

## **THE RELATIONSHIP BETWEEN MUNICIPAL BOND RATINGS AND THE QUALITY OF LIFE IN AMERICAN CITIES, 1970-1990**

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**ABSTRACT:** *This paper examines the relationship between Moody's bond ratings and variables that represent the quality of life in American cities. The 25 largest cities as measured by population in 1970 formed the units of analysis. Thirteen quality of life variables were tested. The relationships were calculated using correlation analysis (Spearman correlation coefficients). The conclusion is that municipal bond ratings can be useful to urban geographers interested in the quality of life in U.S. cities. Bond ratings can be considered self-fulfilling prophecies in that low bond ratings force interest rates up, necessitating higher taxes and higher fiscal deficits. The result is a further weakening of the city's financial structure, and perhaps a further lowering of the bond rating. Thus, cities with low bond ratings may face unstable or declining futures, whereas cities with higher bond ratings may face improving, brighter futures.*

### **INTRODUCTION**

Over the last several decades, central cities of the United States have experienced dramatic demographic and economic change. Faced with stagnant or declining tax bases and rising demands for services, most cities borrow large sums of money in order to provide the services demanded of them. The needed funds are often borrowed by selling general obligation bonds or revenue bonds. A city's ability to sell bonds and negotiate terms of sale are strongly influenced by its municipal bond rating. How secure is a city's debt? That is the question agencies such as Moody's try to answer when they rate a municipal bond. The factors considered include the municipality's debt level vs. property taxes, the value of homes and businesses that can be taxed, infrastructure, job base, and demographics (i.e., are there enough people paying taxes to balance out retirees or those on welfare?).

A low municipal bond rating is not just a slap in the face to civic pride. It means investors will not be enthusiastic about the bonds that a particular city is trying to sell. Less enthusiasm means fewer takers, and low demand means it is

more expensive to borrow money. More expensive money brings out the budget slashers: firefighters get fired, libraries close, tolls go up, and overall quality of life generally decreases.

The potential value of bond ratings to geographers lies in their ability to represent the quality-of-life and in the insight they provide into urban conditions throughout the nation. The question to be answered, then, is do quality of life rankings correlate to any degree with cities bond ratings -- i.e., Moody's municipal bond ratings? This paper will examine the relationship between Moody's bond ratings and variables that represent the quality of life in American cities. Thirteen quality of life variables are tested. The bond ratings data come from Moody's Municipal and Government Manuals (1967-1995). The social and economic data used come from County and City Data Book (1977,1988, 1994). The relationships are calculated using correlation analysis (Spearman correlation coefficients). Conclusions are drawn as to the usefulness of municipal bond ratings to urban geographers interested in the quality of life in U.S. cities.

## **BACKGROUND**

When municipalities need very large sums of money for construction of schools, streets, sewers, or other services, long term financing is often necessary. The two traditional long-term debt devices are revenue bonds and general obligation bonds. Revenue bonds are used to finance the construction of services for which a user charge is possible. Revenue bonds are secured by the user charges and a mortgage on the properties built with the loan funds. Because these bonds are secured by user charges, their quality does not necessarily reflect the economic and social conditions of the city involved. If the services desired do not have a user charge associated with them, municipalities can borrow by selling general obligation (GO) bonds. Instead of being secured by user charges and/or a mortgage on the properties built, the municipality pledges its "full faith and taxing power" for payment of the bonds. Thus, unlike revenue bonds, the quality of the general obligation bond is dependent on the economic and social conditions in the issuing community (Public Securities Association, 1990).

When a community sells general obligation bonds, buyers often insist that they be given some idea of the riskiness of their loans. Institutional investors have their own analysts to evaluate risk, but individuals have to count on the rating agencies. Municipal bonds have long been considered among the safest investments. And most still are. But the tax revolts of the late 1970s effectively left municipal governments with less money to pay the public bills. And since President Ronald Reagan's "new federalism" mandated that states pick up expensive spending programs, obligations have grown while expensive social problems have swelled (Economist, 1991).

A rating ranks each bond (security) according to what the rating agency believes is its creditworthiness; such a rating is considered obligatory for the sale of any major issue. Smaller issues, however, can sometimes be marketed on a nonrated basis. The ratings field is dominated by three agencies: Moody's Investor Service, Inc., Standard & Poors Corporation, and Fitch Investor Service, Inc. All three are located in New York City. Moody's has been rating municipal bonds

since 1918. Standard & Poors started rating municipal bonds in 1940. In 1990, Moody's<sup>1</sup> had about 40,000 outstanding municipal bond ratings and currently assigns a rating to approximately 6,000 new issues a year. Standard & Poors had about 23,000 municipal bond ratings outstanding in 1990, and it assigns a rating to a further 3,800 or so new issues each year. Fitch has been rating bonds since 1923. All three also rate short-term notes, commercial paper, and obligations secured by insurance, bank, and other credit enhancements (Public Securities Association, 1990; Lamb and Rappaport, 1987; White, 1985).

This study will use the bond ratings provided by one of the three ratings agencies, Moody's Investor Service, Inc. The agency is the oldest, the largest, and provides the most extensive coverage of municipal issues. In addition, the company generally has a good reputation and its rating data are readily available (Moody's Municipal and Government Handbook, 1965-1995).

## **MOODY'S BOND RATINGS**

The rating of a municipal bond is, in essence, a negative process. A rating measures the degree of risk the buyer of a bond is assuming. As a result, a rating determines both who will buy the bonds, and what interest rate the city will have to pay to get the bonds sold. The purpose of Moody's Ratings is to provide investors with a simple system of gradation by which the relative investment qualities of bonds may be noted. Moody's ratings are described as follows:

- Bonds rated **Aaa** are judged to be the best quality. They carry the smallest degree of investment risk and are generally referred to as "gilt edge." Interest payments are protected by a large and/or exceptionally stable margin and principal is secure.
- Bonds rated **Aa** are judged to be high quality by all standards. Together with the **Aaa** they comprise what are generally known as "high grade" bonds. They are

Table 1 Moody's Bond Rating Symbols and General Descriptions

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General Description	Moody's Symbol
Best Quality ("gilt edge")	Aaa
High Quality	Aa
Upper-Medium-Quality Grade	A
Medium-Grade	Baa
Moderate-Speculative Grade	Ba
Low Grade	B
Poor Grade (can include defaults)	Caa
Highly Speculative Grade	Ca
Lowest-Rated (Defaulted)	C

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Note: Those bonds in the Aa, A, Baa, Ba and B groups which Moody's believes possess the strongest investment attributes are designated by the symbols Aa-1, A-1, Baa-1, Ba-1 and B-1.

Source: Public Securities Association, 1990.

rated lower than the best bonds because margins of protection may not be as large as in Aaa bonds. Fluctuation of protective elements may also be greater or there may be other elements present which make the long term risks somewhat larger than in Aaa bonds.

- Bonds rated A possess many favorable investment attributes and are considered "upper-medium grade" obligations. Factors giving security to principal and interest are considered adequate but elements may be present which suggest a susceptibility to impairment sometime in the future.

- Bonds rated Baa are considered "medium grade" obligations, i.e., they are neither highly protected nor poorly secured. Interest payment and principal security appear adequate for the present but certain protective elements may be lacking or may

be characteristically unreliable over the long term. Such bonds have speculative characteristics and generally lack outstanding investment characteristics as well.

- Bonds rated Ba have speculative elements and their future cannot be considered assured. Often the protection of interest and principal payments are only moderate and therefore not well safeguarded during both good and bad times over the future. Position uncertainty characterizes bonds in this class.

- Bonds rated B generally lack assurance of interest and principal payments or of maintenance of other terms of the contract over any long period of time.

- Bonds rated Caa are of poor standing. Such issues may be in default or have elements of danger with respect to

principal or interest.

- Bonds rated Ca represent obligations which are highly speculative. Such issues are often in default or have other marked shortcomings.
- Bonds rated C are the lowest rated class of bonds. Issues so rated have extremely poor prospects of ever attaining any real investment standing (Moody's Government and Municipal Handbook 1965-1995; Public Securities Association, 1990).

Despite the fact that ratings are general standards of quality and that differences within a rating class may be large, investors use the ratings to establish the interest yield they desire. In order to lessen variations within rating classes, Moody's also added an Aa-1, A-1, Baa-1, Ba-1 and B-1 rating during the late 1960's. Such ratings indicate that the bonds are the best in that class, but are not good enough to receive the next highest rating (Public Securities Association, 1990; White, 1985).

Municipal bond interest is exempt from federal income taxation. The major market for municipal bonds is banks, insurance companies, and individuals in high income tax brackets. Most states prohibit banks and insurance companies from investing in municipal bonds rated below Baa. Most states also place limits on investments by banks in Baa rated bonds. When limits are approached, the institutions may be asked to review their investment policies. In some states, if too many Baa bonds are held, banks and insurance companies may be ordered to sell some of their holdings. As a result, financial institutions prefer to hold only the highest rated bonds that they can buy (Public Securities Association, 1990).

Individuals can buy any grade of bond they desire. Cities with ratings below Baa usually have no choice but to sell to individuals. The cost is much higher. When an institution buys municipal bonds, it buys several hundred thousand dollars worth. Transaction costs are low. Individuals buy smaller amounts, thus creating higher transaction costs and brokerage fees. In addition, when institutional investors are not actively buying municipal bonds, cities are usually forced to increase the interest rate on new issues to entice individuals to purchase them. In cities such as Boston, Cleveland, Detroit, New York, and

Philadelphia a low bond rating has cost the municipal government millions of dollars in interest (Peterson, 1981).

The potential value of bond ratings to geographers lies in their ability to represent the quality-of-life and in the insight they provide into urban conditions throughout the nation. The question to be answered, then, is do quality of life rankings correlate to any degree with Moody's municipal bond ratings?

## **BOND RATINGS AS QUALITY OF LIFE MEASURES**

Quality of life can be broadly defined as:

"... an individual's happiness or satisfaction with life and environment including needs and desires, aspirations, lifestyle preferences, and other tangible and intangible factors which determine overall well-being. When an individual's quality of life is aggregated to the community level, the concept is linked to existing social and environmental conditions such as economic activity, climate, or quality of cultural institutions. It includes both tangible and intangible measures reflecting local consensus on the communities values and goals" (Cutter, 1985, 1).

Generally, previous studies on quality of life measures include variables that can be classified into six substantive groupings: population, employment, income, housing, social and fiscal criteria (Cutter, 1985).

- *Population variables* include population change, absolute population numbers, density, and specific population-age cohorts related to dependency;
- *Employment variables* consist of employment change in one sector of the economy or another, number or rates of unemployment or significant/abrupt surges in unemployment;
- *Income variables* include the proportion of the population in poverty, those who are defined as low-income, or average/median income or income change relative to other jurisdictions or the nation as a whole;
- *Housing variables* refer to age of structure, housing quality, crowding, number of housing units built annually or

percent of year round housing that is rental;  
● *Social variables* relate to specific characteristics of the population. Education, female-headed households, percent of the population-minority, percent of the population dependent, birth rates, death rates and suicide rates; and

● *Fiscal variables* include outstanding city government debt per capita, federal funds and grants per capita, and direct general expenditures on education, health and hospitals, police protection, public welfare, and highways.

In addition to the problem of selecting which variables to use, another difficulty is determining the relative weights to assign the variables selected. The lack of a clearly defined social welfare function model means that any weighting scheme will have no theoretical guidance to help determine the proper weightings. Weight assignment schemes, therefore, necessarily involve rather arbitrary judgments on the part of the investigator. Thus the equal weighting technique is often used to avoid protracted debates and to simplify the analysis (Cutter, 1985).

## ANALYSIS AND RESULTS

Since bond ratings are given on debt issues of municipal governments, any correlation analysis between bond ratings and quality of life measures should be done at this same scale, the legal city. In this study, the 25 largest cities as measured by population in 1970<sup>2</sup> formed the units of analysis. The cities and their respective Moody's bond ratings (1965-1995) are listed in Table 2.

The quality of life variables selected are listed in Table 3. The thirteen variables selected are similar to those used in the quality of life rating schemes of previous studies (Cutter, 1985). All the socio-economic data are from the County and City Data Book (1977,1988). Since this study calculates quality of life for both 1970 and 1980, the same variables were used for both years to ensure comparability. Thus, variables which were available for only 1980 were omitted. The variables were

weighted equally. It is also important to note that the variables selected are relatively few and should by no means be considered an exhaustive list of variables representing the quality of life in urban America.

To test the proposition that bond ratings are useful as quality of life measures, two tests were run. In the first test, the quality of life variables for 1970 were correlated with the median<sup>3</sup> Moody's bond rating for the odd years from 1967 to 1977 using Spearman correlation coefficients (Table 3). Spearman's rank order correlation coefficient is a nonparametric measure that is calculated as the correlation of the ranks of the variables (Vogt, 1993). A similar test, using the 1980 quality of life variables and the median Moody's bond ratings for the odd numbered years from 1977 to 1987, was also executed (Table 3). In both tests, all interval ratio data and data in percentage values were transformed into ranked data so that all variables lie on an ordinal scale and meet the requirements of Spearman's correlation coefficient (Vogt 1993).

The results of the 1970 test indicate that bond ratings are probably a poor indicator of quality of life during the 1970's. Only four of the 13 quality of life variables tested were significant at the 95 percent confidence level. However, with the exception of the variable Hospital Beds, the signs of the Spearman correlation coefficients were as expected. Families Below the Poverty Line, City Government Debt Outstanding Per Capita and Unemployment were all negatively correlated and significant, while Education Attainment and Per Capita Income were positively related and significant.

These findings are not that surprising. Moody's had a reputation during the 1970's for paying close attention to particular financial ratios, i.e., debt outstanding per capita (Moody's Investors Service, 1977). During the 1980's, however, Moody's claims to have expanded the number of variables under consideration, including more "social issues" variables. Although Moody's rating formulas are proprietary, the claimed inclusion of "social issues" variables has met with controversy. Most recently, Moody's dropped Detroit's 1992 GO bond rating below investment grade and asked whether the city would be "viable" over the long run (Moody's Government and Municipal Handbook,

*Bond Ratings and Quality of Life, 1970-1990*

Table 2: Moody's Bond Ratings for Selected Cities

	CITY	1965	1970	1975	1980	1985	1990	1995
1.	Baltimore, MD	A	A	A	A-1	A-1	A-1	A-1
2.	Boston, MA	Baa	Baa	A	Baa	Ba-1	A	A
3.	Chicago, IL	A	A-1	Aa	Aa	Baa-1	A	A
4.	Cleveland, OH	Aa	A	A	Caa	Ba-1	Baa-1	Baa-1
5.	Columbus, OH	Aa	Aa	Aa	Aa	A-1	Aa-1	Aa-1
6.	Dallas, TX	Aa	Aa	Aaa	Aaa	Aaa	Aaa	Aaa
7.	Denver, CO	Aa	Aa	Aa	Aa	Aa	Aa	Aa
8.	Detroit, MI	Baa	Baa	Baa	Baa	Ba	Baa	Baa
9.	Houston, TX	A	A-1	Aaa	Aaa	Aa-1	Aa	Aa
10.	Indianapolis, IN	Aa	Aa	Aaa	Aaa	Aa	Aaa	Aaa
11.	Jacksonville, FL	A	A-1	A-1	A-1	A-1	A-1	A-1
12.	Kansas City, MO	Aa	Aa	Aa	Aa	Aa	Aa	Aa
13.	Los Angeles, CA	Aa	Aa	Aaa	Aaa	Aaa	Aaa	Aaa
14.	Memphis, TN	Aa	Aa	Aa	Aa	Aa	Aa	Aa
15.	Milwaukee, WI	Aaa	Aaa	Aaa	Aaa	Aa	Aa	Aa
16.	New Orleans, LA	A	A-1	A-1	A	A	Baa	Baa
17.	New York City, NY	Baa	Baa-1	Caa	B	Baa	A	A
18.	Philadelphia, PA	A	Baa-1	A	Baa	Baa	Baa	Baa
19.	Phoenix, AZ	A	A	Aa	Aa	Aa-1	Aa-1	Aa-1
20.	Pittsburgh, PA	A	A-1	A-1	Baa-1	Baa	Baa-1	Baa-1
21.	St. Louis, MO	Aa	Aa	A	Baa-1	Baa	Baa	Baa
22.	San Antonio, TX	A	Aa	Aa	Aa	Aa	Aa	Aa
23.	San Diego, CA	A	A-1	Aa	Aa	Aa-1	Aaa	Aaa
24.	San Francisco, CA	Aa	Aa	Aaa	Aaa	Aa-1	Aa	Aa
25.	Seattle, WA	A	A-1	Aa	Aa	Aa	Aa-1	Aa-1

Table 3: Correlation of Quality of Life Variables with Moody's Bond Ratings, 1970-80s.

Variables	1970s	1980s
Population Density (per square mile)	-.39***	-.43**
Percent of Population 65 years and over	-.28	-.51*
Deaths (per 1000 resident pop.)	-.36***	-.65*
Hospital Beds (rate per 100,000 resident population)	-.06	-.35***
Education Attainment (% completing 12 years or more)	.51*	.63*
Per Capita Income (total dollars)	.47**	.61*
Percent of Families Below Poverty Line	-.49**	-.67*
Percent Owner Occupied Housing	.12	.12
Median Value, Owner Occupied, Single Family	.17	.53*
City Government, Debt Outstanding Per Capita	-.46**	.02
Serious Crimes (rate per 100,000 resident population)	-.01	-.02
Unemployment rate	-.53*	-.32**
Percent of Population that is Black	-.35	-.48**

Correlation coefficients rounded to the nearest hundredth, where: \* = significant at the 99.0% confidence level; \*\* = significant at the 95.0% confidence level; and \*\*\* = significant at the 90.0% confidence level.

Note: All interval ratio data and data in percentage values were transformed into ranked data so that all variables lie on an ordinal scale and meet the requirements of Spearman's correlation coefficient (Vogt, 1993).

1992). Detroit's public officials responded with an attack on Moody's, charging that the agency was applying new standards; suggesting that Moody's was simply writing off urban America; and observing that Moody's had no minorities on its Detroit team (Noble, 1992). Public officials also questioned whether the agency's decision involved bias against largely minority cities (Solomon and Tsiantar, 1993).

The lower bond rating will cost Detroit millions of dollars in interest. Critics complain that Moody's (and the other agencies) even with added staff, urban experts and other specialists are not equipped to evaluate "social issues" variables and that they are "out of touch" with the local political nuances. At present, no government body regulates Moody's or any of the other municipal bond rating agencies. Moody's makes money from fees that bond issuers and buyers pay for the agency's opinion of the creditworthiness of a city, state, or government body. Moody's is only able to wield power because their work is generally respected (Hawthorne, 1990).

Given Moody's claim that they have expanded the set of variables under consideration, the relationship between the quality of life variables selected and Moody's average bond ratings during the 1980's should be stronger. The results of the 1980 test appear to confirm this hypothesis. Of the 13 quality of life variables tested, eight were significant at the 95 percent confidence level and two (Unemployment, and Hospital Beds) were significant at the 90 % confidence level. Again, only Hospital Beds had an unexpected sign. Instead of a positive impact on quality of life, a relatively large number of hospital beds per 100,000 residents may indicate an older/sicker population, and thus, explain the negative rating.

Not surprisingly, densely populated cities with older populations and a relatively high percentage of families below the poverty line tend to have lower bond ratings, while cities with a relatively well educated population and low unemployment tend to have higher bond ratings. Perhaps most interesting is the negative relationship between percentage of a city's population that is black and its GO bond rating. The finding indicates that Moody's (and other agencies) may be biased against cities with large minority populations as some critics contend (Soloman and Tsiantar, 1993).

It should also be noted, however, that percentage of a city's population that is black is also negatively correlated (99 percent confidence level) with per capita income, and positively correlated (99 percent confidence level) with percentage of families below the poverty line.

## SUMMARY AND CONCLUSIONS

The purpose of this paper was to examine the relationship between Moody's bond ratings and variables that represent the quality of life in American cities. The 25 largest cities as measured by population in 1970 formed the units of analysis. Data for the thirteen variables selected to represent quality of life came from the County and City Data Book (1977, 1988). The relationships were calculated using correlation analysis (Spearman correlation coefficients).

The low number of significant relationships found in the 1970 test suggests that municipal bond ratings were not a very good indicator of quality-of-life during the 1970's. The finding was not surprising given Moody's reputation for focusing on a limited number of financial ratios in its rating calculations during the 1970's. However, the high number of significant correlations (10 out of 13) found in the 1980 test indicates the opposite -- that Moody's bond ratings are a 1980's quality of life correlate. Perhaps most interesting was the negative relationship (significant at the 95 percent confidence level) between percentage of a city's population that is black and its general obligation (GO) bond rating. The finding appears to support critics claims that rating agencies are biased against cities with large minority populations.

The conclusion is that municipal bond ratings can be useful to urban geographers. (1) Municipal bond ratings reflect the raters' perceptions of the social and economic conditions of the cities that they rate. Thus, low ratings provide a means of identifying those cities which face the most serious social and economic problems; and (2) Change in a city's bond rating may indicate the direction in which social conditions of a city will move. Bond ratings, to an extent, can be considered self-fulfilling prophecies. Low bond

ratings force interest rates up, necessitating higher taxes and higher fiscal deficits. The result is a further weakening of the city's financial structure, and perhaps a further lowering of the bond rating. Thus, cities with low bond ratings may face unstable or declining futures, whereas cities with higher bond ratings may face improving, brighter futures.

The findings of this study suggest it would be useful to look at the relationship between 1990 census data (quality of life variables) and Moody's municipal bond ratings during the 1990's. Future research on the relationship between municipal bond ratings and the quality of life in U.S. cities should also include a greater number of cities (controlling for size/population) as well as an expanded number of variables used to calculate quality of life. This would incorporate a more robust measure of quality of life, and allow for comparison by region and city size.

### ENDNOTES

1. Moody's operated as an independent company until 1962, when it was purchased by Dun and Bradstreet.
2. The exception is Washington, D.C. which had no public debt rated at the time.
3. The median value is the appropriate measure of central tendency for ranked data (Vogt, 1993).

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