What Drives General Obligation Bond Ratings for North Carolina's Counties?

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Between 1990 and 2000, North Carolina experienced a 21 percent increase in population.[1] Since 2000 the state's rapid population growth has continued. The influx of new residents has placed a burden on the state's infrastructure. The American Society of Civil Engineers has cited many current infrastructure needs in the state, including the following:[2]

- $5.92 billion in wastewater needs

- 55 percent of school buildings with at least one inadequate feature

To help finance projects to meet these needs, the state and its local governments must incur debt. Nearly all this debt will be in the form of bonds that are marketed in public sales.[3] Debt that is sold publicly is marketed through investment bankers to interested individuals, mutual funds, banks, and other investors, and it is typically rated by bond rating agencies. Bond ratings directly affect the interest rates charged for debt (the total amount a local government owes) and debt service (the amount that is due each year). A high or superior bond rating can save considerable amounts of money for any governmental entity issuing large amounts of debt. As a result, public officials in-

volved in decisions to finance major infrastructure projects want to know what variables can result in high or improved bond ratings.

The potential variables that result in high or improved bond ratings fall into four categories: management strategies/administrative, debt, economic, and

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What Is a Moody's Credit Rating?

Following are the generic rating classifications used by Moody's, from Aaa to Caa, accompanied by explanations of their meaning. Moody's applies the numeric modifiers 1, 2, and 3 in each classification from Aa to Caa. The modifier 1 indicates a ranking in the higher end of the generic rating category; the modifier 2, a ranking in the middle of the generic rating category; and the modifier 3, a ranking in the lower end of the generic rating category.

Aaa
Bonds rated **Aaa** are judged to be of the best quality. They carry the smallest degree of investment risk.

Aa (Aa1, Aa2, Aa3)
Bonds rated **Aa** are judged to be of high quality by all standards. Together with the Aaa group, they are generally known as high-grade bonds.

A (A1, A2, A3)
Bonds rated **A** possess many favorable investment attributes and are considered to be upper-medium-grade obligations.

Baa (Baa1, Baa2, Baa3)
Bond rated **Baa** are considered to be medium-grade obligations; that is, they are neither highly protected nor poorly secured.

Ba (Ba1, Ba2, Ba3)
Bonds rated **Ba** are judged to have speculative elements; their future cannot be considered well assured.

B (B1, B2, B3)
Bonds rated **B** generally lack the characteristics of a desirable investment. Assurance of interest and principal payments or of maintenance of other terms of the contract over any long period may be small.

Caa (Caa1, Caa2, Caa3)
Bonds rated **Caa** are of poor standing. Such issues may be in default, or elements of danger may be present with respect to principal or interest.

Ca
Bonds rated **Ca** represent obligations that are highly speculative. Such issues often are in default or have other marked shortcomings.

C
Bonds rated **C** are the lowest-rated class of bonds. They can be regarded as having extremely poor prospects of ever attaining any real investment standing.

Source: From *Moody's Approach to Local Government Financial Analysis*, by Illiana Pappas, James Mintzer, and Linda Lipnick (New York: Moody's Investors Service, 2002).

financial. Moody's Investors Service has stated, "Each of the four credit categories carries equal weight."[4]

This article reports the results of a study examining how selected variables from the four credit categories influence general obligation (G.O.) bond ratings for the seventy-seven North Carolina counties that have a Moody's Investors Service rating. (For an explanation of Moody's ratings, see the sidebar on page 41.) The study used Moody's ratings for two reasons. First, Moody's rates the G.O. bonds of more North Carolina counties than do its two competitors, Standard & Poor's and Fitch Ratings: 77, versus 73 and 15, respectively. Second, earlier research on which the study builds uses Moody's ratings exclusively.

The article also reports what variables influence bond ratings for North Carolina counties when the counties are grouped by population: large (200,000 and up), medium-sized (50,000–199,999), and small (49,999 and below).

Background

The approach to identifying the bond rating variables in this study is based on an initial analysis by economics professors Paul Farnham and George Cluff of Georgia State University.[5] Unlike the Farnham and Cluff study, which focused on bond rating variables for municipalities nationwide, this study looks exclusively at variables affecting North Carolina's counties. (For examples of the bond ratings of selected North Carolina counties, see the sidebar on this page.)

Methodology

To determine what variables are currently influencing North Carolina counties' G.O. bond ratings, a linear regression and a correlation matrix were employed.[6] The linear regression analyzed variables influencing the bond ratings for all North Carolina counties, and the correlation matrix evaluated the effect of these variables on the bond ratings when North Carolina counties were grouped by population.

All the variables studied in the linear regression and the correlation matrix were ones that Moody's or Farnham and Cluff identified as important to local government G.O. bond ratings. (For a list of the variables, see Table 1.) The variables represented all four of Moody's rating categories.

Results and Discussion

First, I present and discuss the results of the regression analysis. Then I present the results from the correlation matrix relating to North Carolina counties of different population groups.

Regression Analysis

Of the eleven variables selected, six were statistically significantly related to the G.O. bond ratings for all counties: percentage of property tax levy collected, net debt per capita, net debt as a percentage of appraised property valuation, median household income, population per square mile, and property tax growth. The remaining five variables—full value per capita, percentage of housing units built before 1940, percentage change in population, fund balance, and change in fund balance—had statistically nonsignificant relationships. Both the significant and the nonsignificant variables related to bond ratings in ways that were expected, unexpected, and, in a few cases, thought-provoking.

Expected Findings

As expected, three variables had significant relationships with North Carolina G.O. bond ratings: percentage of property tax levy collected, net debt per capita, and median household income. The first and third variables had positive relationships; the second variable, a negative relationship.[7]

Unexpected Findings

Three other variables that were significantly related to county G.O. bond ratings produced surprising findings:

- **Net debt as a percentage of appraised property valuation.** This variable had a positive relationship with G.O. bond ratings of North Carolina's counties. That is, when the level of net debt as a percentage of appraised property valuation went up in a county, so did its bond rating. This finding contrasts with literature suggesting that the more

Aa

Table 1. **Variables Studied, by Category**

Category	Variable
Administrative	Percentage of property tax levy collected
Debt	Net debt per capita
	Net debt as a percentage of appraised property valuation
Economic	Full value per capita
	Median household income
	Percentage of housing units built before 1940
	Population per square mile
	Percentage change in population (1990–2000)
	Property tax growth (2001–5)
Financial	Fund balance
	Change in fund balance (2001–5)

debt a county or another local government carries, the higher the chance it will see adverse credit implications.[8] The fact that the largest North Carolina counties, which have the highest bond ratings, are carrying, on average, more than double the net debt as a percentage of valuation that the medium-sized and small counties carry, may explain this finding.

- **Property tax growth.** Property tax growth had a negative relationship with county bond ratings.[9] In other words, as the property tax grew in a county, the bond rating went down. This is inconsistent with Moody's reports citing property tax growth as an important variable in sustaining or increasing a bond rating.[10] One explanation may be that between 2001 and 2005, a significant number of North Carolina's small and medium-sized counties saw a relatively larger increase in their property tax revenues than large counties did. More research is needed relating property tax growth and bond ratings in jurisdictions of different sizes.

- **Population per square mile.** Population per square mile, or population density, showed a positive relationship with G.O. bond ratings. Thus, as population density increased in a county, its bond rating rose. This finding might be expected because it suggests that as a county becomes more urban, its wealth and its economic diversity are likely to increase. Accordingly, so is its bond rating. However, increasing population density will support a higher bond rating only if the increases are accompanied by growing wealth. If they are accompanied by proportional increases in economic or social problems, a higher bond rating is unlikely.

Four variables that were not significantly related to G.O. bond ratings also produced surprising findings.

- **Fund balance and change in fund balance.** The most unexpected findings were that fund balance and change in fund balance did not signif-

icantly affect a bond rating. Moody's and other rating agency literature identify fund balance as an important variable in a G.O. bond rating.[11] A possible explanation of why fund balance and change in fund balance were not related to bond ratings is that North Carolina local governments have relatively high levels of fund balance, compared with local governments in most other states. Thus, when a North Carolina county's high level of fund balance goes up or down marginally, it does not affect the county's bond rating.

- **Full value per capita.** "Full value per capita" is the full market value of all taxable property within a county, divided by the county's population. This variable is used to look at a county's property wealth. Moody's considers it to be one of the most important economic factors underlying a local government's G.O. bond rating.[12] One possible explanation for its statistical insignificance in the present study relates to North Carolina's property-rich coastal and mountain counties. Properties in these counties have high valuation levels per capita, but the counties themselves have average bond ratings. Despite the high property values, median household incomes are not as high as in some of the state's metropolitan counties. Many of the coastal and mountain counties' residents are retirees living on fixed incomes. Moreover, the counties' economies rely heavily on tourism, an industry that generally offers low-paying jobs. For coastal counties, hurricanes might limit the bond ratings, and for mountain counties, remoteness.

- **Percentage change in population.** A possible reason for the insignificance of this variable is that North Carolina's small and medium-sized counties experienced a relatively larger increase in population than did the large counties, which have higher G.O. bond ratings. This trend could continue as North Carolinians search for less expensive housing in counties neighboring the state's large counties. For example,

Union County, which has become a bedroom community for Charlotte, experienced a 32 percent increase in population from 1990 to 2000. This increase was more than twice that in Mecklenburg County, where Charlotte is located.

- **Percentage of housing units built before 1940.** This variable, which Farnham and Cluff found to influence bond ratings significantly, did not significantly affect North Carolina counties' G.O. bond ratings.

Correlation Matrix

Some of the more interesting findings from the correlation matrix were similarities and differences among the large (N = 10), medium-sized (N = 35), and small (N = 32) counties in the sample with regard to the relationship of the variables studied to county G.O. bond ratings. The variables that displayed similarities were percentage of property tax levy collected, full value per capita, and percentage change in population. The variables that exhibited unexpected differences were net debt per capita, net debt as a percentage of appraised property valuation, fund balance, and change in fund balance.

Expected Findings
Percentage of property tax levy collected, full value per capita, and percentage change in population positively correlated with G.O. bond ratings in all three county population groups. I expected these correlations because Moody's identifies each of these variables as influential in a local government's G.O. bond rating.[13]

Although the finding of a positive correlation for full value per capita was not surprising, it differed from the results of the regression analysis. The conflict was due to the ability of the regression analysis to eliminate the influence of other variables on the relationship between bond ratings and full value per capita.

Unexpected Findings
- **Net debt per capita and net debt as a percentage of appraised property valuation.** Both debt variables had

a positive relationship with G.O. bond ratings for the large counties. In other words, the more debt held by a large county, the higher the bond rating it obtained. In contrast, for both the medium-sized and small counties, the debt variables did not correlate with bond ratings. This difference may be explained by the ability of North Carolina's more affluent large counties to carry relatively larger sums of debt, in the view of Moody's, than the small and medium-sized counties can. A possible reason for the finding regarding the large counties is that Moody's considers North Carolina counties' G.O. debt levels, even for the large counties, to be moderate compared with debt levels for counties and other local governments in many other states.

- **Fund balance and change in fund balance.** The two financial variables correlated negatively in some of the population groups. In the large-county category, fund balance correlated negatively with bond ratings. One possible explanation is that North Carolina's lower-rated large counties are carrying higher levels of fund balance than the

Baa

higher-rated large counties, in an attempt to improve their finances and bond ratings. Similar to the findings of the regression analysis on changes in fund balance, the findings of the correlation matrix showed change in fund balance to have a negative relationship with medium-sized county bond ratings. Both small and large counties' bond ratings did not significantly correlate either negatively or positively with change in fund balance. This finding prompts the question, Why would increases in fund balance not result in higher bond ratings, or why would decreases in fund balance not result in lower bond ratings? As previously stated, Moody's identifies fund balance as important to a bond rating. A reason for this finding, again, might be the healthy or relatively high levels of fund balance that North Carolina counties carry. Another reason might be that marginal changes in fund balance may have little effect on bond ratings.

Limitations and Future Research

Although the study produced some interesting results, the research methodology had a few limitations. First, because of data and time constraints, the study used only one administrative variable. Second, the study examined the effect of only eleven variables on G.O. bond ratings and only for North Carolina counties with a Moody's bond rating. Third, the study looked at North Carolina counties only as one large group and three smaller groups. Because of these groupings, the study could not identify all of North Carolina counties' individual influential variables. Each county may have different variables contributing to its bond rating. Hence, this study should not be used as a substitute for an evaluation to determine what variables are influencing a specific county.

Future research on North Carolina counties' G.O. bond ratings could shed more light on the subject. It might look at other administrative variables and their effect on bond ratings, because local government officials have more potential to control such variables. Future research also might statistically evaluate the effect of other debt, economic, financial, and factors on bond ratings of counties and other local gov-

Table 2. Categories, Variables, and Government Influence

Category	Variable	Government Influence
Administrative	Percentage of property tax levy collected	Higher
Debt	Net debt per capita	Higher
	Net debt as a percentage of appraised property valuation	Higher
Economic	Full value per capita	Lower
	Median household income	Lower
	Percentage of housing units built before 1940	Lower
	Population per square mile	Lower
	Percentage change in population (1990–2000)	Lower
	Property tax growth (2001–5)	Lower
Finance	Fund balance	Higher
	Change in fund balance (2001–5)	In between

Note: **Higher** = The variable can be affected by year-to-year decisions of the local government. There is a stronger link between government actions and changes in the variable. **Lower** = The variable is difficult for government to affect in the short run. It is subject to influence by government actions only in the long term, and it may be affected as much or more by private-sector actors.

ernments in North Carolina. Finally, it might study the complex relationships between a variable and a bond rating and the factors that affect this relationship.

Conclusions

Several conclusions emerge from this study. First, local government officials may be able to affect the G.O. bond ratings of their county positively. For example, of the six variables that influenced bond ratings, local officials can effectively control three: percentage of property tax levy collected, net debt per capita, and net debt as a percentage of appraised property valuation. (See Table 2).

Second, economic variables are important to G.O. bond ratings. Of the six variables that influenced bond ratings, three were economic. Although economic variables can be more difficult to control than administrative, debt, or financial variables, local government managers should become aware of these variables and understand their potential ramifications for a county's bond rating.

Economic variables are important to G.O. bond ratings.

Third, there is a complex relationship between a variable and a G.O. bond rating. A variable's relationship to or effect on a G.O. bond rating can be affected by the presence, the absence, the strength, or the weakness of other variables affecting bond ratings in specific local governments. In addition, a variable's relationship can be affected by certain situational conditions, such as a state's finance regulations (for example, North Carolina's fund balance regulations). These interactions can cause a variable's relationship to a G.O. bond rating to vary significantly. Because a variable's relationship to a G.O. bond rating can vary significantly from county to county, each county should determine what factors are influencing its bond ratings instead of relying exclusively on general information.

Notes

1. U.S. Census Bureau, Population Finder, http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&_name=&_state=04000US37&_county=&_cityTown=&_zip=&_sse=on&_lang=en&pctxt=fph.

2. American Society of Civil Engineers, "Report Card for America's Infrastructure: North Carolina [2005]," American Society of Civil Engineers, www.asce.org/reportcard/2005/page.cfm?id=73.

3. North Carolina Department of State Treasurer, *The State Treasurer's Annual Report 2004–2005* (Raleigh: North Carolina Department of State Treasurer, 2005),www.nctreasurer.com/dsthome/OfficeOfTheTreasurer/AnnualReport.htm.

4. Linda Lipnick et al., *The Determinants of Credit Quality: A Discussion of Moody's Methodology for Rating General Obligation, Lease-Backed and Revenue Bonds* (New York: Moody's Investors Service, 2002), 3.

5. Paul G. Farnham and George S. Cluff, "Municipal Bond Ratings: New Results, New Directions," *Public Finance Quarterly* 10 (1982): 427–55.

6. A full description of methodology and a more detailed report of results appear in *What Drives General Obligation Bond Ratings for North Carolina's Counties?* by Creighton Avila, a paper presented at the School of Government's Capstone Conference on Practical Research for Public Officials, April 20, 2007. This paper may be obtained by contacting the UNC at Chapel Hill Master of Public Administration Program at mpastaff@unc.edu or 919.962.0425.

7. Lipnick et al., *Determinants*, 6.

8. Linda Lipnick et al., *Moody's Approach to Analyzing Municipal Long-Term Debt: A Focus on Local Government Analysis* (New York: Moody's Investors Service, 2004), 2.

9. In a 2003 publication, Patrick Mispagel and his coauthors state, "[E]conomic growth is not necessarily a harbinger for high credit quality. While consistent growth of assessed valuation offers the potential for increased property tax revenue, sales tax revenue, and other economically driven revenues, it also introduces new challenges, including increased demand for services and the need for continuous investment in infrastructure." Patrick Mispagel et al., *How Moody's Examines Economic Conditions as a Factor in Its Local Government Credit Analysis: A Review of the Quantitative and Qualitative Economic Variables Considered in the Bond Rating Process* (New York: Moody's Investors Service, 2003), 2.

10. Ibid., 6.

11. John Incorvaia et al., *Your General Fund Balance—One Size Does Not Fit All!* (New York: Moody's Investors Service, 2002), 4.

12. Lipnick et al., *Determinants,* 3.

13. Ibid., 3–6.