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RESEARCH TRIANGLE INSTITUTE

**MASTER
PROJECT-POOLED ANALYSES:
FEASIBILITY OF COMBINING DATA
FROM SEVERAL ELECTRIC UTILITY
RATE DEMONSTRATION PROJECTS**

Prepared for
U.S. Department of Energy
Office of Utility Systems

December 1978

RTI

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Project-Pooled Analyses: Feasibility of Combining Data from Several Electric Utility Rate Demonstration Projects

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Chapter 1: INTRODUCTION

In 1976 the Federal Energy Administration (now the U.S. Department of Energy), in cooperation with state public utility commissions and participating utilities, initiated 10 electric utility rate demonstration projects (one of which has been discontinued). Subsequently, six additional states were also awarded grants. Funding for the projects was provided by the FEA, participating utilities, and state governments. The primary purpose of these projects was to evaluate experimentally the effects of time-of-use pricing of electricity for residential customers. The time-of-use rate most frequently employed was a time-of-day (TOD) rate.

The method employed by the states to evaluate TOD rates was to select a subset of the residential population, place these people on TOD rates, and with special meters, monitor their temporal use of electricity. As might be expected, with the varying objectives of the states, resources available, and background in load management studies, a variety of approaches were employed, and a variety of data was generated by the projects. Also, data analyses conducted by the project teams vary considerably from project to project due to the differing interests of the states, resources available, and composition of the project teams.

In the fall of 1977, the Department of Energy (DOE) contracted with the Research Triangle Institute (RTI) to provide a comprehensive standardized analysis of the data from the DOE-sponsored electric utility residential rate demonstration projects. This standardized analysis involves

- (a) performing separate data analyses for each of the individual demonstration projects which are, to the extent possible, structured in a consistent manner, and
- (b) if feasible, performing analyses on data combined over several projects (i.e., project-pooled analyses).

Separate reports are submitted for each of the project-specific analyses; the purpose of this report is to discuss the feasibility of conducting the project-pooled analyses.

This report is limited to a consideration of the following demonstration projects:

Ohio

Rhode Island

Connecticut

North Carolina - Blue Ridge Electric Membership Corporation (BREMC)

North Carolina - Carolina Power and Light (CP&L)

Arkansas

Wisconsin

California - San Diego Gas and Electric (SDG&E)

California - Southern California Edison (SCE)

Los Angeles

Puerto Rico.

The remaining projects are omitted because they do not involve residential TOD rates (Washington and Michigan) or they do not provide hourly consumption data to the DOE data base (Vermont, New York, Arizona, and Oklahoma). Brief descriptions of the experiments are given in Volume I of the Analytical Master Plan For the Analysis of the Data From The Electric Utility Demonstration Projects; more detailed descriptions are given in Volume II of that report.

Chapter 2: OBJECTIVES OF PROJECT-POOLED ANALYSES

The project-specific analyses are of three basic types: descriptive, comparative, and response surface (or demand) analyses. Descriptive analyses consist of both graphical and tabular displays of estimated parameters for both test and control group customers. For instance, the graphical displays present several alternative average daily load curves associated with test and control group customers for various averaging periods within selected months. The tabular displays consist of weighted average estimates of several load curve statistics for the control and experimental groups. The comparative analyses include tests for significant differences between test and control group parameters. These two types of analyses provide estimates for specified finite populations--ideally, the class of all residential customers served by a particular utility. Consequently, generalization of these types of analyses to a project-pooled basis is considered to be of little value.

In the context of demand analysis, however, project-pooled analyses (i.e., analyses conducted on a data set consisting of data from two or more projects) may permit some improvements over the project-specific analyses. The potential improvements are of two basic types:

- (1) increased precision in model (parameter) estimation, and
- (2) estimation of more general models.

The increased precision would be expected not only because of larger sample sizes but also because of a larger experimental region (i.e., greater variation in prices). Models could potentially be more general in two basic ways. First, the same model form estimated for an individual project might be generalized to encompass a larger range in

prices by including data from other projects. Secondly, the dimensionality of the experimental region may be increased. That is, different--and, in general, more refined--models may be estimable from the pooled data than would have been possible from each of the component data sets. Obviously, these potential gains are made at the expense of certain assumptions concerning the uniform validity of models over the component projects and the expanded region.

Even for an individual project, a demand analysis requires a number of assumptions; most of these are inherent in the form of the models chosen for relating customers' electricity consumption to the experimental rates. Such analyses are further hampered by deficiencies in the experimental designs, in the sampling designs, and/or in the data available (see Volume I of the Analytical Master Plan). In general, additional assumptions are required to compensate for these deficiencies.

It is obvious that analyses on data pooled over projects will require still further assumptions. Determining the feasibility of such analyses therefore hinges upon the assumptions the analyst is willing to make; hence, the question of feasibility is largely a subjective issue. Nevertheless, a number of common considerations are involved in arriving at a decision as to whether a pooled analysis is reasonable and meaningful. These criteria are discussed in Chapter 3 and are applied to the particular demonstration projects to arrive at our assessment of the feasibility of conducting project-pooled analyses.

Chapter 3: CRITERIA FOR PROJECT-POOLED ANALYSES

The major considerations involved in determining the feasibility of conducting an analysis on data from two or more projects are the following:

- (1) differences in geographic/climatic conditions,
- (2) differences in the experimental procedures employed (e.g., type of participation, use of participation payment, etc.),
- (3) differences in the timing of the experiments (e.g., non-overlap of the experimental periods), and
- (4) differences in the experimental rates used (in particular, the use of differing seasonal, weekly, and daily rating periods).

In addition, because of the large number of assumptions required, the experimental designs of the individual projects should permit at least some check on the adequacy of the model assumed for the pooled analysis. For this reason, it is recommended that those projects involving a single experimental TOD rate be excluded from any pooled analyses. These are the Ohio, Rhode Island, Connecticut, and North Carolina (BREMC) projects.

Geographic/climatic conditions may be important in terms of constructing meaningful models for a specific time period. It is unlikely that California and Wisconsin customers in January, for example, would exhibit similar responses to prices, even if adjustments for weather conditions were incorporated into the model. Restricting the pooled analyses to certain seasons may somewhat alleviate this problem. For the winter, the following would appear to be reasonable groupings of projects based on climatic considerations:

- (1) Arkansas, N.C. (CP&L)
- (2) Wisconsin

- (3) California (SDG&E), California (SCE), Los Angeles
- (4) Puerto Rico.

For the summertime analyses, it is likely that the first two of these groups could be considered as one.

Given the exclusions mentioned above, the projects considered eligible for pooled analyses, and their status with respect to participation procedures and timing of the experiment, are shown in Table 1.

Responses to TOD rates may or may not be different for experiments with differing participation procedures; the pooling of projects with similar procedures would avoid (at least partially) one potential source of bias in the parameter estimates.

Non-overlap of experimental periods from two (or more) projects causes considerable problems in constructing usage variables which are consistent across projects. Even when overlapping occurs, customers in the different projects may have been exposed to the experimental rates for different lengths of time and may therefore respond differently at the same point in time.

Without consideration of the TOD rate structures, the results of Table 1 indicate that pooled analyses may be feasible in the following cases:

- (1) N.C. (CP&L) and Wisconsin - summer, 1978
- (2) California (SCE) and Los Angeles - summer, 1978
- (3) California (SDG&E), California (SCE), and Los Angeles - winter, 1979
- (4) California (SDG&E) and California (SCE) - summer, 1979.

The first of these cases is treated in some detail in Section 3.1 in order to illustrate a methodology for model construction for a combined

TABLE 1

Summary of Relevant Project Characteristics

Project	Climatic Group		Participation Mandatory	Procedures Payments	Availability of Data*									
	Winter	Summer			1976		1977		1978		1979		1980	
					W	S	W	S	W	S	W	S	W	S
Arkansas	1	1	Yes	No	X	X								
N.C. (CP&L)	1	1	Yes	No					X	X	X			
Wisconsin	2	1	Yes	No			X	X	X	X	X	X	X	
California (SDG&E)	3	2	No	Yes							X	X		
California (SCE)	3	2	No	Yes					X	X	X	X	X	
Los Angeles	3	2	No	Yes	X	X	X	X	X	X				
Puerto Rico	4	3	No	Yes							X	X	X	X

* W = Winter, S = Summer.

data set. The remaining cases are discussed very briefly in Sections 3.2 through 3.4.

3.1 Wisconsin and North Carolina CP&L

The summer-season TOD rates for the Wisconsin demonstration project are in effect during the billing months of July through October. For the North Carolina CP&L experiment, the summer season encompasses the June through October billing months. Hence, summer rates are actually in effect on all participants in both experiments throughout the month of August (1978) and for a portion of July and September.

During this period of time, the Wisconsin project involves 10 specific experimental rates that are relevant to demand analyses: nine (seasonal) TOD rates and a flat (seasonal) rate.* The rating structure for all of the TOD rates involved TOD pricing on weekdays; base period prices were utilized on weekends and holidays. The nine TOD rates involve variations in length of peak period (6, 9 and 12 hours), in location of peak periods, in base-period prices, and in peak-period prices. In the design, there were two basic constraints imposed on the overall experimental region:

- (a) No experimental rate could involve a price level of less than 1¢ per KWH.
- (b) All experimental rates were to provide equal revenues (within a season) if the "average" customer made no change in his electricity consumption (pattern).

With these constraints, peak-to-base price ratios of 8:1, 4:1, and 2:1 were to be used within each of the rating period definitions. In one

* This assumes that two rates which are identical except for differences in their customer charges (for rural and urban customers) can be regarded as a single rate.

case, the 8:1 ratio could not be achieved without violating constraint (a) above.

The energy-charge portion of the 10 experimental rates can be uniquely specified (in the summer season) by a four-component vector of prices, (P_0, P_1, P_2, P_3) , where

P_0 = price per KWH during 20-08 weekdays & all weekend & holiday hours

P_1 = price per KWH during 08-09, 12-13, 16-17 weekdays

P_2 = price per KWH during 17-20 weekdays

P_3 = price per KWH during 09-12, 13-16 weekdays.

The 10 design points are as shown in Table 2 below:

TABLE 2
Wisconsin TOD Rates (Summer Season)

Rate No.	P_0	P_1	P_2	P_3	Initial Sample Size
1	1.58	1.58	1.58	12.66	46
2	2.35	2.35	2.35	9.40	46
3	3.10	3.10	3.10	6.20	46
4	1.22	9.77	1.22	9.77	46
5	1.98	7.91	1.98	7.91	46
6	2.86	5.72	2.86	5.72	46
7	1.00	7.61	7.61	7.61	46
8	1.66	6.64	6.64	6.64	46
9	2.62	5.24	5.24	5.24	46
10	3.69	3.69	3.69	3.69	92

Based upon the design strategy, it is apparent that analysis models relating consumption to "price-ratio" and to "length-of-peak-period" were

envisioned. However, models of the following form could also be estimated:

$$\ln Y = \mu + \sum_{k=0}^3 \beta_k [\ln P_k] \quad (3-1)$$

where Y is KWH consumed in some particular period of time, and μ and β_k are parameters to be estimated. Because the constraints imposed on the experimental design yield a highly ill-conditioned set of price vectors, only poor estimates of these parameters can be achieved. For instance, the correlation between the estimates of β_0 and β_3 is .93 (based on the initial sample sizes). More general models involving actual price levels (e.g., cross product terms such as $(\ln P_k) (\ln P_l)$), which would be more desirable as an initial choice, are not estimable.

The North Carolina CP&L experiment includes nine (seasonal) TOD rates that are compatible with demand analysis. These rates involve peak-, intermediate-, and base-period price variations. The rating periods for all of these rates are constant; in the summer season the rating periods are as shown below:

<u>Hour of Day</u>	<u>Weekdays</u>	<u>Weekend Days</u>
00-07	Base	Base
07-10	Intermediate	Intermediate
10-20	Peak	Intermediate
20-23	Intermediate	Intermediate
23-24	Base	Base

The base-, intermediate-, and peak-period price levels are denoted by P_0^* , P_1^* , and P_2^* , respectively. The design involved selecting a cost-based rate (#5 below), which would provide revenue like that of the existing rate if the "average" customer made no change in his usage

(pattern). The price levels for the remaining rates were obtained by varying the prices of this rate in a systematic fashion. On a logarithmic scale, the 9 design points constitute a 2^3 factorial arrangement plus a center point. These rates are given in Table 3.

TABLE 3
North Carolina CP&L TOD Rates (Summer Season)

Rate No.	p_0^*	p_1^*	p_2^*	Initial Sample Size
1	1.06	2.86	3.90	24
2	1.78	2.86	3.90	24
3	1.06	3.90	3.90	24
4	1.78	3.90	3.90	24
5	1.37	3.34	5.06	86
6	1.06	2.86	6.56	24
7	1.78	2.86	6.56	24
8	1.06	3.90	6.56	24
9	1.78	3.90	6.56	24

Because the price levels vary independently, it is not possible to maintain revenue neutrality within a season; by pairing winter rates that have low expected revenues with summer rates that have high expected revenues, and vice versa, annual revenue neutrality is approximately obtained. This confounding of summer and winter prices requires the analyst to assume that wintertime (summertime) rates have no effect on summertime (wintertime) usage.

Because of the orthogonal arrangement of the design points, the parameters of models such as

$$\ln Y = \mu^* + \sum_{k=0}^2 \beta_k^* [\ln P_k^*] \quad (3-2)$$

or

$$\ln Y = \mu^{**} + \sum_{k=0}^2 \beta_k^{**} [\ln P_k^*] + \sum_{k=0}^1 \sum_{j=k+1}^2 \gamma_{kj} [\ln P_k^*] [\ln P_j^*] \quad (3-2)$$

can be estimated with good precision (for the given sample sizes).

Also, the inclusion of the center point in the design permits some check for lack of fit of (3-2) or (3-3) to be made.

Comparison of the daily rate structures for the two studies indicates that explicit representation of the combined set of rates in terms of price levels requires that seven component prices be used. These are defined below:

Price	Hours in Effect	
	<u>Weekdays</u>	<u>Weekend Days</u>
P ₀	00-07, 23-24	00-07, 23-24
P ₁	07-08, 20-23	07-23
P ₂	08-09	
P ₃	09-10	
P ₄	10-12, 13-16	
P ₅	12-13, 16-17	
P ₆	17-20	

The combined set of 19 design points is shown in Table 4. First-order models allowing estimation of own- and cross-price elasticities of demand can be fit to this combined set of points. The elasticities, however, reflect shifts of usage between the above time periods rather

TABLE 4

Combined TOD Rates for the North Carolina CP&L and Wisconsin Demonstration Projects (Summer Season)

Project	Rate No.	Energy Prices (¢/KWH)						
		P ₀	P ₁	P ₂	P ₃	P ₄	P ₅	P ₆
Wis.	1	1.58	1.58	1.58	12.66	12.66	1.58	1.58
	2	2.35	2.35	2.35	9.40	9.40	2.35	2.35
	3	3.10	3.10	3.10	6.20	6.20	3.10	3.10
	4	1.22	1.22	9.77	9.77	9.77	9.77	1.22
	5	1.98	1.98	7.91	7.91	7.91	7.91	1.98
	6	2.86	2.86	5.72	5.72	5.72	5.72	2.86
	7	1.00	1.00	7.61	7.61	7.61	7.61	7.61
	8	1.66	1.66	6.64	6.64	6.64	6.64	6.64
	9	2.62	2.62	5.24	5.24	5.24	5.24	5.24
	10	3.69	3.69	3.69	3.69	3.69	3.69	3.69
N. C. (CP&L)	1	1.06	2.86	2.86	2.86	3.90	3.90	3.90
	2	1.78	2.86	2.86	2.86	3.90	3.90	3.90
	3	1.06	3.90	3.90	3.90	3.90	3.90	3.90
	4	1.78	3.90	3.90	3.90	3.90	3.90	3.90
	5	1.37	3.34	3.34	3.34	5.06	5.06	5.06
	6	1.06	2.86	2.86	2.86	6.56	6.56	6.56
	7	1.78	2.86	2.86	2.86	6.56	6.56	6.56
	8	1.06	3.90	3.90	3.90	6.56	6.56	6.56
	9	1.78	3.90	3.90	3.90	6.56	6.56	6.56

than shifts among the rating periods (i.e., peak-, intermediate-, and base-period own- and cross-price elasticities cannot be estimated).

Hence, it is possible to perform a limited demand analysis on data pooled from the Wisconsin and North Carolina (CP&L) projects. The rate structures of the two experiments are not similar enough, however, to permit a meaningful model to be assumed. Moreover, the problem of utility-by-treatment (i.e., rate) confounding (which is present because the same set of rates are not applied to customers in both experiments) and the very limited time overlap (about 8 weeks) for which pooled analyses are possible suggest that pooling data from these two experiments would not be worthwhile.

3.2 California (SCE) and Los Angeles

The Los Angeles experiment involves 40 experimental rates plus a control (existing) rate. About 1,344 customers are monitored by 15-minute recorders. The experimental rates span a wide range of rating periods and prices and should yield precise elasticity estimates. Thirty-four of the 40 rates involve time-of-day price variations; two are flat rates; and four are flat seasonal rates. Half of the time-of-day rates are applicable throughout the week whereas the remaining half apply only to weekdays (with the off-peak price in effect for all weekend hours). The configuration of rates allows some estimates of seasonal elasticities (within the family of flat seasonal rates) and of weekday vs. weekend shifting of usage. Another factor -- method of participation payment -- is superimposed on the experiment: half of participants on each rate receive full payments quarterly and half receive partial (50%) payments quarterly with the balance paid at the

end of the experiment. The amount of the participation payment not only varies from rate to rate but also depends on the individual's usage pattern. Approximate sample sizes, by treatment, are shown in Table 5.

The SCE experiment is quite different in terms of its rate structures. The rating periods for the eight rates are shown below:

		Hours in Effect	
		<u>Weekdays</u>	<u>Weekend Days</u>
Rates 1-4:	Peak	10-20	
	Base	00-10, 20-24	00-24
Rates 5-8:	Peak	12-22	
	Base	00-12, 22-24	00-24

To combine these rates with those of the Los Angeles experiment in a manner similar to that described in Section 3.1 is obviously fruitless, since the five daily time periods of the Los Angeles experiment (hours 21-09, 09-12, 12-15, 15-18, and 18-21) are completely non-coincident with the four daily time periods of the SCE project (hours 22-10, 10-12, 12-20, and 20-22).

3.3 California (SDG&E), California (SCE), and Los Angeles

The SDG&E experiment involves five experimental rates: a flat rate and four TOD rates. The wintertime rating periods for all of the TOD rates are as shown below:

		Hours in Effect	
		<u>Weekdays</u>	<u>Weekend Days*</u>
Peak:		17-21	
Intermediate:		09-17	
Base:		00-09, 21-24	00-24

* includes holidays.

TABLE 5

Sample Sizes by Treatment for the
Los Angeles Demonstration Project

Energy Charges (¢/KWH)					Method of Payment = a		Method of Payment = b	
P ₀	P ₁	P ₂	P ₃	P ₄	W = 0	W = 1	W = 0	W = 1
2	5	2	2	2	20	20	20	20
2	9	2	2	2	15	15	15	15
2	13	2	2	2	5	5	5	5
2	2	9	2	2	10	10	10	10
2	2	13	2	2	5	5	5	5
2	2	2	5	2	5	5	5	5
2	2	2	9	2	20	20	20	20
2	2	2	13	2	20	20	20	20
2	2	2	2	5	5	5	5	5
2	2	2	2	9	15	15	15	15
2	2	2	2	13	15	15	15	15
2	2	2	7	7	10	10	10	10
1	1	5	5	5	30	30	30	30
1	1	9	9	9	5	5	5	5
1	5	5	5	5	5	5	5	5
1	9	9	9	9	20	20	20	20
5	2	2	2	2	40	40	40	40
2	2	2	2	2	35		35	
5	5	5	5	5	11		11	
5	5	5	5	5	14		14	
8	8	8	8	8	5		5	
2	2	2	2	2	15		15	
2	2	2	2	2	2		2	

P₀ = price per KWH for hours 21-09 on summer weekdays

P₁ = price per KWH for hours 09-12 on summer weekdays

P₂ = price per KWH for hours 12-15 on summer weekdays

P₃ = price per KWH for hours 15-18 on summer weekdays

P₄ = price per KWH for hours 18-21 on summer weekdays

Method of Payment: (a) incentive payment made in full on quarterly basis

(b) incentive payment made in part on quarterly basis
and in part at end of experimental period

W = $\begin{cases} 0 & \text{if weekend rate is same as weekday rate} \\ 1 & \text{if weekend rate is constant equal to min } (P_0, P_1, P_2, P_3, P_4) \end{cases}$

These rating periods are incompatible with those of both the Los Angeles and the SCE project, as depicted by the bar graphs below that show the (winter weekday) rating periods of the three projects.

<u>Project</u>	<u>Hour of Day</u>												
	0	2	4	6	8	10	12	14	16	18	20	22	24
SDG&E:	1					2					3	1	
SCE:	1					2	3					4	1
Los Angeles:	1					2	3	4	5	1			

3.4 California (SDG&E) and California (SCE)

The SDG&E summertime rating periods are identical to those shown in section 3.3 except that the peak and intermediate periods are interchanged. These rating periods are not compatible with those of the SCE project (section 3.2) and attempts to pool data (in the manner of section 3.1) will yield unsatisfactory demand analysis models.

Chapter 4. CONCLUSIONS

Ideally, an individual experiment should provide inferences about how a specific population would respond, at some future time, to some time-of-day rate (not necessarily one of the experimental rates). Thus inferences of three types are involved:

- population inferences, which are obtained by appropriately weighting the sample results to reflect the relationship between the sample (design) and the population,
- inferences to other TOD rates, which are obtained by using a model that is assumed to apply over a continuous experimental region (containing the experimental rates), and
- inferences to future populations (i.e., inferences in time), which are usually (implicitly) assumed to respond like the sampled population.

Of these, only the first is truly a statistical inference, although statistical methods are utilized to estimate the model parameters.

In the context of pooled demand analyses, the population of inference becomes less meaningful, since the estimated response for the "average" customer will be an estimated average over several utilities.

The results could probably not be utilized by any of the component utilities -- for example, in forecasting future system requirements.

Thus, the first, and perhaps the foremost, consideration involves the question of meaningfulness; that is, will the pooling of data from several sources really yield worthwhile results?

It is our opinion that meaningful results can be obtained through pooling under the following conditions:

1. similar sets of rate structures are utilized in each of the component projects;

2. the experimental design permits precise estimation of a realistic response surface model within each project over a common experimental region; and
3. proper sample designs and rate assignment procedures are utilized in each experiment.

These conditions permit the individual-project models to be compared, avoid project-by-rate confounding, and relax the need for similar geographic, demographic and experimental conditions. In this situation, if the same model could be shown to hold for each component project, a strong conclusion would be realized.

Unfortunately, the rate structures and experimental designs of the demonstration projects are not sufficiently compatible to warrant pooled analyses. The analyst desiring to use a pooled data base is forced to construct artificial models that can be estimated. Numerous, untestable assumptions are required and little or no gain in overall precision can be expected.

During the remainder of the contract period, it is therefore recommended that the project-specific analyses be emphasized and that the future reporting requirements on the project-pooled analyses be eliminated.

REFERENCES

1. Analytical Master Plan For the Analysis of the Data From The Electric Utility Rate Demonstration Projects, Volume I, RTI Report No. 41U-1542/00-05F, prepared for U.S. Department of Energy under Contract EC-77-C-01-8684, June, 1978.
2. Analytical Master Plan For the Analysis of the Data From The Electric Utility Rate Demonstration Projects, Volume II, RTI Report No. 41U-1542/F01, prepared for U.S. Department of Energy under Contract CR-04-80220-00, January, 1978.