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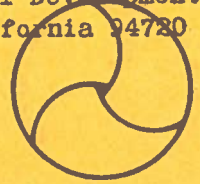
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Municipal Ownership of Electrical Utilities and the Fiscal Problems of the Cities

Institute of Urban & Regional Development
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Municipal Ownership of Electrical Utilities and the Fiscal Problems of the Cities

Leland Gerson Neuberg*

ABSTRACT: The author begins with a history of recent interest in municipally-owned electric utilities (MUNI's) and then argues that neither welfare economic theory nor empirical econometric work provide much of a case against MUNI's. After identifying three views on the municipal ownership issue, two interpretations of cities' fiscal ills are distinguished: one which neglects and one which suggests MUNI's as remedies. Some new empirical evidence is presented on (1) the proportion, and change in proportion, of general revenues MUNI's generate for their cities and (2) the comparative Moody's bond ratings of cities which do and don't own MUNI's. The author closes with some ideas for further research and the suggestion that discussions of local fiscal policy options which neglect MUNI's may be ideological defenses of the owning classes.

* * * * *

1. HISTORICAL INTRODUCTION¹

The question of municipal ownership of electric utilities, which has been nearly dormant since the 1930's, began to arise in cities across the U.S. during the late 1960's. Municipalization attempts were at first confined mostly to a handful of college towns where proponents were usually a loose coalition of "new" and "old" leftists together with groups of consumer advocates and environmentalists. Such forces tended to see

their struggles as fights for local control of industry which would lead to socialized monopoly profits, lower consumer electric rates, and more environmentally-oriented utility policies.²

By the early 1970's, interest in municipal ownership had spread from the initial college towns to a much larger group of cities. Also, those favoring municipalization had grown to include small businessmen and labor unions. Small businessmen tended to see anticipated municipal utility revenues as a potential source of tax relief, replacing some portion of city business taxes. Labor unions in "declining regions" saw municipal systems as potential sources of jobs.³ By mid-1972, Alex Radin [1972; p.6], the head of the American Public Power Association, was able to say: "At no time in my nearly 25 years with APPA have I witnessed so high a level of interest in starting new municipal systems."

*This paper was conceived and the initial research was done when the author was an N.S.F. Energy-Related Postdoctoral Fellow jointly in the Department of Statistics and at the Institute of Urban and Regional Development, University of California at Berkeley. Of the many people who assisted me at various stages of the work, three must be singled out for special thanks: Donna Neuberg, Dan Olivieri, and Rima Shore. The comments of the referees for this journal on an earlier version of this paper, helped generate the improved version presented here.

2. MUNICIPAL VS. INVESTOR OWNERSHIP OF ELECTRICAL UTILITIES

Is There a Pareto Superior Option?

Whether electric utilities should be investor-owned and government regulated (IOU's), or municipally-owned, may be seen as a special case of a general question often raised in economics: Given a "natural monopoly" situation, what form of social ownership/regulation arrangements is preferable?⁴ We learn from no less an authority than Friedman [1962; p. 128] that:

There is unfortunately no good solution for technical [i.e. natural] monopoly. There is only a choice among three evils: private unregulated monopoly, private monopoly regulated by the state, and government operation. It seems impossible to state as a *general proposition* that one of these evils is *uniformly* preferable to another. [emphasis mine]

We all recall that welfare economic theory tells us that perfectly competitive firms (under suitable conditions) yield allocations which are Pareto optimal relative to the existing distribution of income. Friedman, however, is reminding us that welfare economic theory says nothing about the Pareto superiority of one of the three possible arrangements in a natural monopoly situation. The point is worth emphasizing since American-trained economists often implicitly assume Pareto inferiority of government monopoly because, ironically enough, of the influence of Friedman's own "Chicago school"⁵.

Of course welfare economic theory does not preclude that in the particular case of electric utility monopoly, one of the existing forms of ownership/regulation arrangements is Pareto superior to the other. Peltzman [1971; pp.137-140], the only author so far to make an explicit claim, argues that regulated IOU's are Pareto superior to MUNI's. He shift-model estimates a *single* equation with KWH sales per customer a function of average price per KWH, household income, and several other variables. His equation, then, can only be viewed as an individual consumer demand function and his estimates implicitly assume: (a) all customers in a given class have the same individual consumer demand functions and (b) for a given customer class, MUNI's and IOU's have the same constant supply functions. (a) is clearly implausible and (b), also implausible, is even contradicted by Peltzman's own view that, within a given customer class, IOU's tend to price discriminate more than MUNI's. Thus, Peltzman's assertions to the contrary, the Pareto superiority of IOU's over MUNI's (or vice versa) remains an open question.⁶

Empirical Econometric Comparisons of IOU's and MUNI's

In the absence of a persuasive argument that one form of ownership/regulation arrangements is Pareto superior, economists might be expected to turn to secondary choice criteria. In the early 1970's, partly in response to the social conflict on municipal ownership taking place in a number of cities, statistical/empirical studies comparing existing MUNI's and IOU's on an expanding vector of criteria began to make their way into the economics literature. The main findings of these papers are summarized in Diagram 1.* What is remarkable here is that with the possible exception of the management job tenure finding, none of the empirical comparisons yields results which are damaging to the case for municipal ownership. Given the comparative cost-efficiency findings, even the job-tenure result seems not especially damaging.⁷

Three Views on the Municipal Ownership Question

In the recent literature which addresses the municipal ownership question, one may identify three distinct positions on the issue: opponents, proponents, and those offering critical support to municipalization. Opponents of municipalization include Chicago-school authors Moore [1970], Peltzman [1971], and De Alessi [1974a]. Though they oppose municipal ownership, the evidence these authors present is less than convincing, as we have seen already.

Proponents of MUNI's include Brom/Kirshner [1974] and Neuberger [1977b]. Proponents essentially argue that municipalization is a worthwhile reform *per se*, independent of any revolutionary socialist transformation of society as a whole. Thus Brom/Kirshner [1974] make their case primarily on existing MUNI's' lower rates and Neuberger [1977b] points out that existing MUNI's are no less cost-efficient than existing IOU's.

Proponent arguments tend to ignore the overall capitalist framework in which existing MUNI's operate. Thus, for example, to survive in competition for fuel against IOU's, MUNI's have frequently fostered the same sort of ecologically destructive strip-mining as IOU's. Also, in no sense are existing MUNI's worker/consumer controlled: their bureaucratic hierarchical operating arrangements are hard to distinguish from those of IOU's. Finally, though we know MUNI's tend to have lower rates, we as yet have little

*Diagrams 1 and 2, and Tables 1 through 5 are found immediately following the text and before the appendix to this article.

evidence as to which classes (in either the Marxist or income-class sense) benefit most from existing municipal ownership arrangements.

Those who offer critical support for municipalization struggles include Neuberg [1976] and Mollenkopf [1976]. Thus Mollenkopf [1976; pp. 33-34] argues:

State entry into actual production in areas formerly dominated completely by private enterprise provides one key to this vision [of "The Primitive Socialist City"] and running services in a way which corresponds to the real needs of public workers and public clients provides the other . . . The City of Palo Alto, California, for

example, runs its own utilities system at rates competitive with the private sector . . . While these enterprises are managed in ways quite similar to private firms, they nonetheless suggest the germ of an alternative development.

MUNI's for Mollenkopf, then, *formally* challenge private property relations in their being "publicly-owned". Municipalization is thus *potentially* a "nonreformist reform" in Gorz's [1968] sense. To become *historically* revolutionary, municipalization must be instituted by a self-consciously anti-capitalist movement in the context of an overall struggle for socialism.⁹

3. CITIES' FISCAL PROBLEMS

Two Interpretations of Emerging Fiscal Problems

Though neither classical economic theory nor statistical/econometric studies have produced arguments or evidence especially damaging to the case for municipal ownership of electric utilities, public interest in municipalization has waned somewhat since the early 1970's. Diminished interest in municipal ownership has at least three sources. First, many of the early municipalization proponents have expended much of their 1960's' energy. Second, IOU's have spent tremendous sums of money in media campaigns in defense of "free enterprise". Last, and most important, since the early 1970's fiscal problems have emerged as the dominant local-level issue. Given most cities' fiscal plights, municipalizations based on the asking prices of IOU's, and financed by voter-approved bond issues (which are increasingly hard to pass) cannot be very attractive propositions.¹⁰

Cities' emerging fiscal problems have generated a still-growing stream of explanatory literature. These interpretive works fall, roughly, into two categories: demographic and Marxist. The demographic literature links emerging fiscal problems primarily to geographic/demographic shifts. First, the migration of blacks and the poor from rural areas to the central cities is viewed as having enlarged the expenditures sides of cities' budgets. Second, the interacting moves of industry/jobs/tax base and middle-class residents/tax base from the central cities to the suburbs and more recently from the Northeast/Midwest to the South/Southwest/West are seen as having strained many cities' revenue-raising capacities. Finally, birth-rate trends are depicted as having left cities with some "fixed" service expenditures which are no longer productive and which the present generation of

taxpayers is increasingly unwilling to finance — e.g. public school expenditures in the face of declining school age populations.¹¹

The demographic literature focuses primarily on consumers' tastes and technological factors in explaining the geographic/demographic shifts it sees generating cities' fiscal problems. For example, black/poor migration to the central cities is seen as resulting from the mechanization of agriculture; suburban growth is explained in terms of the coincidence of the invention/improvement of the automobile and peoples' tastes for less dense living; and Northeast/Midwest relative decline is explained in terms of the coincidence of the increasing accessibility of air-conditioning and people's climatological preferences.¹²

The Marxist literature denies neither geographic/demographic shifts, technological advances, nor consumers' tastes as factors explaining cities' fiscal problems. But Marxists argue that class struggle and capital accumulation needs are more fundamental explanatory factors accounting for the cities' fiscal problems directly and through many of the intermediate explanatory factors cited by the demographic school. Thus, for example, the stagnation in state sector growth at *all* levels (local, state, and federal) is laid to capital's diminished ability, since its Vietnam War defeat, to create the requisite surplus wealth through international market expansion. Migration of industry to the South and Southwest is pictured as capital's fleeing organized labor. The growth of automobile-oriented suburbs is viewed as stemming from the accumulation needs of monopoly capital (the auto companies) and local developers. Diagram 2 depicts the implicit explanatory systems of the emerging Marxist and demographic literatures on cities' fiscal problems.¹³

Improving Cities' Fiscal Situations

When one looks at demographic and Marxist conceptions of possible fiscal amelioration measures, the difference in interpretive emphasis grows acute. Consider, for example, Peterson's [1976; p.103] account of local possibilities:

Our review of fiscal options thus far has indicated that the cities are unlikely to be rescued from their fiscal predicament by outside forces [i.e. state or federal aid]. The ultimate choice therefore is a local one: in balancing their budgets the cities must cut back on local spending, raise local taxes, or (what is surely the most probable outcome) adopt a mixture of both strategies.

Earlier, (pp. 72-84) he has suggested various metropolitan-level redrawings of boundaries to cope with the suburban migration source of city fiscal problems. Even so, for Peterson, the city as an economic entity is essentially a non-productive unit. Thus he reduces city revenues to "local taxes". Contrast Peterson's conception of local options with O'Connor's [1973; p.179] account of the revenue side of the state (in the generic sense) budget:

The state can finance increased budgetary outlays in three general ways: first, by creating state enterprises that produce surpluses which in turn may be used to underwrite social capital and social expenditures; second, by issuing debt and borrowing against future tax revenues; third by raising tax rates and introducing new taxes.¹⁴

What is striking in the two accounts is O'Connor's inclusion and Peterson's omission of state enterprise as a city revenue option.

State enterprise is certainly a logical possibility as a revenue source for improving cities' fiscal situations. Whether in practice such enterprise would actually produce positive net revenues for cities is certainly debatable. O'Connor himself argues (pp. 180-188) that for a number of theoretical reasons one would expect state

enterprise in an overall capitalist framework often to generate negative net revenues. He then cites empirical evidence, mostly from Western Europe, to corroborate his view. Thus O'Connor's discussion is a theoretical and empirical one. To truncate *a priori* a list of local revenue options to taxes only, and omit *any* discussion of state enterprise, as Peterson does, can only be seen as an ideological conception — i.e. one which refuses to consider options which might challenge the institution of income-generating private property.¹⁵

Municipal Ownership of Electric Utilities and the Fiscal Problems of the Cities

Cities' emerging financial problems have shifted the debate on municipal- vs. investor-ownership of electric utilities primarily onto the fiscal problems' terrain. Opponents of municipal ownership now stress the fiscally inhibiting initial cost of acquisition.¹⁶ Observers such as O'Connor [1973; p. 182], stress the fiscally liberating *potential* of municipally-owned utilities:

Local governments could free themselves fiscally by taking over hundreds of utilities (franchises granted fifty to seventy-five years ago will expire shortly). For example Gainesville, Florida, derived over 23 percent of its revenues from surpluses generated by its electric utility operation in 1965. But powerful forces seek to keep the utilities in private hands or to prevent them from generating surpluses should they fall to the state. The Municipal Finance Officers Association argues that utilities should not generate surpluses but rather are created to furnish services at cost (a striking illustration of the anomaly of public officials attempting to keep the state dependent on private capital).

O'Connor's theoretical remarks here point the way toward a more formal empirical investigation of municipal ownership of electric utilities and cities' fiscal problems than he himself has conducted.

4. SOME NEW EMPIRICAL EVIDENCE

The "Profitability" of Municipally-Owned Electric Utilities

O'Connor's phrase "from surpluses generated by its electric utility operation [emphasis mine]" certainly admits a definition of electric utility net revenue (or "profit") as the difference between revenue and current operating expense. Yet municipally-owned electric utilities also face expenses of capital outlay and interest

on debt. Therefore we take P = the difference between revenue and (current operating expense + capital outlay + interest on debt) as our definition of electric utility "profit". Further, with G = city general revenue we define $R = P/G$ = electric utility contribution to city revenue.¹⁷

The first four questions O'Connor's passage suggests are: (1) do municipally-owned electric utilities

tend to generate positive net revenues (i.e., "profits") for their cities, (2) has the tendency to generate "profits" changed over time, (3) *how much* "profits" do electric utilities tend to generate for their cities, and (4) has this amount tended to change over time? (1) and (2) can be answered employing ordinary and "matched pairs" binomial models respectively. (3) may be answered by estimating a median of a continuous distribution while (4) can be answered using a "matched pairs" nonparametric shift model. The samples employed here consist of information on around 300 MUNI-owning cities for the 1966-67 and 1971-72 fiscal years.*

Statistical Results

Tables 1 and 2 present the results of the binomial model analysis. From Table 1 we see that the 1966-67 probability that a MUNI was profitable was in the vicinity of .80 while the same figure for 1971-72 was around .70. Hence, on the descriptive level, Table 1 suggests a deterioration from 1966-67 to 1971-72 in the tendency for MUNI's to be profitable. Table 2 formally confirms this decline at the .003 significance level. Thus, while most MUNI's seem to generate positive net revenues for their cities, many may not (see footnote 17) and the profitability tendency appears highly time dependent.

Tables 3 and 4 present the results of the nonparametric analysis of the city revenue contributions of MUNI's. Table 3 shows that the 1966-67 distribution of (utility "profit"/city general revenue) centers (in the sense of median) in the vicinity of 14.68% while the same figure for 1971-72 is around 7.17%. Table 3 suggests, on a descriptive level, a decline from 1966-67 to 1971-72 in the proportion of city general revenue which MUNI's tend to supply to their cities and Table 4 confirms this decline at the .0069 significance level.

The Relative "Credit-Worthiness" of Cities Which Do and Don't Own Electric Utilities

So far we have discovered a (time-dependent) tendency, of modest magnitude, for MUNI's to supply revenues to their cities. O'Connor's passage, however, argues that such a tendency is diminished by the dominant view among municipal finance officials that electric power should be sold at cost. It is natural then to seek some measure of the latent potential for revenue supply which is not itself the actual revenue supplied. Also, given O'Connor's argument on the intentionality of municipal finance officials, it seems reasonable to impose the *a priori* condition that the latency measure

be reasonably free of the direct influence of municipal finance officials.

One possible measure might be a city's Moody's bond rating, which is given by an institution which is, at least formally, independent of the officials of the city being rated. Traditionally a city's bond rating is taken as a measure of its credit-worthiness, though New York City's high rating at the onset of its fiscal crisis has called into question the identification of Moody's bond rating with credit-worthiness. Whether Moody's bond ratings reflect something called "credit-worthiness" or not, a higher rating does seem to mean a lower interest rate paid on bonds — a not so latent fiscal advantage.¹⁸ Thus, the question we shall ask is: do cities which own electric utilities tend to have higher Moody's bond ratings than cities which don't?¹⁹

In comparing the Moody's bond ratings of cities which do and don't own electric utilities, one should somehow "control for" factors one *a priori* believes may be simultaneously associated with bond rating and ownership. Otherwise, a finding of higher bond ratings for utility-owning cities would be too easily challenged as due to an "intervening variable". City size seems one factor that should be "controlled for" since MUNI-owning cities tend to be smaller, and smaller cities may plausibly have more manageable fiscal situations and hence better bond ratings. Also, recent inter-regional controversies suggest federal revenue dispersals to cities (and hence possibly bond ratings) tend to vary with region, and concentrations of MUNI's certainly vary with region, so region should be "controlled for".²⁰

To "control for" city size and region, we first establish, *a priori*, several "blocks" across which the variation of region and city-size is greatly reduced (from its extent across the entire sample of cities). Then we compare only cities within a given block and finally aggregate the results blockwise. To compare the Moody's bond ratings of cities which do and don't own MUNI's, we employ a generalization of the Wilcoxon rank-sum test. The data employed here consists of the Moody's general-obligation bond ratings as of January 1977 for around 1650 cities.*

Statistical Results

Table 5 presents the results of comparing the bond ratings of cities which do and don't own a portion of their electric power systems. A negative (positive) value of $[W_s(i) - E(W_s(i))]/\sqrt{\text{Var } W_s(i)}$ means that bond ratings for block *i* cities which own a portion of their electric power systems tended to be higher (lower) than those of block *i* cities which didn't. So on a descriptive level, at least, only two of the twelve blocks

*The precise mathematical/statistical models employed here, together with a discussion of the data to which they were applied, may be found in the Appendix.

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— small cities in the South and large ones in the Northeast — show MUNI-owning cities tending to have lower bond ratings. Inferentially, the blockwise aggregation confirms, at the .0002 significance level, that MUNI-owning cities tend to have higher bond rat-

ings. This finding, then, is compatible with the conception of MUNI's strengthening their cities' fiscal situations regardless of the intentions of their cities' municipal finance officers.²¹

5. FURTHER SPECULATION

Directions for Future Empirical Research

The statistical results presented in this paper are only a small first step in investigating the relationship of municipally-owned electric utilities and cities' fiscal problems. A partial list of probably fruitful future empirical inquiries would include:

1. An extended time series look at MUNI "profitabilities" to see how our 1966-67 to 1971-72 downward shift looks in the context of longer term trends.
2. A study of the association of MUNI "profitabilities" and MUNI rate levels to (a) see if they were positively correlated as one might guess and (b) gauge how high "profitability" might go before rates became "excessive".
3. A comparative look at welfare levels in a sample of "low-profit" MUNI-owning cities and a sample of otherwise similar cities to see if the MUNI's might be performing a Keynesian job-creation function.
4. An econometric comparison of property tax rates in cities which do and don't own MUNI's to see if MUNI-owning cities tend to substitute MUNI-generated net revenues for property-tax revenues.
5. A statistical study of the contributions to cities' general revenues, in non-MUNI-owning cities, of taxes (property and other) imposed on local IOU's — which source of tax revenue a MUNI-owning city certainly forgoes.²²

Given reasonably reliable data, the results of each of the above-listed studies would deepen our understanding of a thus far empirically neglected economic policy possibility: alleviation of cities' fiscal problems through municipally-owned electric utilities. No claim is being made, though, that any of these studies would definitively settle the question of whether MUNI's tend to be assets or liabilities for their cities. Nor are we asserting that any of these studies is a necessary next step for those debating local-level fiscal policy. Rather, we are merely arguing that municipally-owned electric utilities in particular (and local-level state enterprise in

general) should begin to receive the same serious empirical attention that other logically possible local fiscal options are receiving.

Summary, Conclusions, and Policy Implications

We began with a recent history of interest in municipal ownership of electric utilities in the U.S. and then argued that neither economic theory nor recent empirical econometric work provide much of a case against MUNI's. Close textual analysis of some recent urban economic work on cities' fiscal problems suggested that demographically-oriented studies have ignored the possibility of alleviating cities' fiscal problems through municipally-owned electric utilities, although this option has been suggested by authors such as O'Connor. Statistical / empirical analysis then showed:

1. A MUNI in a city of over 10,000 population tended to supply in the vicinity of an increment of 15% in 1966-67 and 7% in 1971-72 to general revenue, and
2. Blocking for city size and region of the country, cities which owned MUNI's tended to have higher Moody's bond ratings in January 1977, than cities which didn't.

Thus the *a priori* reduction of fiscal remedy possibilities to a combination of tax increases and spending decreases is conceptually inadequate. We conclude that future discussions of local fiscal options must either give serious attention to the possibility of municipally-owned electric utilities or invite the justified accusation of being ideological defenses of the propertied classes.

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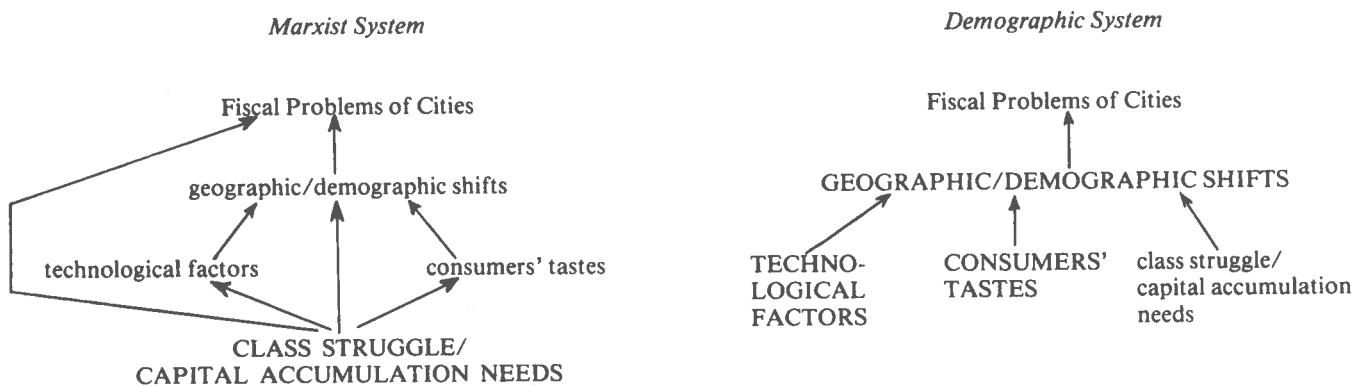
DIAGRAM 1.

*PRINCIPAL FINDINGS OF RECENT EMPIRICAL COMPARISONS
OF MUNI'S AND IOU'S⁸*

MUNI's probably tend to:	Sources
1. sell retail power at lower prices	1. Moore [1970], Peltzman [1971], Meyer [1975]
2. sell wholesale power at lower prices	2. De Alessi [1975]
3. provide longer job tenure for top level managers	3. De Alessi [1974a]
4. be no less cost-efficient in generation, transmission or distribution (for fixed firm size)	4. Meyer [1975], Neuberg [1977b]

DIAGRAM 2.

*IMPLICIT EXPLANATORY SYSTEMS OF EMERGING MARXIST AND DEMOGRAPHIC
LITERATURES ON CITIES' FISCAL PROBLEMS*



NOTE: The use of capital letters means an element is central in the authors' explanations.

TABLE 1.

*PROBABILITY OF A PROFITABLE MUNICIPALLY-OWNED
ELECTRIC UTILITY*

	1966-67	1971-72
number of profitable utilities	229	228
number of unprofitable utilities	57	96
point estimate of π	.80	.70
95% confidence interval estimate for π	(.75, .85)	(.65, .75)
99% confidence interval estimate for π	(.74, .86)	(.63, .77)

NOTES: (1) π is the underlying probability of profitability.
(2) interval estimates employ the normal approximation to the binomial distribution.

TABLE 2.

*DECLINE IN PROBABILITY OF A PROFITABLE MUNICIPALLY-OWNED
ELECTRIC UTILITY*

1966-67	1971-72	No. of Pairs	Sign Test of Decline: $H: q = \frac{1}{2}$ against $A: q < \frac{1}{2}$
1	1	159	
1	0	58 (= r)	
0	1	32 (= m)	$\frac{32/90 - 1/2}{\sqrt{1/(4)(90)}} \approx -2.74$ so significance probability $\approx .003$
0	0	24	
		Total: 273	

NOTES: (1) 1 means profitable and 0 means unprofitable,
 (2) the sign test was conducted using the normal approximation to the binomial distribution
 but conservatively allowing the largest possible sampling allowance: $\sqrt{(1/4)/(m+r)}$

TABLE 3.

*ADDITIONS TO CITY REVENUES BY MUNICIPALLY-OWNED
ELECTRIC UTILITIES*

	1966-67	1971-72
sample size	320	283
sample median of (utility "profit"/city general revenue)	14.68%	7.17%
95% confidence interval estimate for population median of (utility "profit"/city general revenue)	(11.61%, 18.38%)	(4.85%, 10.38%)
99% confidence interval estimate for population median of (utility "profit"/city general revenue)	(10.28%, 20.14%)	(4.20%, 11.90%)

NOTES: (1) sample medians are consistent point estimates of population medians (see Lehmann [1975; p.181])
 but are not used in calculating interval estimates of population medians.
 (2) the normal approximation with continuity correction (to the binomial distribution) is employed
 in interval-estimating population medians.

TABLE 4.

*DECLINE IN ADDITIONS TO CITY REVENUES BY MUNICIPALLY-OWNED
ELECTRIC UTILITIES FROM 1966-67 TO 1971-72*

sample size (= # of pairs = N)	267
V_r = sum of ranks with negative sign	21001
$E_H(V_r) = [N(N+1)] / 4$	17889
$\sqrt{\text{Var}_H(V_r)} = \sqrt{[N(N+1)(2N+1)] / 24}$	1262.9736
$[V_r - E_H(V_r)] / \sqrt{\text{Var}_H(V_r)}$	2.464
significance probability	.0069

NOTES: (1) Model is N pairs (R_i^1, R_i^2) with $R_i^2 \sim (R_i^1 - \Delta)$ where R_i^1 is the 1966-67 "profit rate"
 and R_i^2 is the 1971-72 "profit rate" for the i th MUNI,
 (2) we employ the Wilcoxon signed-rank test of $H: \Delta = 0$ against $A: \Delta > 0$,
 (3) the "significance probability" is based on the normal approximation with continuity
 correction.

TABLE 5.

*COMPARISONS OF JANUARY 1977 MOODY'S BOND RATINGS FOR CITIES,
With $\geq 10,000$ Population, Which Do and Don't Own at Least the Distribution
Portions of Their Electric Power Systems*

City Population \ Geographic Region	Northeast	South	Central	West
<i>10,000 to 24,999 population</i>				
N_i	329	171	209	64
n_i	16	59	40	5
$W_S^{(i)}$	1987	5305	4023	128
$[W_S^{(i)} - E(W_S^{(i)})] / \sqrt{\text{Var } W_S^{(i)}}$	-1.8620	.7866	-.5483	-1.0219
<i>25,000 to 49,999 population</i>				
N_i	158	93	148	75
n_i	20	29	12	10
$W_S^{(i)}$	1022	1179.5	528.5	304
$[W_S^{(i)} - E(W_S^{(i)})] / \sqrt{\text{Var } W_S^{(i)}}$	-3.0779	-1.5815	-2.6864	-1.2811
<i>50,000 or more population</i>				
N_i	105	106	103	86
n_i	3	20	12	17
$W_S^{(i)}$	189.5	1045.5	480	606
$[W_S^{(i)} - E(W_S^{(i)})] / \sqrt{\text{Var } W_S^{(i)}}$	.5990	-.2063	-1.5589	-1.5143
Statistics for Blockwise Aggregation				
$E(W_S) = \sum_{i=1}^{12} n_i / 2$	121.5			
W_S	107.653			
$[W_S - E(W_S)] / \sqrt{\text{Var } W_S}$	-3.666			
significance probability	.0002			

NOTES: (1) N_i = # of cities in block i while n_i = # of MUNI-owning cities in block i .

(2) $W_S^{(i)}$ = the Wilcoxon rank-sum statistic for block i and $W_S = \sum_{i=1}^{12} W_S^{(i)} / (N_i + 1)$,

(3) "significance probability" is of the one-tailed test of H : cities which do and don't own a portion of their electric power systems tend to have the same bond ratings against A : cities which own a portion of their electric power systems tend to have higher bond ratings, employing the normal approximations to the null distribution of W_S .

APPENDIX

The "Profitability" of Municipally-Owned Electric Utilities

Statistical Models

First, suppose for utility i that $X_i = 1$ if $P_i > 0$ and $X_i = 0$ if $P_i \leq 0$ (in a given year). Suppose also that one has a sample of n utilities where the X_i 's are independent ($i = 1, \dots, n$). Then if

$$X = \sum_{i=1}^n X_i,$$

X has the binomial distribution $b(n, \pi)$ and one can answer question (1) by estimating (or testing hypotheses about) π . Now suppose X_i is defined as before, Y_i is defined similarly for a later year, and one has independent pairs (X_i, Y_i) for n utilities. Let m be the number of (0,1) and r the number of (1,0) observations. Then if $C = \sum Y_i$, C has the binomial distribution $b(m+r, q)$ and one can answer question (2) by testing

$H: q = 1/2$ against $A: q > 1/2$ (or $A: q < 1/2$).²³

Assume $R_1^1, \dots, R_n^1$ (for year 1) where $n = \#$ of utilities in sample, are identically and independently distributed according to a continuous distribution F_1 . If $R_{(1)}^1, \dots, R_{(n)}^1$ denote the ordered R_i^1 's and if μ is any median of F_1 , i.e.

$$\Pr(R^1 < \mu) = \Pr(R^1 > \mu) = 1/2,$$

then we can answer question (3) by interval estimating μ using:

$$\Pr(R_{(i)}^1 < \mu \leq R_{(i+1)}^1) = \binom{n}{i} / 2^n$$

for all $i = 0, 1, \dots, n$. Also if the R_i^1 's are defined as before and $R_1^2, \dots, R_n^2$ (for year 2) are also assumed identically and independently distributed according to a continuous distribution F_2 with $R_i^2 \sim (R_i^1 - \Delta)$ for all $i = 1, \dots, n$, then we can answer question (4) by using the Wilcoxon signed-rank test for $\Delta > 0$ (or $\Delta < 0$).²⁴

Data

The conceptual population at which inference is aimed is U.S. cities of 10,000 or more population which own at least the distribution portion of their electric power systems. For the binomial models the three samples employed are: (1) B_1 = the 286 cities ($\geq 10,000$ pop. by 1960 census) for which profitability for 1966-67 was calculable from U.S. Bureau of the Census [1969], (2) B_2 = the 324 cities ($\geq 10,000$ pop. by 1970 census) for which profitability for 1971-72 was calculable from U.S. Bureau of the Census [1974], and (3) the 273 cities of $B_1 \cap B_2$. The samples S_1 , S_2 , and $S_1 \cap S_2$ of sizes 283, 320, and 267 for the nonparametric models are gotten from B_1 , B_2 , and $B_1 \cap B_2$ by imposing the additional condition that profit rate must be calculable from the same census sources. 1966-67 profit for utility $i = P_i^{67} = \text{revenue}_i$

— (current operating expense $_i$ + capital outlay $_i$ + interest on debt $_i$) for 1966-67; 1971-72 profit is defined similarly. 1966-67 electric utility contribution to city revenue for utility $i = R_i^{67} = P_i^{67}/G_i^{67}$ where $G_i^{67} = 1966-67$ general revenue $_i$; 1971-72 electric utility contribution to city revenue is defined similarly.²⁵

The Relative "Credit-Worthiness" of Cities Which Do and Don't Own Electric Utilities

Statistical Model

Suppose there are b blocks with N_i cities in block i , n_i of them MUNI-owning cities and $m_i (= N_i - n_i)$ of them not. Let $1 > \dots > k$ be the ranks corresponding to the k Moody's bond ratings and let $S_{i1} < \dots < S_{in_i}$ denote the n_i ranks, having adjusted for ties, of the MUNI-owning cities of block i . Then

$$W_S^{(i)} = \sum_{j=1}^{n_i} S_{ij}$$

is the Wilcoxon rank-sum statistic for the i th block and we employ

$$W_S = \sum_{i=1}^b [W^{(i)} / (N_i + 1)]$$

to test H : the bond ratings of MUNI-owning cities tend to be the same as those of non-MUNI-owning cities against A : the bond ratings of MUNI-owning cities tend to be higher than those of non-MUNI-owning cities.²⁶

Data

Cities are classified into the four regions — North-east, South, Central, and West — of U.S. Bureau of Census [1974] and into three 1977 estimated city sizes — 10,000 to 24,999; 25,000 to 49,999; and 50,000 and over populations. Thus b = number of blocks = 12. Bond ratings are the nine distinct ranks from Moody's [1977] received by cities in the samples. We aim to make inferential statements about two populations of cities with $\geq 10,000$ residents: those which do and don't own at least the distribution portion of their electric power systems. The two samples of cities contain only those for which ratings were available in Moody's [1977]. Sample S_1 = the 243 ($= \sum_{i=1}^{12} n_i$) rated cities listed in Municipal Yearbook [1976] as owning a portion of their electric power systems and also appearing in U.S. Bureau of Census [1974]. Sample S_2 = the 1404 ($= \sum_{i=1}^{12} m_i$) rated cities listed in Municipal Yearbook [1976] as not owning a portion of their electric power systems and also appearing in U.S. Bureau of Census [1974].²⁷

NOTES

1. Neuberger (1976; pp.7-11) has a more extensive account of the recent history of the municipal ownership movement than is presented here. Two contrasting histories of earlier interest in public power are Hellman (1972; Chapter 1) and Vennard (1968).

2. There is of course no *guarantee* that municipal ownership is more environmentally-oriented. For example, the American Public Power Association, essentially a trade association for the existing municipal systems, tends to see nuclear power as a necessity (see Radin (1977)). When environmentalist forces are prominent in the public power coalition, though, one would expect municipalization to lead to more environmentally-oriented utility policies.

3. Once again, there is no guarantee that municipally-owned power systems will tend to have lower capital/labor ratios than investor-owned ones. Moore (1970; p.373) reports no difference in capital/labor ratios between a sample of municipally-owned utilities and a sample of investor-owned utilities. Recent labor union involvement in the municipal-ownership movement has been most extensive in upstate New York (see Leahy and Dowd (1976; Chapter IX)) where one definite focus of the movement has been labor-intensive technologies. In the upstate New York context then, one would expect municipalization to lead to more jobs.

4. Actually, investor-owned systems are subjected to a set of government regulations X while municipally-owned systems are subjected to a set of generally weaker government regulations $Y \neq X$. So comparative empirical studies of the two types of systems cannot really distinguish between the effects of variation in ownership-type and variation in regulation. From now on we shall refer to the two types of systems as "investor-owned" and "municipally-owned", leaving the regulation differences to be implicitly understood.

The "natural" or "technical" monopoly concept is somewhat vague, having almost as many formal definitions as there are economics textbooks. Most economists would probably view electric power production as a "natural" monopoly. However, Weiss (1975) points out that there currently is *some* competition at all 3 stages — generation, transmission, and distribution — of production, and argues that there could and should be even more. Primeaux (1975) makes a case for duopolistic competition in distribution.

5. The appropriate theorems of welfare economics are presented most intelligibly in Arrow (1970). Even if one could demonstrate the Pareto superiority (relative to the existing distribution of income) of one of the three forms of ownership/regulation arrangements, it would not follow that the Pareto superior form was more socially desirable.

6. Had Peltzman simultaneously shift-model estimated supply and aggregate demand functions (with output = KWH sales) he would have at least had a basis for credible statements about MUNI's' and IOU's' relative economic efficiency of production. As is, his conclusion that "the output of privately owned utilities is substantially closer to the most efficient output rate than it is for government utilities (p.140)" is *completely* gratuitous since he nowhere includes output (= KWH sales) in his estimated equations!

7. That is, MUNI's longer job tenure for top management apparently leads to no relative MUNI cost inefficiency, though this conclusion would be more credible if a study were available somehow pairing cost-efficiency and length of top management job tenure in individual firms rather than the separate studies of cost-efficiency and job-tenure we now have.

8. None of the studies cited in Diagram 1 is without some conceptual/statistical problems. For example, given that all firms price discriminate to some extent the *ex-post* average revenue figures employed by *all* the price studies are questionable substitutes for actual *ex-ante* prices. For conceptual/statistical critiques of Moore (1970) and Peltzman (1971) see De Alessi (1974b).

9. The present author's view on municipalization lies somewhere between that of "proponents" and that of those "offering critical

support". These categories are close to those of "normative" and "advocatorial" presented critically by Offe (1974; p.15).

10. For example, in Berkeley, California, as the strength of the pro-municipalization forces grew in the 18 months (April, 1972-November, 1973) between unsuccessful electoral municipalization attempts, the local IOU's asking price for the distribution system went from \$55 to \$70 million. Since the city's total 1972-73 budget (= expenses) was only \$25 million, the IOU's asking price was certainly a discouraging figure. While asking \$55-\$70 million for its system the local IOU was enjoying an \$8 million assessment for property tax purposes (well below the usual 25% of "market value", if the asking price can be taken as an indication of "market value"). For more on the particulars of the Berkeley case see Petulla (1973).

11. Actually, in most areas schools are financed through local districts rather than directly through city budgets. These local districts are in fiscal trouble all around the country and their problems certainly affect the fiscal plights of the cities in their areas.

12. Much of the best demographic work on cities' fiscal problems is being done by the authors in Sternlieb and Hughes (eds., 1975). A geographic/demographic orientation permeates almost all the articles in this collection. To cite just one example, Mueller (pp. 197-220) explains variation in the extent of cities' fiscal problems primarily in terms of variation in cities' population growth (or decline) rates. The primacy of technological innovations as explanatory factors is stressed, for example, by Hughes and Sternlieb (pp. 11-12, 29). Most authors in the volume allow *some* role for "class struggle" (never calling it that), e.g. geographic wage differentials and public sector unionization, in generating geographic/demographic shifts and cities' fiscal problems. Yet Thompson (pp. 189-190) is typical in subordinating all other explanation to the "passing of the age of manufacturing" conceived of as an essentially technological revolution.

13. The best of the Marxist-oriented work on the cities' "fiscal crises" has been collected (along with some demographic school papers) in Alcaly and Mermelstein (eds., 1977). For a Marxist conception of the real but subordinate role of technological forces and consumer preferences in cities' fiscal problems (and post-War urban development in general) see Mollenkopf (1975; p.268). Both Marxist and demographic explanations of cities' fiscal situations tend to be reductionist. For example, suburban birth/growth seems due to a conjunction of automobile invention/improvement, consumers' preferences for less dense living, and monopoly and competitive capital's accumulation needs. Whether one subordinates the other factors to capital accumulation needs or ignores capital accumulation needs entirely, one is mis-reconstructing history. The Marxist subordinating tendency frequently leads to explanations of a doctrinaire sort. The demographic tendency to ignore often leads, as we shall see shortly, to conceptions which are ideological (in Marx's sense). For further analysis of the reductionisms of Marxist and technologically-oriented explanations of social change see Neuberger (1975).

14. O'Connor, speaking generically of the state, has included debt-financing in his account of revenue options. Peterson (p.51) suggests that, at the local level, such debt-financing is usually constitutionally prohibited. In fact, localities are usually allowed to debt-finance "capital" but not "operating" expenses.

15. No claim is being made here that Peterson *intends* his conception as a defense of capitalism. Rather, the argument is that it constitutes such a defense irrespective of Peterson's intentions. The general question of the relationship between intentionality and meaning is of course a difficult philosophical problem which can't be dealt with here. Peterson isn't the only demographic urbanist to ignore the state enterprise revenue option. In Sternlieb and Hughes (eds., 1975) Mueller (p.215), having not once mentioned the state enterprise possibility, concludes: "If this prognosis (little rise in federal/state aid) is correct, older metropolitan areas have two obvious choices — increase local taxes or reduce outlays." Sternlieb and Hughes (p.169) summar-

ize Mueller with "by virtue of this confluence of events, two policy options bound the continuum of alternatives — increase local taxes or reduce outlays" adding not a word of critical commentary.

16. The acquisition cost question is of course ultimately a political one. At one extreme, IOU asking prices are probably considerably above "value" in any meaningful sense of the term. At the other, outright expropriation at no initial cost is a possibility though historical/political forces are probably nowhere in the U.S. of sufficient strength to implement such a move.

17. General revenue = all revenue of a city except utility revenues, liquor store revenue, and employee-retirement revenue. To calculate P for a given year we shall use the "capital outlay" in that year because it was the only figure available. In fact, in a given year (1) any sizeable capital outlays will be bond financed so not actually "laid out" then, and (2) there may be some old utility debt to redeem. Hence our value for P will probably tend to *considerably understate* the net revenue actually available from a given year.

18. Rubinfeld (1973), for example, found in an empirical study that even fixing certain market evaluation factors of a community's financial status, higher Moody's ratings tend to be associated with lower municipal borrowing costs.

19. Even if a city's Moody's bond rating is an inaccurate measure of its "credit-worthiness", there seems no *a priori* reason to believe the inaccuracy varies between cities which do and don't own a portion of their electric power systems. Thus the shift model of bond ratings we shall employ could conceivably capture an underlying shift in "credit-worthiness" even if the bond-ratings themselves are inaccurate measures of "credit-worthiness".

20. The set of factors which might influence bond-ratings is of course potentially infinite. In the absence of a mathematically formulated theory of bond rating determination, inclusion of those "intervening factors" for whose influence an *a priori* case can be made, seems the appropriate rule. It is an observer-specific rule in the sense that other researchers might construct *a priori* cases for additional factors. For further discussion of this problem in non-experimental statistical/empirical research see Neuberger (1977a).

21. Though sufficiently detailed results are presented for the interested reader to do so, no formal tests were conducted on individual blocks because no hypotheses about particular blocks were entertained prior to undertaking the study.

22. With the results of the 1977 Census of Governments, which should be available shortly, and the 1962 Census of Governments data, one could at least extend the two sample analysis of "profitability" presented in this paper to a four sample model.

If low "profitability" MUNI's are substituting jobs for welfare then their "profitability" itself may not be an accurate gauge of the social benefits they generate.

A recent look at the tendency of MUNI-owning cities to substitute electric utility profits for property taxes in raising revenues has been made by Strauss and Wertz (1976). They find a markedly lower per capita "own revenue" (= property taxes + sales taxes + license fees + alcoholic beverage sale profits) collection from MUNI-owning cities when per capita income and city population are "controlled for" by multiple regression analysis. Their study has at least the three weaknesses (in increasing order of seriousness) that: (1) the sample of cities is all from North Carolina, making geographic generalization of results difficult, (2) no economic theoretic explanation of why per capita "own revenue" should be related to per-capita income and city population is presented, and (3) no attempt is made to "control for" variations in property wealth and taxable sales — two of the theoretically appropriate variables — from city to city. We are currently working on a study which extends and deepens the Strass/Wertz work, eliminating three listed weaknesses, and hope to report some results soon.

Our MUNI expense figures do *not* include payments in lieu of taxes which MUNI's often make to their cities.

23. The test of $H: q = \frac{1}{2}$ against $A: q < \frac{1}{2}$ is what Lehmann (1975; pp.120-123) calls "the sign test for paired comparisons".

24. See Lehmann (1975; pp.123-132) on the Wilcoxon signed-rank test. We were originally led to nonparametric tests here because the skewness and kurtosis of the sampling distributions of the variable being studied made the assumption of underlying normal populations implausible. Though parametric tests would have been asymptotically valid, given certain underlying distributions the sample size required for actual significance levels to be "close to" stated ones was considerably larger than the samples we had. Thus the weaker assumptions of the nonparametric tests seemed more plausible. Also, it seems clear intuitively that the nonparametric techniques employed in this paper are less sensitive to measurement error than their parametric counterparts.

25. The term "population" used in this paragraph is somewhat ambiguous. It can mean either (1) an actual collection of cities or (2) some sort of conceptual collection of cities. Even the nonparametric techniques we employ here presume *continuous* underlying distributions (which would require meaning (2) rather than (1) since any property in an actual collection of cities would have a discrete distribution). Consideration of conceptual problems of this kind underlying the applicability of the mathematical theory of statistical inference to social events might lead one to argue that only descriptive (not inferential) analysis of economic phenomena is possible. See Neuberger (1977a) for further discussion along these lines. In the absence of *a priori* evidence to the contrary, we assume our "samples" here, chosen solely on the basis of whether the required information was available or not, represent their respective "populations".

26. The model employed here is that of Lehmann (1975), pp.5-13 (basic model), pp.18-23 (treatment of ties), and pp.132-141 (combining results from different blocks). Formally, the model presupposes that the ranks employed manifest an underlying continuous distribution. For our purposes, the underlying continuous variable is thought of as the inaccessible "credit-worthiness".

27. 1977 city-size was estimated by adding 2 x the estimated 1970-73 population growth to the 1970 census population. The 1970-73 population growth was, in turn, Municipal Yearbook's [1976] figure = U.S. Bureau of Census's (1975) estimate based on 1960-70 city population growth. Thus the block assignments based on 1977 city-size are certainly subject to measurement (=projection) error. Two points are worth making about the error: (1) there is no *a priori* reason to assume that the error is anything but random with respect to whether or not a city owns a MUNI and hence there is no *a priori* reason to assume the measurement error affects the statistical results, and (2) the only way to have avoided the error from projection would have been to employ 1970 census figures and 1970 Moody's bond ratings, thus foregoing any kind of statement about the situation in the wake of the fiscal upheavals beginning in the early 1970's.

The nine Moody's ratings for cities' general obligation bonds and the ranks assigned them were: Aaa (1), Aa (2), A1 (3), A (4), Baa1 (5), Baa (6), Ba (7), B(8), and Caa (9).

As before, in the absence of *a priori* evidence to the contrary, we assume our "sample" here, chosen solely on the basis of whether the required information was available or not, represents its "population", i.e. either some conceptual collection of U.S. cities over 10,000 population in 1977 or the actual collection of U.S. cities over 10,000 population in 1977.

Since Municipal Yearbook (1976) eliminates townships (from U.S. Bureau of Census (1974)) which don't have city-like functions/structures, by taking the intersection of the two lists we really, strictly speaking, end up with a sample consisting of cities or city-like townships which had 10,000 population in 1970 and for which January 1977 bond ratings were available.

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