Rural Policy Brief

An Analysis of the Agreement of Financial Data Between the Medicare Cost Report and the Audited Hospital Financial Statement

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PURPOSE

Very few studies have thoroughly examined the discrepancies between the financial information in the Medicare Cost Report (MCR) and that in the audited hospital financial statement (FS). Furthermore, this type of study has never been conducted for rural hospitals. In this policy brief, we present the findings from our study, which used statistical methods to examine the agreement between the MCR and the FS of a series of financial measures in rural hospitals. The results are expected to inform policy makers of the limitation inherent in using MCR data as the single source of data to examine the financial performance of rural hospitals.

CONCLUSION AND POLICY IMPLICATIONS

A comparison of MCR and FS data shows considerable agreement for most hospital time-point measurements, especially when arrayed around a line of perfect agreement in a visual presentation. However, some hospital time-point measurements do not agree well. Specifically, in either report, the financial margins are quite small, so a difference will mean that a positive margin in one report, say the MCR, may be a negative margin in the other. For 24% of the data pairs in this analysis, the MCR-reported total margin is more than 5% greater than the FS-reported margin. Based on the observed data, we would predict a considerable range in the magnitude of differences—as much as 7.34 percentage points larger (MCR to FS) or 6.47 percentage points smaller. The fact that a great discrepancy exists between the MCR and the FS in those outliers also suggests that relying on a single source of financial data, such as the MCR, to assess the financial performance of rural hospitals may be inappropriate. The difference in margins helps explain differences of opinion about the financial status of small rural hospitals. When policy analysts and policy makers assess the financial performance of rural hospitals using the best available national data (the MCR), they should recognize that the true financial conditions of hospitals are more accurately portrayed as a range above and below the MCR-reported data.

DATA AND METHOD

We obtained audited financial statements for fiscal years 1997, 1998, and 1999 (including both balance sheet and income statement) from 52 of the 237 rural hospitals from which they were requested in the following eight states: North Carolina, South Carolina, Pennsylvania, Illinois, Wisconsin, Texas, Nebraska, and Montana. The hospital criteria for inclusion in the study were (1) rural status, (2) no more than 100 acute care beds, and (3) not designated as a Critical Access Hospital (CAH) during the study time frame. To make comparisons, the same three years of financial data were extracted from the G worksheet of the Centers for Medicare & Medicaid Services' Hospital MCR Data Set.[1]

Fourteen financial ratios (see Appendix B) were calculated using both MCR and FS data. For each financial ratio, 156 pairs of values (52 hospitals x 3 years = 156 pairs of values) were created from MCR and FS data.[2] Simple descriptive statistics were calculated to describe the general agreement between the two data sources. The average difference between the financial measures and the limits of agreement based on a 95% confidence level were estimated for each ratio using a mixed effects ANOVA model[3] based on the methods suggested by Bland and Altman (1986) and Altman and Bland (1983).

FINDINGS

General Agreement Between MCR and FS Data

Table 1 shows the general agreement between MCR and FS data in the fourteen financial ratios; a graphical summary of the data is presented in Figure 1. In general, the agreement between MCR and FS data ranged from 32% (capital expense) to 90% (equity financing), in terms of the proportion of paired MCR and FS measures where the difference was within 5% of the FS value.[4]

Taking total margin as an example, the results are interpreted as follows:

$ For 8% of the observed data pairs, the MCR and FS values were exactly the same (i.e., perfect agreement).

$ For 59% of the observed data pairs, the difference between the MCR and FS values was within 5% of the FS value.

$ For 41% of the observed data pairs, the difference between the MCR and FS values was more than 5% of the FS value.

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[1]The only exception was that capital expenses (including interest and depreciation expenses) came from the A worksheet of the MCR. Please see Appendix A for details about the MCR worksheet and line of the financial data reported in this brief.

[2]For some ratios, fewer than 156 pairs of measures were used in the analysis because of missing data.

[3]The ANOVA model was adjusted for a random hospital effect and a fixed year effect.

[4]A data pair was regarded as having agreement if $-0.05 \leq \dfrac{\text{MCR} - \text{FS}}{\text{FS} + 0.0001} \leq 0.05$, where 0.0001 is added to the denominator term to avoid division by 0.

The results suggest that more than two-fifths of the data pairs (hospital-years) showed some degree of disagreement in the total margin value between MCR and FS data. Using a logistic regression analysis, which was adjusted for the repeated measurements taken on each hospital over the three-year period, we found that higher total margin, as indicated by the FS data, increased the odds of agreement by 12% for a 1 percentage point increase in the total margin, and by 76% for a 5 percentage point increase in the total margin (p-value = 0.01). This result suggests that better profitability (as indicated by the total margin from FS data) is associated with better agreement in the total margin ratio between MCR and FS data.

In addition, the capital expense ratio had the poorest agreement (i.e., only 32% of data pairs had a difference within 5% of the FS value) among all ratios, a result that was consistent with the common observation that there might be cost-shifting between operating expenses and capital expenses when hospitals reported their financial data to the MCR (Cowles, 1991; Ashby, 1992; Magnus and Smith, 2000).

Table 1.   Descriptive Summary of Agreement Between MCR Ratios and FS Ratios

Financial Ratio	% Perfect Agreement	% Where Difference Was Within 5% of the FS Value	% Where MCR Value > FS Value by More Than 5%	% Where MCR Value < FS Value by More Than 5%
Total margin	8	59	24	17
Reported income index	14	41	10	49
Return on equity	2	63	19	18
Current ratio	5	68	20	12
Growth rate in equity	8	65	15	20
Equity financing	8	90	8	2
Long-term debt to capitalization	17	72	18	10
Days cash on hand*	5	47	12	41
Cash flow to total debt	1	36	23	41
Days in patient accounts receivable*	15	72	16	13
Capital expense	1	32	10	58
Total asset turnover	12	70	7	22
Fixed asset turnover	8	75	12	12
Current asset turnover	7	67	12	21

*Fifteen (9.6%) of the data pairs had a 0 value from the MCR data source. Since we could not distinguish "real zero" from "missing data" (note: MCR coded missing data as "zero"), another analysis excluding those data pairs with zero values from the MCR was conducted. A hospital with extreme differences between the financial measures was also excluded for the secondary estimation of the value for the days cash on hand variable. The new results were that 55% and 80% of data pairs had an agreement of within 5% FS value for days cash on hand and days in patient accounts receivable, respectively.

Figure 1.   Descriptive Summary of Agreement Between MCR Ratios and FS Ratios
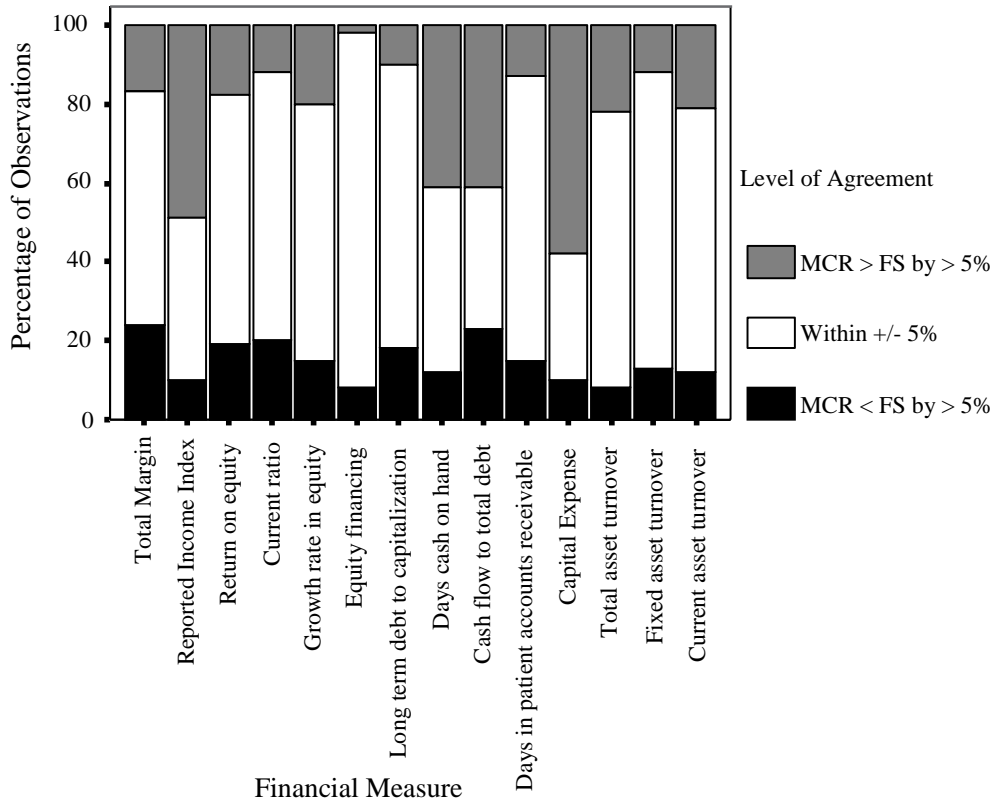
Average Difference Between MCR and FS Ratios

Table 2 shows the average difference between MCR and FS data for each of the fourteen financial ratios. For the ratios related to profitability (total margin, reported income index, and return on equity), liquidity (current ratio), and financing structure (growth rate in equity, equity financing, and long-term debt to capitalization), MCRs generated on average a higher value than FSs. On the other hand, for the ratios related to cash (days cash on hand and cash flow to total debt), the efficiency of using asset to generate revenue (total asset turnover and current asset turnover), days in patient accounts receivable,[5] and capital expense, MCRs generated on average a lower value than FSs. The finding that the profitability ratios (e.g., total margin) calculated using MCR data had, on average, a greater value than those from FS has important policy implications. In a memo to Capitol Hill, the Medicare Payment Advisory Commission (MedPAC) argued that CAH designation should not be extended to all small rural hospitals because "a smaller share of small rural hospitals had negative Medicare margins in 1999 than most other hospital groups" (Medicine & Health, 2002, p. 4). However, MedPAC's conclusion was based on the analysis using the MCR data. Our study using a sample of non-CAH rural hospitals to assess facility-wide profitability suggests that not all rural hospitals are performing as well financially as the MCR data indicate. Although our results must be carefully interpreted because a certain degree of variability and uncertainty may exist in the estimation of the means, our finding suggests that relying on a single source of financial data such as the MCR to assess the financial performance of rural hospitals may be inappropriate.

[5]After excluding data pairs with extreme values from the analysis, the result indicated that on average the MCR generated a higher days in patient accounts receivable than did the financial statements.

Table 2.   Average Difference Between MCR Ratios and FS Ratios

Financial Ratio	Average Difference (MCR Ratio minus FS Ratio)
Total margin	0.44
Reported income index	0.12
Return on equity	0.7
Current ratio	0.06
Growth rate in equity	0.47
Equity financing	0.46
Long-term debt to capitalization	0.15
Days cash on hand	-12.41*
Cash flow to total debt	-0.94
Days in patient accounts receivable	-4.61*
Capital expense	-0.67
Total asset turnover	-0.02
Fixed asset turnover	0.06
Current asset turnover	-0.07

*Another analysis excluding the 15 data pairs (9.6% of total data pairs) with zero values for the MCR measurement was conducted. A hospital with extreme differences between the financial measures was also excluded for the secondary estimation of the value for the Days Cash on Hand variable. The new average estimates were -1.15 for days cash on hand and 2 for days in patient accounts receivable.

Possible Range of the Difference Between MCR Ratios and FS Ratios

Using the Bland-Altman method of agreement analysis, we estimated the 95% limits of agreement for each of the fourteen financial ratios, reported in Table 3. Again, taking total margin as an example, the results are interpreted as follows:

- At a 95% confidence level, the total margin calculated through the MCR data could be greater than the total margin calculated through the FS data by up to 7.34 percentage points; or

- At a 95% confidence level, the total margin calculated through the MCR data could be smaller than the total margin calculated through the FS data by up to 6.47 percentage points.

In other words, based on this result, it might be possible that the "actual" value of total margin for an individual hospital in a certain year could be 7.34 smaller or 6.47 larger than the total margin value observed from the MCR.[6]

[6]One hospital in the sample showed a large difference between the MCR and FS total margins. After excluding this hospital from the analysis, the limits of agreement at 95% confidence level become (-3.89, 4.42).

Table 3. Limits of Agreement (with 95% confidence) Between MCR Ratios and FS Ratios

Financial Ratio	95% Confidence Interval for the Difference Between MCR Value and FS Value (i.e., MCR minus FS)
Total margin	(-6.47, 7.34)
Reported income index	(-5.16, 5.4)
Return on equity	(-12.11, 13.52)
Current ratio	(-0.85, 0.96)
Growth rate in equity	(-11.33, 12.28)
Equity financing	(-6.02, 6.95)
Long-term debt to capitalization	(-9.65, 9.95)
Days cash on hand	(-118.01, 93.18)*
Cash flow to total debt	(-32.31, 30.42)
Days in patient accounts receivable	(-43.67, 34.45)*
Capital expense	(-2.46, 1.12)
Total asset turnover	(-0.17, 0.13)
Fixed asset turnover	(-0.78, 0.9)
Current asset turnover	(-1.35, 1.21)

*Another analysis excluding the 15 data pairs (9.6% of total data pairs) with zero values for the MCR measurement was conducted. A hospital with extreme differences between the financial measures was also excluded for the secondary estimation of the value for the days cash on hand variable. The new 95% limits of agreement were (-30.19, 27.9) and (-10.2, 14.2) for days cash on hand and days in patient accounts receivable, respectively.

LIMITATIONS

This study focused on comparisons of the financial data between the G worksheet of the MCR and the FS. We recognized that the financial data in the G worksheet of the MCR may have limited implication for the assessment of Medicare payment policies due to its limited relevance to the Medicare reimbursement process. Nevertheless, because it is the only section in the MCR that provides standardized financial accounting data like that found on typical financial statements, many researchers and analysts still use the financial data from the G worksheet of the MCR and make policy recommendations accordingly. Therefore, it is still important to examine the difference between the G worksheet of the MCR and the FS.

In addition, the data summary is based on information collected from the 52 hospitals that responded to the data request from among the 237 hospitals contacted for information, resulting in a response rate of 22%. We are only able to comment on the level of agreement between the financial measures for hospitals that responded to the data request.

APPENDICES

Appendix A: MCR Worksheet and Lines of the Financial Data

Financial Ratio	MCR Worksheet and Lines
Total margin	G-3: 3, 25, 31
Reported income index	G-3: 31; G: 51
Return on equity	G-3: 31; G: 51
Current ratio	G: 11, 36
Growth rate in equity	G: 51
Equity financing	G: 27, 51
Long-term debt to capitalization	G: 42, 51
Days cash on hand	G: 1, 2; G-3: 4; A-7: 5
Cash flow to total debt	G: 36, 42; G-3: 31; A-7: 5
Days in patient accounts receivable	G: 4, 5, 6; G-3: 3
Capital expense	G-3: 4; A-7: 5
Total asset turnover	G: 27; G-3: 3, 25
Fixed asset turnover	G: 21; G-3: 3, 25
Current asset turnover	G: 11; G-3: 3, 25

Appendix B: Definitions of Financial Ratios (from The Center for Healthcare Industry Performance Studies)

1. Total margin = [(Excess revenues over expenses)/(Total revenue)]x100
2. Reported income index = (Excess revenues over expenses)/(Change in net assets)
3. Return on equity = [(Excess revenues over expenses)/(Net assets)]x100
4. Current ratio = (Current assets)/(Current liabilities)
5. Growth rate in equity = [(Change in net assets)/(Net assets)]x100
6. Equity financing = [(Net assets)/(Total assets)]x100
7. Long-term debt to capitalization = [(Long-term debt)/(Long-term debt + Net assets)]x100
8. Days cash on hand =
   (Cash + Short term investments)/[(Total expenses – Depreciation expenses)/365]
9. Cash flow to total debt =
   [(Excess revenues over expenses+ Depreciation expenses)/(Current liabilities+ Long-term debt)]x100
10. Days in patient accounts receivable =
    (Net patient accounts receivable)/[Net patient service revenue)/365]
11. Capital expense = [(Interest expense + Depreciation expense)/(Total expense)]x100
12. Total asset turnover = (Total revenue)/(Total assets)
13. Fixed asset turnover = (Total revenue)/(Net fixed assets)
14. Current asset turnover = (Total revenue)/(Current assets)

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