.⁶⁵

The third measure of capital structure—the long-term debt to capitalization ratio—is calculated by dividing long-term debt by the sum of long-term debt and net assets.⁶⁶ It describes the relationship between debt and total financing; a company with a long-term debt to capitalization ratio of 0.5 or 50% is financed exactly half by debt, or rather, it has exactly as much in long-term debt as it has in net assets.

SOLVENCY

Solvency in the general sense is a measure of a business' ability to meet its long-term financial obligations. As such, it is a forward-looking or longer-term counterpart to liquidity. In this study, total free cash flow, cash flow to total debt, and cash to capital expenditure ratios measure solvency.

Total free cash flow measures a company's ability to meet its long-term debts; a business with a total free cash flow ratio of 1 has exactly enough income, adjusted for capital expenditures and dividends, to reliably pay the year's portion of long-term debts. The numerator of the total free cash flow ratio is net income plus accrued and capitalized interest expense, plus depreciation and amortization, plus operating lease and rental expense, minus declared dividends, minus capital expenditures. The denominator is accrued and capitalized interest expense plus operating lease and rental expense, plus the current portion of long-term debt, plus the current portion of capitalized lease obligations.⁶⁷

The second measure of solvency used in this study—the cash flow to total debt ratio—is calculated by dividing cash flow from operations by total debt.⁶⁸ Thus, it is a measure of the degree to which a business' intake of cash covers its debts; its reciprocal is the number of years it would take a business to pay off its debts if it maintained current cash flow and did not incur any new debts. Indirectly, it is a measurement of a business' ability to take on new debt. A business with a cash flow to total debt ratio of 0.5 brought in half as much cash during the year as would be necessary to pay off its debts; thus, it could pay off its debts in two years under the conditions mentioned above.

The third measure of solvency—cash to capital expenditure ratio—is calculated by dividing cash flow from operations by capital expenditures.⁶⁹ It is a measure of a company's ability to cover capital expenditures with cash, and

⁶⁵ Holmes, G. M, Pink, G. H., Friedman, S. A., and Howard, H. A. (August 2010). *A Comparison of Rural Hospitals with Special Medicare Payment Provisions to Urban and Rural Hospitals Paid under Prospective Payment* (Final Report No. 98). Chapel Hill: Office of Rural Health Policy. Retrieved from: <http://www.shepscenter.unc.edu/rural/pubs/report/FR98.pdf>.

⁶⁶ Pink, G., Holmes, G., D'Alpe, C., Strunk, L., McGee, P., & Slifkin, R. (2005) *Financial Indicators for Critical Access Hospitals* (Flex Monitoring Team Briefing Paper No. 7). Minneapolis: Author. Retrieved from: http://www.flexmonitoring.org/documents/BriefingPaper7_FinancialIndicators.pdf.

⁶⁷ Price, C. A., Cameron, A. E., and Price D. L. (2005) Distress Detectors: Measures for Predicting Financial Trouble in Hospitals. *Healthcare Financial Management*, 59(8), 74-80.

⁶⁸ Ibid.

⁶⁹ Mills, J. R. and Yamamura, J. H. (1998). The Power of Cash Flow Ratios. *Journal of Accountancy*, 186(4), 53-62. Retrieved from: <http://www.journalofaccountancy.com/Issues/1998/Oct/mills.htm>.



Total free cash flow measures a company's ability to meet its long-term debts.

Cash flow to total debt ratio is calculated by dividing operations cash flow by total debt. It measures the degree to which a hospital's cash intake covers its debts.

Cash to capital expenditure ratio is calculated by dividing operations cash flow by capital expenditures. It measures a hospital's ability to cover capital expenditures with cash.

OSA staff aggregated results from the 12 measures (subsets of four categories) to make an overall judgment about the financial well-being of the rural hospitals in the study group.

A hospital's overall score for a given year in a given category was calculated by simply adding the adjusted values together.

thus also of its ability to cover debt after such expenditures. A business with a cash to capital expenditures ratio of 1.2 has enough cash flow to cover its capital expenditures, with a sixth of that cash flow available for debt coverage or other purposes.

Aggregation of OSA Designed Measures

OSA staff aggregated the 12 separate ratios described above to make an overall judgment about the financial well-being of hospitals in the study group using the OSA designed analytic method. Furthermore, OSA wanted to be able to make judgments about categories of financial well-being – e.g., profitability – as a whole, rather than having to rely solely on the individual ratios in that category. Thus, aggregation within categories, as well as across categories, was necessary.

Any such method of aggregation must not assume *a priori* that some particular ratio or category is more important than the others; it must also control for outliers within each category of ratios, and must allow for meaningful statistical analysis on the final product. OSA's method met this requirement.

For purposes of this study, values within each category—e.g., values of operating cash flow—were quantile-normalized to a discrete uniform reference distribution with minimum zero, maximum one, and equal intervals between all members.⁷⁰ This method is mathematically equivalent to rank-ordering all scores and then normalizing the ranks. That is, where P is the total number of members of the population and N is the rank of a given subject within that population,⁷¹ the adjusted operating cash flow score of a given hospital would be $(N-1/P-1)$. Thus, the hospital with the best operating cash flow in the population has an adjusted value of one, the hospital with the worst operating cash flow in the population has an adjusted value of zero, and all other hospitals' scores fall in between.

While it is beyond the scope of this study to discuss the issue in any detail, it is worth noting that this method has many advantages. The final adjusted value preserves rank and thus quartile properties. This adjusted value enjoys a common scale with all other similarly adjusted financial quantities and thus, can be added to them; it allows for readily understandable numbers on a common scale no matter the size of the population; and it meaningfully admits to a wide range of statistical analysis, including the humble but important mean (average) used in this study as the measure of central tendency across time.⁷²

A hospital's overall score for a given year in a given category was calculated by simply adding the adjusted values together. Thus, a hospital's score for, say, 2010 profit could range from 3 (if it was better than every other hospital in the population in all three measures of profitability) to 0 (if it was not better than any hospital in the population in any of the three measures of profitability).

⁷⁰ For a discussion of quantile normalization, see Bolstad, B. M., Irizarry, R. A., Åstrand, M., and Speed, T. P. (2003). A Comparison of Normalization Methods for High Density Oligonucleotide Array Data Based on Variance and Bias. *Bioinformatics*, 19(2), 185-193.

⁷¹ With $N=1$ for the lowest-ranking member of the population and $N=P$ for the highest, assuming no ties. Ties are assigned the rank of the low end of the range of tied values. Thus, if the lowest five members of a population of 10 are tied, the population's ranks would be 1, 1, 1, 1, 6, 7, 8, 9, 10, and their adjusted values would be 0, 0, 0, 0, 0.56, 0.67, 0.78, 0.89, 1.

⁷² For a discussion of the applicability of statistical analyses to various data types, see Velleman, P. F. and Wilkinson, L. (1993). Nominal, Ordinal, Interval, and Ratio Typologies are Misleading. *The American Statistician*, 47(1), 65-72. Retrieved from: <http://www.cs.uic.edu/~wilkinson/Publications/stevens.pdf>.



OSA auditors developed the overall watch list by adding the category scores for a given year, producing an overall yearly score between 12 and 0.

Any hospital whose overall score was in the bottom quarter of the population was considered worth watching.

The final watch list for this study are those hospitals that appeared on both the FSI[®] and the OSA method's watch list.

All results can be found on pages iv to viii of this report.

The four hospitals appearing on the final combined watch list were:

- *Montfort Jones Memorial Hospital in Attala County,*
- *Natchez Regional Medical Center,*
- *Tallahatchie County General Hospital, and*
- *Tippah County General Hospital.*

In order to control for anomalous single years, this study took four years' worth of scores for each category. A hospital was considered to be on the watch list for a single financial category if its mean score in that category was less than the mean of the bottom quartile border for all four years. OSA auditors developed the overall watch list for their analytic method by simply adding together the category scores for a given year, producing an overall yearly score with a maximum possible value of 12 and a minimum possible value of 0. Any hospital whose mean overall score was less than the mean of the bottom quartile borders of overall scores was considered to be on this overall watch list. In other words, any hospital whose mean overall score would place it in the mean bottom quarter of the population was considered to be worth watching.

The Overall Aggregation and the Watch List

As mentioned earlier, the final watch list for this study was simply the conjunction of the FSI[®] watch list and the watch list generated by this study's OSA designed assessment technique.

CONCLUSION

There were four hospitals from this population whose mean FSI[®] score was below -2: Montfort Jones Memorial Hospital, Natchez Regional Medical Center, Tallahatchie General Hospital, and Tippah General Hospital. See Graph 1/Table 1 on page iv for the FSI[®] scores of the entire population of 25 hospitals selected for this study.

There were six hospitals in the watch list calculated using the OSA developed analysis technique: Hardy Wilson Memorial Hospital, Montfort Jones Memorial Hospital, Natchez Regional Medical Center, Noxubee General Critical Access Hospital, Tallahatchie General Hospital, and Tippah County Hospital. See Graph 2/Table 2 on page v for the OSA analysis method scores of each of the 25 hospitals selected for this study.

Ultimately, there were four hospitals on the combined, final watch list: Montfort Jones Memorial Hospital, Natchez Regional Medical Center, Tallahatchie General Hospital, and Tippah General Hospital.

The mean scores for the individual hospital financial elements—profitability, liquidity, capital structure, and solvency—analyzed for the OSA method can be found on pages vi through viii of this report.

The scores generated by the FSI[®] and the OSA designed assessment technique used in this study were highly correlated, at $p < 0.01$. As such, future studies could very likely make do by using only one or the other. Which of the two measures is more useful depends on the methodological needs of the particular study for which it is intended. As mentioned above in the discussion on grade curving, if you doubt the fairness of the test, a curved grade is appropriate. Similarly, using the OSA designed measure developed for this study instead of the FSI[®] guards against the possibility that the FSI[®]'s benchmarks are not appropriate for the particular population of your study; the OSA designed assessment method's benchmarks are always relative to your population. On the other hand, if you are teaching a class whose skills are very similar to one another, and you want their grades to reflect that fact—if you know you have a class of all straight-A students, for instance—then an uncurved test is preferred (as long as the test itself is fair, of course). Similarly, if you believe that your population may consist entirely of financially strong hospitals, and you believe



The fact that the watch list generated by OSA's method was larger than the FSI® list is not surprising, since the average performance of the hospitals in this population was superior to the national average performance determined by the FSI® method.

This study's methodology yields conservative results (minimizes false positives) and is applicable to any hospital, regardless of size, ownership type, or other variables.

As such, this study's methodology may well be useful for assessing the financial viability of other populations of hospitals.

Future research should focus on the causes of the results—the “why” answer to where the hospitals fall on the watch list.

It is easier to determine what the financial position of a hospital is than why it is in a certain financial position—such studies require much closer attention and expert knowledge of hospital finances than are addressed in this study.

the FSI®'s benchmarks are appropriate for your population, then it may be preferable. Future studies without a position on the FSI® benchmarks or their population clustering can use both methods, as this study did.

Even using both measures, one might still generate the final watch list in several different ways. To mention two simple options: Future studies might use both the FSI® and the measure developed for this study, but generate a final watch list by disjoining the results of the two. That is, a hospital would make it on this list if it were in the bottom zone of either the FSI® or the OSA designed measure. This method would tend to reduce false negatives; it is to be used if the policy consequences of mistakenly placing a hospital on the watch list are less than the policy consequences of mistakenly leaving one off that list. The current method, of generating a final watch list by conjunction of the two component lists, is designed to reduce false positives; it is intended to maximize assurance that any hospital on the final watch list is there for good reason.

The fact that the watch list generated by the OSA designed technique was larger than that generated by the FSI® is perhaps not surprising, given that the median performance of the hospitals in this population was superior to the simplified national median performance used by the FSI®. Borderline hospitals according to the slightly higher standards of hospitals in this population may well cross entirely over the border of a standard formulated for a slightly less financially healthy population.

The aggregation methods used in this study, and the demarcation of the watch list, are obviously open to discussion. A large part of the motivation behind the design of this study's original measure was to guarantee a basic set of rigorous, readily manipulable numbers reflective of important aspects of financial performance: the three-point scores for profitability, liquidity, capital structure, and solvency. These numbers can be aggregated in many different ways, and many different watch lists can be constructed from them.

As this paper should indicate, the current methodology is rigorous, in accordance with the literature, and conservative (i.e., designed to minimize false positives); it is minimally committed to any particular theory about the relative importance of its selected indicators. It is also a methodology that is applicable to any hospital, regardless of size, ownership type, or other variables, though comparisons among hospitals with very different characteristics should be undertaken with great caution. As such, it may well be useful for other entities needing to assess the financial viability of some population of hospitals. This utility should remain even if the current aggregation and demarcation methods are modified.

Future research on this topic should focus on the causal origins of hospital watch list status—i.e., the reasons why low-performing hospitals perform relatively poorly, and high-performing hospitals perform relatively well. Such a study should direct such attention by making it easy to determine which features of a particular hospital's performance contribute the most to that hospital's watch list status. Of course, determining why a given hospital's profitability (for instance) is low—as opposed to simply determining that it is low—is likely to require closer individual attention than was within the scope of this study.

Several demarcations of peer groups typically used in studies of hospital financial health⁷³ were simply irrelevant to this study (e.g., teaching status, ownership status, and status as a rural or urban hospital), as every hospital in the current population fell into a single peer group. Several other frequent peer

⁷³ E.g., by Zeller, T. L., Stanko, B. B., & Cleverley, W. O. (1996). A Revised Classification Pattern of Hospital Financial Ratios. *Journal of Accounting and Public Policy*, 15, 161-182.



group markers⁷⁴ (number of beds, net patient service revenue, total revenue, CAH status) proved to have no significant correlation with any of the summary measures used in this study. As such, we can at the very least conclude that hospital financial health within the study population is not simply a matter of size, revenue, or the other variables mentioned above.

Another tentative intermediate conclusion to be drawn from the above facts is that the population of this study is reasonably similar; rural Mississippi hospitals under public ownership may have within-group similarities that outweigh many of their differences. Thus, it is also possible to conclude that there is no immediately obvious reason to think that the watch list is illegitimate because it fails to take into account strong within-group differences that might affect performance on the selected financial indicators without affecting overall financial well-being.

There are some differences in hospitals that lead to differences in financial performance; the only question is whether those differences are unique or whether they can be captured by some set of subgroup determinations. Future research might very productively focus on a more detailed investigation of such possible peer group effects.

One way to do this would be to simply seek out more variables around which to create peer groups; for instance, a hospital's management of a rural health clinic may affect a hospital's financial well-being.⁷⁵ Another, and possibly more productive, alternative would be essentially to reverse the above approach. This latter method would involve constructing peer groups *a posteriori* (by a number of possible methods; one way of doing so is based on Euclidean distance among hospitals according to relevant financial characteristics⁷⁶) and only then determining which characteristics unite those groups and separate them from others. This latter approach would require some expertise regarding healthcare finance generally and the hospitals in this population specifically, but it would be much more focused, and thus likely more productive, than trying to determine *a priori* what characteristics of the current population are relevant to financial well-being.

⁷⁴ Mentioned by, among others: Cleverley, W. O. (1985). Predicting Hospital Failure with the Financial Flexibility Index. *Healthcare Financial Management*, 39(5), 29-37; and Pink, G. H., Holmes, G. M., Thompson, R. E., & Slifkin, R. T. Variations in Financial Performance Among Peer Groups of Critical Access Hospitals. *Journal of Rural Health*, 23(4), 299-305.

⁷⁵ Mentioned by, among others: Holmes, G. M., Pink, G. H., Friedman, S. A., and Howard, H. A. (August 2010). *A Comparison of Rural Hospitals with Special Medicare Payment Provisions to Urban and Rural Hospitals Paid under Prospective Payment* (Final Report No. 98). Chapel Hill: Office of Rural Health Policy. Retrieved from: <http://www.shepscenter.unc.edu/rural/pubs/report/FR98.pdf>; and Pink, G. H., Holmes, G. M., Thompson, R. E., & Slifkin, R. T. Variations in Financial Performance Among Peer Groups of Critical Access Hospitals. *Journal of Rural Health*, 23(4), 299-305.

⁷⁶ Byrne, M. M., Daw, C. N., Nelson, H. A., Urech, T. H., Pietz, K., & Petersen, L. A. (2009). Method to Develop Health Care Peer Groups for Quality and Financial Comparisons Across Hospitals. *Health Services Research*, 44(2), 577-592.

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