





# Ratio Analysis, Simplified

An Alternative Framework for Analyzing  
the Financial Condition of a Government  
Using Mead's 10-Point Ratios

BY AMAN KHAN AND OLGA MUROVA

**F**inancial ratios are a valuable tool for analyzing an organization's financial condition. While the 10-point ratios and their extensions continue to provide the foundation for much of the discussion on the subject, the methodology underlying the approach has an important weakness: it is heavy on data requirement, which could be extremely time-consuming. Also, the choice of the scale—as used by Ken Brown and subsequently by Dean Mead—to determine the overall financial condition of a government needs further refinement. In this article, we develop a composite measure, an index, based primarily on Mead's ratios, that is simple and easy to analyze and interpret.<sup>1</sup>

## Methodological overview

Several important characteristics of both Brown and Mead's ratios are worth noting.<sup>2</sup>

- Like Brown, Mead uses 10 ratios but refines them considerably in light of the changes in the reporting procedures introduced in 1999,

under the Governmental Accounting Standards Board (GASB) Statement 34, *Basic Financial Statements – and Management's Discussion and Analysis for State and Local Governments*.

- The refined ratios are inherently financial in character, which better reflects the financial conditions of a government, for example, financial position, financial performance, liquidity, solvency, revenues, debt burden, debt coverage, and long-term fixed (capital) assets.
- The use of purely financial ratios makes it possible to collect the relevant data directly from the annual financial reports.
- Both Brown and Mead use a large number of similar-size governments as a benchmark against which the ratios of a government are compared to determine its overall financial condition, as noted previously. For instance, Brown uses 750 small cities of similar size and Mead also uses a large number of cities. It can require an enormous amount of time to gather the relevant data, analyze it, and compare the results.

From a methodological perspective, both Brown and Mead use quartile analysis, an ordered statistic that divides data into four quarters, with each quarter containing 25 percent of the data (Q1 = lowest 25 percent; Q2 = between 25 and 50 percent; Q3 = between 50 and 75 percent; and Q4 = the highest 25 percent) to determine where the ratios of a city in question would fall on a particular quartile. Both authors also use a four-point Likert-type scale that ranges between -1 and +2. For example, if the ratio of a city falls on Q1 it will receive a value of -1; if it falls on Q2 it will receive 0; if it falls on Q3 it will receive +1; and if it falls on Q4 it will receive +2. Finally, to determine the overall ranking of a city relative to the database cities, both authors use a scoring system that ranges between -10 and +20, where 10 or more is considered among the best, 5 to 9 is better than most, 1 to 4 is about average, 0 to -4 is worse than most, and -5 or less is among the worst. It is unclear why this particular scoring system was used, along with, more importantly, the cut-off points for determining the overall financial condition. Brown recognizes this

apparent weakness, however, and suggests that individual researchers could modify the scoring technique if necessary.

The approach suggested here is based on Mead's ratios, rather than Brown's, because they are predominantly financial in character. Also, the information can be easily obtained from a government's annual financial report, which makes the data collection considerably easy. In fact, Mead does a great job of indicating the specific statement in the report, which contains the information one would need to construct a particular ratio. On the other hand, our approach does not require a large number of governments of comparable size to determine the overall financial condition of a government. Additionally, it avoids the ranking system both Brown and Mead use, which is somewhat inconsistent as to the arithmetic distance between the ranks, with a scale that is consistent. The product of this approach is an index, a single measure, based on the same 10 ratios Mead uses.<sup>3</sup> Operationally, a single measure such as an index is more efficient than a measure that compares each individual ratio against a benchmark based on many similar governments. The process, as we noted, can be extremely time-consuming.

Constructing the index

The index suggested here has several important characteristics:

- It ranges between 0 and 1 (for instance, between 0 and 100 percent), which is important for maintaining the consistency of the ratios.
- It ensures that the ratios fall within this range. To achieve this, the original ratios were algebraically reformulated without changing any of the variables in a ratio, except for a minor change in one-R7.

EXHIBIT 1 | COMPARISON OF BROWN-MEAD AND THE ALTERNATIVE FRAMEWORK

BROWN-MEAD SCORE	BROWN-MEAD RATING	ALTERNATIVE FRAMEWORK SCORE (%)	ALTERNATIVE RATING (AND SCALE)
-5 or less	among the worst	0.0-0.2 (0-20)	very poor (1)
0 - (-4)	worse than most	0.2-0.4 (20-40)	poor (2)
1 - 4	about average	0.4-0.6 (40-60)	good (3)
5 - 9	better than most	0.6-0.8 (60-80)	very good (4)
10 or more	among the best	0.8-1.0 (80-100)	excellent (5)

A single measure such as an index is more efficient than a measure that compares each individual ratio against a benchmark based on many similar governments.

- The individual ratios (scores) are then averaged to produce a composite score (for example, an index).
- The index is compared against a five-point Likert-type scale (5 = excellent, 4 = very good, 3 = good, 2 = poor, and 1 = very poor) to determine a government's overall financial condition.

Since the composite score can fall anywhere between 0 and 1 (as in, between 0 and 100), we use quintiles instead of quartile range to make the final ranking consistent with the rating structure Brown and Mead use. Exhibit 1 shows the comparison of the two rating systems.

According to Exhibit 1, for instance, a composite score of 0.25, under our alternative framework, would fall between 0.2 and 0.4, and will be rated as poor—which would be worse than most under the Brown-Mead system. Similarly, a composite score of 0.75

under our system would fall between 0.6 and 0.8 and will be rated as very good; under the Brown-Mead system, it would be better than most. Another significant difference between the two systems is that, while we use the same 10 ratios as Mead, we use a slightly different algebraic formulation for each ratio to ensure that our scores fall within the specified range between 0 (low) and 1 (high). This is necessary to make sure that all the ratios have a positive constant within the defined range, making the index construction simple and also easy to interpret. Exhibit 2 shows the comparison of our ratios with those of Mead, and their corresponding algebraic formulations.

Two things are worth noting in our formulation of the ratios. One, all but three of the ratios (R1, R3, and R10) were algebraically reformulated to ensure that, when converted, our ratios would produce a value between 0 and 1 to help us construct the index.<sup>4</sup> Two, the debt burden ratio (R7), which is per capita debt, was refined to better reflect the extent of debt burden. While per capita debt is frequently used as a measure of debt burden, it has an inherent weakness in that it doesn't provide a precise measure of the severity of debt, especially considering a government's ability to meet its debt obligations. For instance, two governments with identical debt but different population size will produce different ratios—providing different pictures of the burden, which may not reflect the actual severity of

**EXHIBIT 2 | ALGEBRAIC FORMULATION OF MEAD'S RATIOS: ORIGINAL AND ALTERNATIVE FORMULATION**

MEAD'S RATIOS	ALGEBRAIC FORMULATION (A= numerator and B= denominator)	ALTERNATIVE FORMULATION OF MEAD'S RATIOS	MEAD'S RANKING	INTERPRETATION	RANKING UNDER ALTERNATIVE FORMULATION
<b>R1:</b> Short-run financial position: Unreserved general fund balance/General fund revenues	A/B	A/B (Unchanged)	High	Good	High
<b>R2:</b> Liquidity: General fund cash and investments/ (General fund liabilities – General fund deferred revenues)	A/B	A/(A+B)	High	Good	High
<b>R3:</b> Financial performance: Change in governmental activities net assets/Total governmental activities net assets	A/B	A/B (Unchanged)	High	Good	High
<b>R4:</b> Solvency: (Primary government liabilities – Deferred revenues)/Primary government revenues	A/B	B/(A+B)	Low	Good	High
<b>R5:</b> Revenues, A: (Primary government operating grants + Unrestricted aid)/Total primary government revenues	A/B	B/(A+B)	Low	Good	High
<b>R6:</b> Revenues, B: (Net expense, or revenue, for governmental activities/Total governmental activities expenses) x -1	(A/B) x (-1)	1-((A+B)/B)	Low	Good	High
<b>R7:</b> Debt burden: Total outstanding debt of the primary government/Population	A/B	1-(Total Debt/Total Assets (Changed))	Low	Good	High
<b>R8:</b> Coverage, A: Debt service/Non-capital governmental funds expenditures	A/B	(B-A)/B	Low	Good	High
<b>R9:</b> Coverage, B: (Enterprise funds operating revenue + Interest expense)/Interest expense	A/B	(A/B)/((A/B)+1)	High	Good	High
<b>R10:</b> Capital assets: (Ending net value of primary government capital assets – Beginning net value)/Beginning net value	A/B	A/B (Unchanged)	High	Good	High

the debt. A better alternative would be to use total assets rather than population because it is the size of the asset that, in the final analysis, determines the ability of a government to incur debt (for instance, its ability to borrow).<sup>5</sup> Additionally, obtaining the information should not be difficult since it is easily available from the annual financial reports.

Another point worth noting in our approach is that all the ratios we use have the same weight. Both Brown and Mead assume that the ratios are of equal importance and therefore have the same weight, although Brown leaves the option to future users to make any changes. Our index also doesn't make changes in the weight structure, keeping it the same as Brown and Mead—but, like Brown, it leaves the door open.

**EXHIBIT 3 | APPLICATION OF THE METHOD**

MEAD'S RATIOS	ALGEBRAIC EXPRESSION	APPLIED TO MEAD'S STUDY	APPLIED TO LUBBOCK (2020)
<b>R1:</b> Short-run financial position	A/B	0.37	0.33
<b>R2:</b> Liquidity	A/(A+B)	0.90	0.86
<b>R3:</b> Financial performance	A/B	0.07	0.47
<b>R4:</b> Solvency	B/(A+B)	0.47	0.29
<b>R5:</b> Revenues–A	B/(A+B)	0.90	0.96
<b>R6:</b> Revenues–B	1-((A+B)/B)	0.72	0.72
<b>R7:</b> Debt burden	1-(A/B)	0.77	0.99
<b>R8:</b> Coverage–A	(B-A)/B	0.84	0.76
<b>R9:</b> Coverage–B	(A/B)/((A/B)+1)	0.98	1.00
<b>R10:</b> Capital assets	A/B	0.05	0.11
<b>Index</b> = (R1:R10)/10	Arithmetic average	6.07/10 = 0.607	6.49/10 = 0.65

**RATIO CALCULATIONS** *[as applied to Mead's study]*

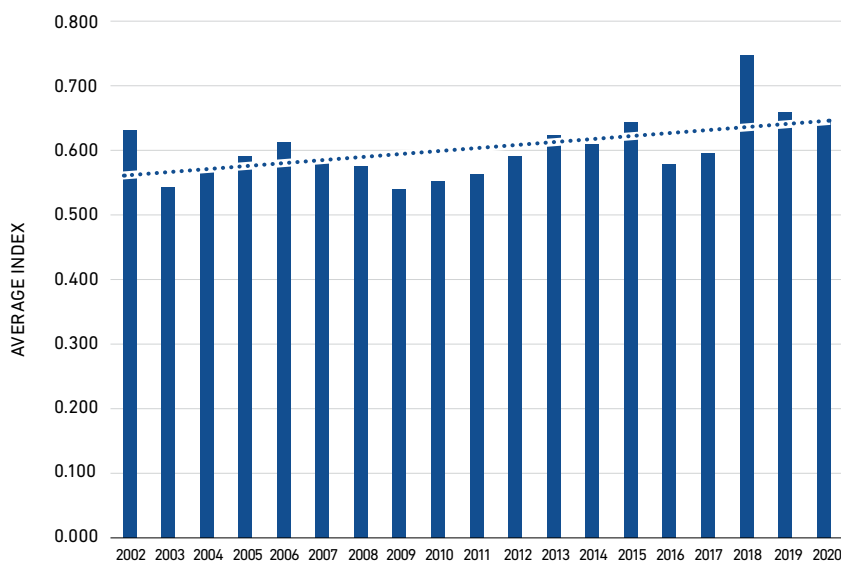
- R1** = A/B (Stays the same)  
= 0.37 or 37%
- R2** = A/(A+B)  
=  $4,377,368 / (4,377,368 + (796,058 - 306,473)) = 4,377,368 / 4,866,953 = 0.899$  or 89.9%
- R3** = A/B (Stays the same)  
= 0.07 or 7%
- R4** = B/(A+B)  
=  $(15,877,339 + 1,425,380 + 627,815 + 19,928,578) / ((43,441,261 - 179,857) + (15,877,339 + 1,425,380 + 627,815 + 19,928,578)) = 37,859,112 / (43,261,404 + 37,859,112) = 37,859,112 / 81,120,576 = 0.47$  or 47%
- R5** = B/(A+B)  
=  $(15,877,339 + 1,425,380 + 627,815 + 19,928,578) / ((1,425,380 + 2,666,347) + 37,859,112) = 37,859,112 / (4,091,727 + 37,859,112) = 37,859,112 / 41,950,839 = 0.90$  or 90%
- R6** =  $1 - ((A+B)/B)$   
=  $1 - (15,921,202 + 22,228,063) / 22,228,063 = 1 - (6,306,861 / 22,228,063) = 1 - 0.28 = 0.72$  or 72%
- R7** =  $1 - (A/B)$   
=  $1 - (22,981,400 + 11,603,300) / 151,642,682 = 1 - (34,584,700 / 151,642,682) = 1 - 0.23 = 0.77$  or 77%
- R8** = (B-A)/B  
=  $((26,518,698 - 4,601,515) - 3,500,823) / (26,518,698 - 4,601,515) = 18,416,360 / 21,917,183 = 0.84$  or 84%
- R9** =  $((A/B) / ((A/B) + 1))$   
=  $(11,257,893 / 232,908) / ((11,257,893 / 232,908) + 1) = 48.3362 / 49.3362 = 0.98$  or 98%
- R10** = A/B (Stays the same)  
= 0.05 or 5%

**Application of the index**

To determine the soundness of our index—in other words, how well it compares with Mead's ratios—we apply it in two stages: first, to the study Mead uses, and, next, to a mid-size city in the State of Texas. For the latter, we use ratios for several years to provide an assessment of the financial condition of the city over time, although it is not necessary to use multiple years. A single year to determine the current financial condition should suffice. Exhibit 3 shows the results of our approach, when applied to Mead's study, as well as to the sample city.

As shown in Exhibit 3, when applied to Mead's study, our approach produces a composite score (arithmetic average) of 0.607, or 60.7 percent, which puts the city's financial condition as very good [better than most] and compares well with Mead's own ratio. The score Mead's analysis produced was 5, which means the financial condition of the city, according to Mead, was better than most [very good]. Interestingly, the scores produced by both approaches place the city at the lower end of the scale—the lower end of better than most and very good.

Next, we apply the index to the City of Lubbock, Texas, a mid-size city that has been growing slowly but consistently over the years. It has a good economic base that is relatively stable and healthy, with a strong foundation in agriculture, followed by advanced technology, energy, financial services, healthcare and bioscience, education, and hospitality. Lubbock is also the central hub of the South Plains region, one of the largest cotton-producing regions in the world<sup>6</sup>—which, along with energy, healthcare services, and education provides a financial safety net against the economic ups and downs that often affect larger communities. This is evident in the overall financial condition of the city. For instance, the composite score for Lubbock for 2020 was 0.65, or 65 percent (see Exhibit 3), which rates the city's overall financial condition as very good [better than

**EXHIBIT 4** | FINANCIAL INDEX FOR LUBBOCK

most]. Exhibit 4 shows the composite scores for the city over a 19-year period, from 2002 to 2020.

As Exhibit 4 shows, the scores range between 0.5 and 0.7, indicating that the financial condition of the city has been consistently between good and very good. Looking at the trend and, more importantly, the growth in population—which has been increasing steadily—it seems unlikely that the trend will change anytime soon. In fact, we can use this information to forecast the future financial condition of the city. This is an important advantage of ratio analysis: If one has data on past financial ratios, they can be easily used to forecast the financial condition of a government for any number of years.

## Conclusion

While ratio analysis has its strengths and limitations, Mead's 10-point ratios will continue to be used as firsthand approximation of the financial condition of a government. Also, as the financial conditions of a government change, or as changes are made in the reporting requirements by GASB, the ratios will need to be updated to reflect the change. The real challenge, though, is to find a suitable approach for analyzing the ratios without placing a heavy demand on time or data requirements—but the approach must be methodologically sound, and, more importantly, appeal to an organization that is interested in using the ratios. The advantage of the approach suggested here is that it is simple and can be applied to any level of government, as well as to business enterprises, which have a long history of using ratio analysis. Furthermore, the suggested methodology can be expanded to include any number of ratios, not just 10. ■

**Aman Khan** is a professor at Texas Tech University, Lubbock, Texas.

**Olga Murova** is an associate professor at Texas Tech University, Lubbock, Texas.



## THE HISTORY OF FINANCIAL RATIOS

Financial ratios have been extensively used in the private sector since the 1920s, following the development of the income tax code in 1913 and the establishment of the Federal Reserve System in 1914. In government, they drew considerable attention, first with the publication of ICMA's Financial Trend Monitoring System, followed by two major developments—the publication of Ken Brown's 10-Point Ratios and the subsequent refinement by Dean Mead. Since then, there have been numerous studies suggesting ways to improve the ratios, along with an extensive array of applications of these ratios in government.

### For more information:

- *Performance Audit of City's Financial Condition*, Office of the Auditor, City of San Diego, California, 2015.
- *Measuring San Jose's Financial Condition*, Office of the Auditor, City of San Jose, California, 2016.
- *Indicators of Financial Condition: A Comparison of Chicago to 12 other Cities*, The Civic Federation, 2013.
- William C. Rivenbark and Dale J. Roenigk, "Implementation of Financial Condition Analysis in Local Government," *Public Administration Quarterly*, Summer 2011.

<sup>1</sup> Dean Michael Mead, "The New Financial Statements: Reconnecting with Basics of Financial Management" *Journal of Public Affairs Education*, April 2001.

<sup>2</sup> Kenneth W. Brown, "The 10-Point Test of Financial Condition: Toward an Easy-to-Use Assessment Tool for Smaller Cities," *Government Finance Review*, December 1993; *ibid*.

<sup>3</sup> An important contribution of the approach suggested here is that it does not have to be restricted to 10 ratios both Brown and Mead use; it can be applied to any number of ratios, such as those suggested by ICMA (1980), and for any level of government or type of organization—public, private, and quasi-public. The only requirement is that the algebraic formulations will be different in each situation, depending on the type of ratio, but the overall framework for analysis will remain the same. See: J. Griesel and J. Leatherman, *Evaluating Financial Condition, A Handbook for Local Government*, ICMA Fiscal Indicators Resource Guide, Kansas State University, Office of Local Government, 2005.

<sup>4</sup> Interestingly, under our system, as shown in Exhibit 3, the algebraic formulation of R6 produces exactly the same result as Mead's but has the advantage of not needing to be multiplied by -1 to avoid a negative value, which could not be explained otherwise.

<sup>5</sup> We assume here that total debt will not exceed total assets, which is, by and large, the case with state and local governments because of the restrictions on these governments regarding how much they can borrow,

given their overall financial condition, in particular the size of their assets. The logic of the argument is simple: It is the size of the asset that determines the ability of a government to borrow. There is a parallel here with firms and businesses in that when a firm defaults, it sells off its assets to meet its debt obligations—first to the debt holders, and then to the stockholders. Likewise, if a government defaults, it may be required to do the same. For instance, when the City of Cleveland, Ohio, defaulted in 1978 for failing to repay \$14 million in loans it owed to six local banks and subsequently was unable to market its bonds for almost two years, it was on the verge of selling off some of its assets to meet its debt obligations to the debt holders until the state came to its rescue, according to Case Western Reserve University, *Encyclopedia of Cleveland History*.

This does not, however, apply to U.S. government debt because it does not have the same restrictions for borrowing as the state and local governments do. For instance, the total assets of the government were \$4.9 trillion in FY 2021, compared to its debt for the year of \$34.8 trillion, which includes \$22.3 trillion in actual debt, \$10.2 trillion in federal employee and veterans benefits payable, and the rest on interest payable (see: Bureau of the Fiscal Service, *Financial Report of the United States*). The government is able to borrow more than its assets because it has a variety of instruments that it can use without necessarily requiring it to sell off its assets to meet its debt obligations.

<sup>6</sup> *Cotton Production Regions of Texas*, Texas A&M AgriLife Extension