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THE IMPACT OF THE 1973-1974 OIL EMBARGO ON THE AMERICAN HOUSEHOLD

James R. Murray
Michael J. Minor
Robert F. Cotterman
Norman M. Bradburn

of the

Continuous National Survey
National Opinion Research Center
University of Chicago

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ACKNOWLEDGMENTS

The effort to sustain the Continuous National Survey was akin to traversing endless concentric mazes--there appeared to be no beginning and no ending, just more running to be done. To be sure, there was much "running" done this past year by all persons involved with making the CNS a fruitful endeavor. The number of persons who contributed to the CNS project and to this report is great indeed and we can, therefore, mention only a few who were particularly supportive during our monitoring of public reactions to the energy shortages of winter 1973-1974.

The CNS staff was the group most instrumental in maintaining the successful operation of the project. Each of the following persons, with unique talents and skills, contributed significantly to the CNS: Wendy Kreitman, Joanna Crawford, Nora Schaeffer, Monica Schaeffer, Robert Trobbiani, Michele Dohne, Art Cuneo, Christian Haller, David Morgan, Brigid Boylan, Barbara Bohman, Lily Ford, Craig Williams, Wanda Jefferson, Susan Rand, Chana Friedman, and Steve Machalow. We wish to express a special note of gratitude to Laura Lowe, who spent many late nights and weekends preparing weekly and monthly reports of the energy data.

The CNS did not function as an autonomous unit, but rather existed within a broader institutional setting--the National Opinion Research Center--that housed other ongoing survey projects. Frequently, NORC employees gave the highest priority to the needs of the CNS and consistently demonstrated their ability to respond effectively to the ever present CNS demands. Without this supportive environment, the CNS would have been doomed to failure. NORC personnel who contributed significantly to the CNS project were: Maxine Hart and the keypunching staff; Bill Bland and the print shop staff; Martha Banks and the sampling department; Shirley Knight, Gibby Downey, Mary Burich and the field department; Toshi Takahashi, Mary Okazaki, and the steno pool. This report was edited by Paige Wickland, with the assistance of Susan Campbell, and was proofread by the latter and Laura Lowe.

One of the major purposes of the CNS was to supply to government agencies data about public opinion that would prove to be useful information for policy decisions. A prerequisite for the effective functioning of this input system was the establishment of productive relationships with governmental personnel. To a certain extent this goal was achieved. Without the support of Alan Pisarski and his staff at the Department of Transportation, and Pamela Kacser at the Federal Energy Administration, this report could not have become a reality. Other government persons involved were: Nicholas Schaeffer and David Rubin at DOT-TSC in Cambridge, Massachusetts; Susan Hickey of the OMB Energy Task Force; John Fallon and Howard Smulkin at FEO; Joseph Lerner at the Department of Treasury; and Milo Sunderhuff at OMB.

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In conclusion, we would like to express our deepest appreciation to the NORC interviewers. They consistently demonstrated diligence,

perseverence, high quality performance--and a sense of humor--in the face of the strenuous pressures of participating in the Continuous National Survey.

As is apparent from the above list, the CNS attracted persons from many different backgrounds. Such diversity was undoubtedly one of the major reasons that this project was the challenging, exciting, and rewarding experience that it was.

INTRODUCTION

This monograph contains the results of a weekly national probability sample survey of the American public's response to the energy shortages during the winter of 1973-1974. The weekly survey--the Continuous National Survey (CNS)--was begun in April of 1973 under a grant from the National Science Foundation, RANN program. The purpose of the CNS was to provide multiple federal agencies with a timely and flexible shared resource for gathering social data relevant to program and policy issues. The specification of topics and informational needs was the responsibility of the agencies who participated in the CNS; the development of questions and the analysis of data were the responsibility of the CNS staff.

The Department of Transportation provided the initial impetus for the collection of data relevant to decreased energy supply, particularly gasoline, as it related to the American household. In May 1973, Alan E. Pisarski of the DOT pointed out the impending shortage of gasoline and the consequent value of developing and using questions in the CNS that would provide information on the extent of the shortage and the policy preferences of the public regarding fuel allocations. Accordingly, the first set of energy-related data was collected in June/July 1973; the most notable data related to energy supplies and public reactions were collected between November 23, 1973 and April 11, 1974. Some additional data concerning knowledge and attitudes about nuclear and solar energy sources were collected in May 1974 for the National Science Foundation. Other federal agencies that participated directly in the CNS during the "energy crisis" were: The Federal Energy Office, the OMB Task Force on Contingency Planning, The Energy Policy Office of the Department of the Treasury, and the Department of the Interior.

Throughout the energy crisis, the staff of the agencies mentioned above worked directly with the National Opinion Research Center in topic/issue specifications and in data feedback and interpretation. The CNS provided these agencies with data about public opinion on the following policy issues: whether or not to ration gasoline; how to structure the gas-rationing system; fuel allocation shares across users; retail pricing policies; perceptions of the causes of the shortages; issues of equity in fuel consumption and allocation; evaluation of public conservation programs; estimation of how serious the shortages were on the household level; and Year Round Daylight Savings Time.

Although the use and importance of the data collected through the CNS about energy supplies on the household level will never be completely known, these data had at least one noticeable impact on energy policy--the decision about a revised Daylight Savings Time schedule. Serious discussion about the possibility of using a revised Daylight Savings Time schedule began during the summer of 1973. In anticipation of the decision on this matter, Mr. Pisarski directed the development of a series of questions on the topic of Year Round Daylight Savings Time and related issues. These questions were first asked in September 1973 and were reused, revised, and supplemented in the CNS through May 1974. The data from these questions were included in a DOT report that provided information to Congress for use in its decision to adopt a revised daylight savings plan--eight months on DST, March through October, and four months off DST, November through February.

We feel that this project has successfully accomplished the major objective of the NSF-RANN grant, namely that significant social data can be collected by sample survey methods within a short time period and that the data and interpretation can be supplied to relevant governmental agencies as timely inputs to policy formulation and action. During the energy crisis, federal agencies outside the HEW conglomerate were forced to deal with domestic problems on a scale and with time pressures typically reserved for times of war or great economic upheaval. During this period, data on public experiences and opinion were needed on a continuous basis both to provide inputs to policy formulation and to monitor the consequences of governmental actions. The data-generating capabilities of the CNS were unique in being able to provide such data from a national probability sample on a continuous basis and in time to be responsive to the information needs of policy makers. Without such a tool, those involved with energy policy would have had to rely entirely on limited reports from the media based on the convenience samples with which they deal, the information afforded by energy suppliers such as the American Petroleum Institute, and other informal sources that might be available. While not denying the value of such data, they cannot provide information that is generalizable to the experiences or opinions of the entire country. A true probability sample, even when small, offers the only guarantee against sample biases that are inherent in other methods of data collection. We feel pride in our demonstration that a continuous sample survey can be conducted in close cooperation with federal agencies, and that the data that we collected could help in the difficult task of managing the national energy crisis.

CHAPTER 1

EVOLUTION OF PUBLIC RESPONSE TO THE ENERGY CRISIS

Abstract

The text of the following chapter originally appeared as an article in a special issue of Science devoted entirely to energy-related topics. The article, written by James R. Murray, Michael J. Minor, Norman M. Bradburn, Robert F. Cotterman, Martin Frankel, and Alan E. Pisarski, summarizes the basic findings of the data collected from November 1973 through February 1974. Several of the graphs and tables in these pages also appear in Chapters 2 and 3 and in the Appendix with additional results included from the March to May 1974 interviewing period.

Social scientists are usually in the position of lamenting the absence of systematic data that would allow them to know how the public is reacting to events and what social adaptations, either constructive or destructive, are occurring or likely to occur. As the energy crisis began to move from a topic of discussion and dire prediction to a concrete reality, we have been, for the first time, in a position to examine an important event as it occurred. Through national probability sample

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surveys, we have detected the spread of the energy crisis throughout the nation and measured the changes in behavior and attitudes of the public as they encountered energy shortages. This assessment has been made through the Continuous National Survey (CNS), a small weekly nationwide probability sample of the U.S. population conducted since April 1973 by the National Opinion Research Center (NORC) at the University of Chicago. The CNS program was designed to provide multiple federal agencies with data relevant to program and policy issues. The data presented here were collected to provide the Department of Transportation and the Federal Energy Office with current information on the impact of the energy crisis. We have been providing reports to these agencies within 10 days of each interviewing week on these energy data since the first week of December.

In this article we present some of our major findings related to public exposure and reaction to the developing energy crisis since November 1973, when the American public began to experience shortages of gasoline and other oil end products.

The general picture that emerges from the survey data is that while a majority of the public consider the energy shortage an important problem, only about 25 per cent feel that it is the most important problem facing the country today. The public shows some understanding that there is a problem with all types of energy, but experience with actual shortages has been dominated so far by shortages in gasoline, and reactions appear to be largely conditioned by these experiences. Nevertheless, there has been little support for gasoline rationing, although there is some indication that this view may have been changing at the end of February.

Agreement is widespread that responsibility for the energy crisis lies most heavily on the federal government and the oil companies, and there is little tendency to blame Arabs, Israelis, environmentalists, or individual consumers. There is also a prevailing sentiment that the federal government is not handling the situation well. While a large majority report that the energy shortage has changed their way of living somewhat, the changes have not yet been perceived as major. In early January, when experiences with gasoline shortages were still not widespread or serious, about as many reported that the changes in their lives had been for the better as that they had been for the worse. However, at the end of February there was an increase in reports that the changes were predominantly for the worse and some evidence of greater annoyance and anger.

Since the Arab boycott and the President's nationwide television appeal in early December, there have been pervasive but modest efforts at energy conservation on the part of most segments of the public. However, these efforts have not yet gone beyond saving a bit here and there. There is little indication of any serious change in lifestyle, such as changing the mode of transportation to work or increasing the average occupancy of cars on the trip to work. People still are very resistent to car pools.

So far, the public has been cooperative in efforts to conserve energy, but not yet fully convinced that we must seriously restructure our high energy consumption way of life. A majority of the population believe that we will have as much energy as we need within five years.

Exposure

Fuel Oil

Homeowners who utilize fuel oil to heat their houses (N = 331) were asked about problems with the purchase of fuel oil last winter (1972-1973) and with their last purchase this winter (1973-1974). Only 1 per cent reported problems in the winter of 1972-1973, and less than 3 per cent reported difficulties during their last purchase this winter. Hence, despite predictions about heating fuel shortages, there was a very low incidence of problems in purchasing fuel oil in the past two years.

Electricity

All respondents (N = 1946) were asked to report problems with obtaining electricity in the past year. Only 5 per cent indicated experiences with electrical problems such as brownouts and power failures. Although a few respondents from all areas of the country reported such difficulties, the highest incidence occurred in the New England region, where 23 per cent reported experiencing electrical problems in the past year.

Gasoline

The percentage of car-owning households that reported trouble getting gasoline in the past month increased more than threefold (from 17 to 56 per cent) in the three-month interviewing period. There is a significant positive monotonic trend in the rate of reported difficulties throughout the interviewing period, except for the last few weeks, when the incidence of problems appears to have stabilized around 56 per cent. The largest single increase in experienced difficulties occurred over the Christmas holidays (21 to 37 per cent).

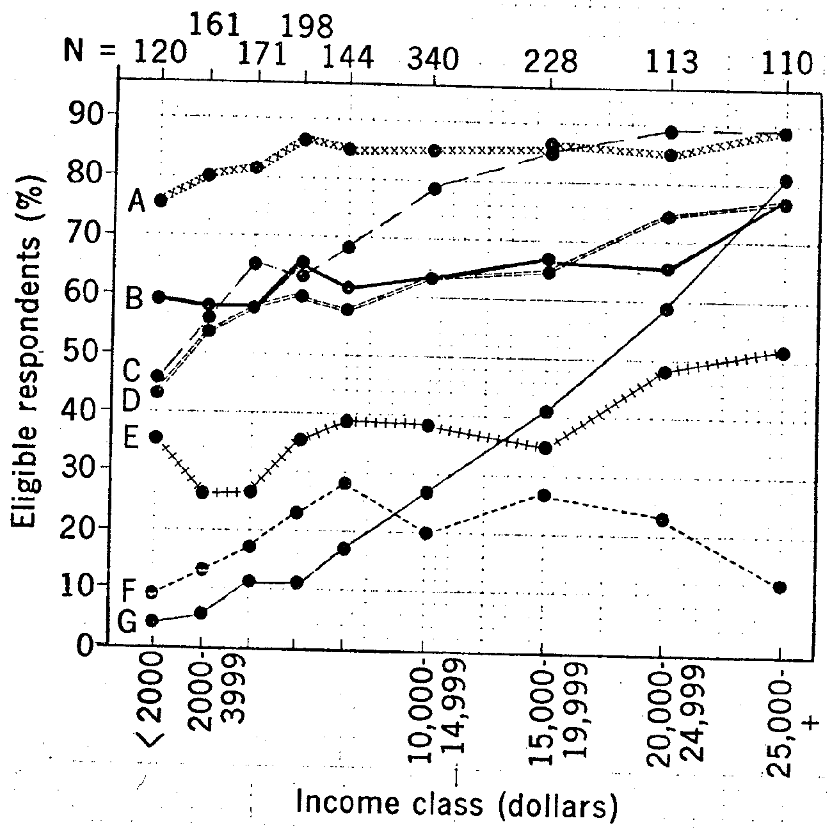
Analyses by census regions indicate that in February the highest incidences of gasoline problems were reported from the Pacific Coast (83 per cent) and New England (82 per cent). These regions had the highest percentage of respondents reporting this difficulty from December through February. The percentage in the Rocky Mountain region (20 per cent) has remained fairly stable; in the South Atlantic and West Central regions, there have been sixfold (10 to 60 per cent) and fivefold (11 to 57 per cent) increases, respectively.

Figure 1.1 shows the distribution of difficulties in getting gasoline over income classes for the entire three-month interviewing period. The relation between trouble getting gasoline and income class remains similar even if households are separated by area of residence (metropolitan or nonmetropolitan); the metropolitan curve is merely an upward translation of the nonmetropolitan curve (the overall percentages are 39 and 32, respectively). Similarly, correction for the number of cars owned by the household does not essentially alter the relation; the curves are the same shape for one-car and for two-car households (overall percentages, 30 and 40, respectively) as for all households together.

If a member of the household did experience problems obtaining gasoline, the respondent was asked to state the type of problem encountered. Although the incidence of all types of problems increased monotonically during the last three months, the two most pervasive difficulties were

Figure 1.1

CONSERVATION MEASURES, EXPOSURE TO SHORTAGES, AND APPLIANCES OWNED ACCORDING TO INCOME CLASS (CUMULATIVE RESULTS FOR THE INTERVIEWING PERIOD)



LEGEND

(A) Trying to cut electricity use
(B) Cut driving
(C) Have clothes washer or dryer
(D) Reduced temperature this winter
(E) Had trouble getting gasoline during the past month
(F) Washer or dryer owners cutting use of the appliance
(G) Have dishwasher

gas stations being out of gas and gas stations not being open as much (75 per cent in February for each item). In February, approximately 50 per cent reported problems related to getting as much gas as they wanted or to waiting in line. There is a large week-to-week variation in reports of when these problems occurred; however, an average of 70 per cent reported encountering problems between Monday and Friday. In February, 15 per cent reported that gas stations had gone out of business.

It is worth noting that exposures to different energy shortages across domains--gasoline, heating fuel, or electricity--are not significantly related.

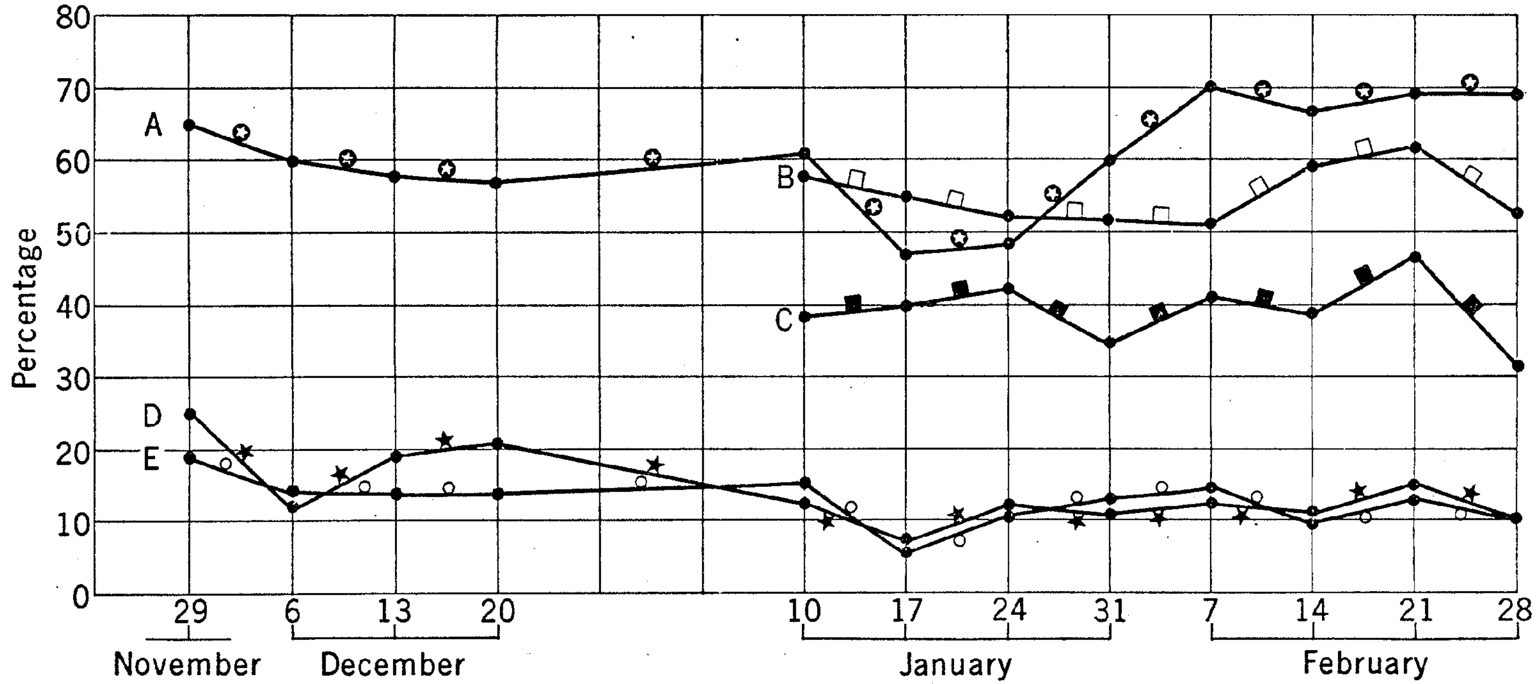
Expectations

Expectations are particularly important for analysis from a social science perspective, because they generally reflect not only previous experiences but also assessments about current situations and anticipations of future events. Respondents were asked questions about three distinct types of expectations: (1) Did they expect to have difficulty getting gasoline, heating fuel, or electricity within the next year? (2) How seriously did they expect to be affected by energy shortages in six months and in five years? (3) How many years did they think it would be until "we have as much energy as we need"?

Figure 1.2 shows the percentage of respondents expecting difficulty getting heating fuel, gasoline, or electricity in the next year. For gasoline, there is a sharp drop in the middle of January, followed by an increase of about 20 per cent in February, reflecting the relative increase in the availability of gasoline after Christmas and the unexpected decrease

Figure 1.2

EXPECTATIONS ABOUT FUTURE ENERGY SHORTAGES



LEGEND

(A) Expect problems obtaining gasoline in the next year
(B) Feel the shortage will affect them seriously in 6 months
(C) Feel the shortage will affect them seriously in 5 years
(D) Homeowners who expect problems obtaining fuel for heating in the next year
(E) Expect problems obtaining electricity in the next year

at the end of January. The low level and slight downward trend in the heating fuel curve reflect the relatively mild problems encountered by the public early in the period and their diminution as time went on. The relative increase in this curve before Christmas was undoubtedly due to the government's highly publicized fears of "unheated homes." Respondents reporting difficulty obtaining fuel are twice as likely to expect further problems over the next year as those not reporting difficulty. Futhermore, there are "transfer effects"; that is, exposure to problems with one type of fuel, such as gasoline, increases the expectation of problems with other types of fuel, such as electricity or heating fuel.

Expectations about the seriousness of the energy shortage in six months and in five years are also presented in Figure 1.2. Most respondents perceive the short-term effects as more serious than the long-term effects (54 and 40 per cent, respectively). Exposure to gasoline shortages is positively related to expectations for six months but is unrelated to expectations for five years from now. Thus, the February rise in the percentage of respondents expecting serious problems in six months is due to the increased difficulty in purchasing gasoline in this period.

Respondents' estimates of the number of years until we have as much energy as we need are close to the estimate given by the government as the goal for attaining "energy independence." In fact, the median of the estimates indicates that the public expects an absence of energy shortages before 1980. The estimate of the number of years until energy sufficiency, like the expectation of the seriousness of problems in five years, is unrelated to exposure or other expectations.

These findings lead us to conclude that there are two types of expectations. Short-term expectations are influenced by exposure to shortages, and themselves determine evaluations and conservation behaviors. Longer-term ones are insensitive to recent experiences of shortages, relatively stable over time, and unrelated to evaluations of the energy shortage and conservation behaviors.

Clearly, the public believes that fuel shortages are not inevitable in the future and will most likely be solved within four or five years. This relatively optimistic public stance is further indicated by the finding that the median estimate of the price of gasoline after one month of free market conditions is $0.75 per gallon.

Personal Reactions

Despite highly publicized protests about the "unfairness" of fuel allocations, 95 per cent of the respondents considered that they were receiving their fair share of fuel for home and transportation use. This percentage remained stable over January and February, and therefore appears to be insensitive to changes in levels of exposure.

Although most respondents thought they were receiving a fair share of fuel, 25 per cent reported that they were suffering more than people of other income levels because of the energy shortage. This reaction is negatively related to household income and unrelated to exposure, and hence may reflect general attitudes that higher-income households suffer less. Of course, our data only indicate the occurrence of problems and not their severity. Therefore, although the incidence of problems is greater in the higher-income household, the impact of the problems could be greater for the lower-income ones.

There has been a significant decrease in the percentage of car owners who felt they were able to use their cars as much as they wanted. These feelings were at the highest level (70 per cent) during the third week in January, but decreased linearly to 38 per cent during the last week of February. The relation between reactions about the amount of car use and exposure to gas shortages is significant. Reaction about amount of car use is also significantly related to satisfaction with the amount of use. A curve of the percentage reporting "completely satisified" (mean = 48 per cent) is an exact downward translation of the "amount of use" curve, and a curve of the percentage reporting "not at all satisfied" is an exact reflection of the "amount of use" curve, with a mean of 10 per cent.

The percentage of respondents who reported that there were changes in their lives because of the energy shortage increased significantly (from 64 to 79 per cent) during January and February. During the first two weeks in January, respondents were equally divided between those who felt these changes were for the better and those who felt they were for the worse. Since the third week in January, however, there has been a significant shift in these proportions. We believe that those seeing changes initially as for the better were reacting to the novelty of the sudden onset of shortages; however, as problems became more pervasive and short-term resolution less certain, the percentage of negative evaluations increased. Weekly estimates of the strength of the feelings of respondents who reported negative life changes show that during the second and third weeks in February the percentage expressing annoyance or anger increased significantly to 73 per cent.

Sixty-seven per cent of the February sample expressed the belief that the gasoline shortage could be solved if individual consumers cut down on gasoline consumption. While there were no major differences in this percentage when respondents were categorized by demographic characteristics, a higher percentage (78) of respondents who resided in farm or rural areas believed in the effectiveness of individuals. There is no relation between support for this belief and exposure to gasoline shortage. This finding may represent higher levels of self-reliance or self-sufficiency in farm or rural areas.

These personal reactions are not significantly interrelated. Belief in the ability of individual consumers to solve the energy shortages is significantly related to reports of cutting down on driving and turning off of lights. Reports of life changes are positively related to the evaluation of the importance of the energy shortage as a problem. While expressions of feelings of inequity concerning the fuel distribution system were rare, we believe that the high rate of negative perception of life changes, with attendant feelings of hostility, provides a context for public disturbances and violence if perceptions of inequity were to increase dramatically.

Evaluation

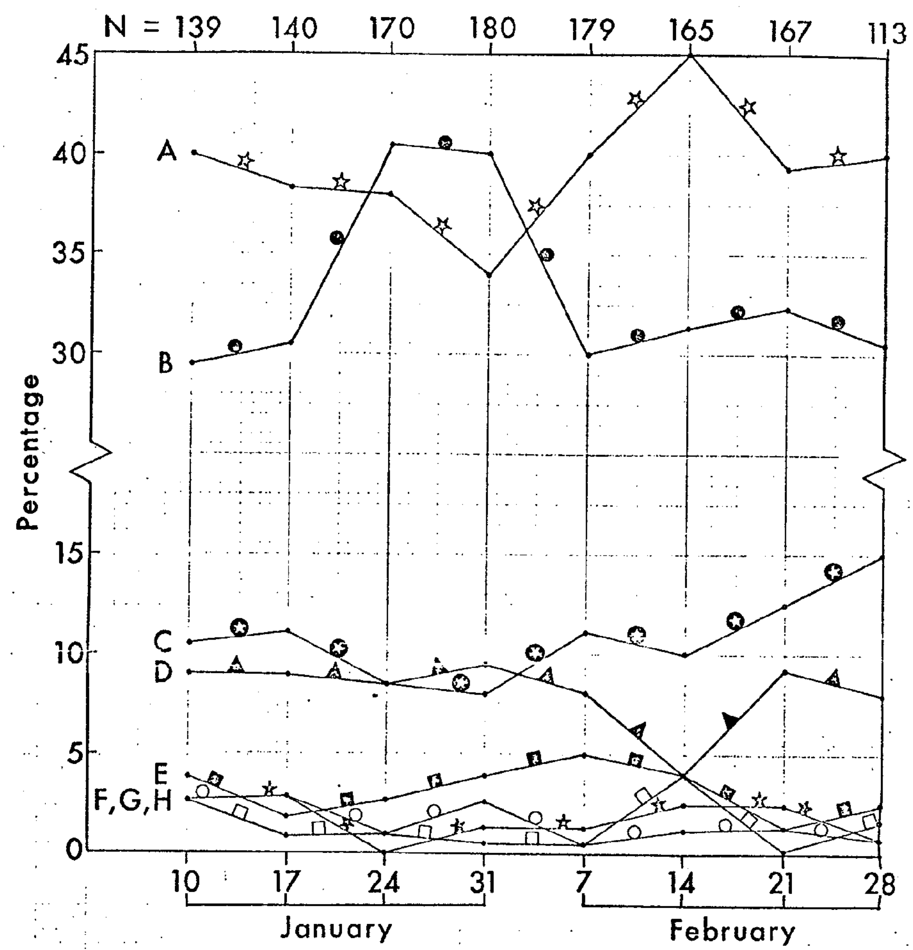
The importance respondents attach to the energy shortage as a national problem has been fairly stable. The overall estimates for the three months of interviewing are: most important, 26 per cent; very important, 59 per cent; fairly important, 14 per cent; not a problem, 8 per cent. Two findings about these evaluations should be emphasized: (1) The public is aware of the energy shortages, as only 8 per cent do not think the shortages are a problem. The majority, however, do not view these problems as the most important in the country. (2) In the last two weeks of February there was a significant increase (to 32 per cent) in the percentage of respondents who think the shortage is the most important problem.

An analysis by demographic characteristics shows that opinions concerning the importance of the energy shortage are not significantly related to region, education, income, or area of residence. However, they are related to expectations of problems in obtaining gasoline and electricity and to reports of a change in life-style due to the energy shortages. We found that exposure to gasoline problems was not related to the evaluations of importance in November, December, or January, but was significantly related in February. This suggests that the evaluations do not become articulated with behavioral events (exposure) until the duration of the situation (shortages) and the pervasiveness of the events have reached a certain threshold.

Weekly results concerning assignment of responsibility for the current energy shortage to various groups are presented in Figure 1.3. Although there is some variation, the rank orderings of groups remain

Figure 1.3

WHICH GROUP IS MOST RESPONSIBLE FOR THE
CURRENT ENERGY SHORTAGE?



LEGEND

(A) Government in Washington
(B) Oil and gas companies
(C) Arabs
(D) Big business
(E) Individual consumers
(F) Russians
(G) Israelis
(H) Environmentalists

fairly stable across the two-month period. The government in Washington is perceived as the most responsible (mean = 40 per cent) throughout the interviewing period, except for the last two weeks in January, when the oil and gas companies were perceived as the most responsible group. This sudden and brief reversal of order is best explained by the disclosure during that period of the high profits of the major oil companies. Of the other groups, all but the Arabs and big business were seen as most responsible by less than 5 per cent of the sample. These evaluations of responsibility are unrelated to any other variables, such as exposures, expectations, or demographic characteristics.

Changes in the weekly ratings of the performance of the national and state governments in handling the fuel shortages suggest two significant trends: (1) In February there was a significant increase (to 44 per cent) in the number of respondents who thought the state government was doing a good job (the baseline level in January was 36 per cent). (2) During the last three weeks in February, there was a significant increase (49 to 58 per cent) in the number of respondents who thought the national government was doing a poor job (the baseline in January was 53 per cent). Throughout January and February there was a significant difference in mean levels between state and national governments in the ratings of "good performance" (38 and 16 per cent, respectively). The ratings of government performances are unrelated to any demographic characteristics or other variables.

Policy Preferences

Since July 1973, we have collected data about the public's preferences with respect to allocation priorities, gas rationing, and Daylight Savings Time. The opinions of the respondents about allocation priorities, presented in Table 1.1, are best summarized by three statements: (1) The order and magnitude of the preferences have been stable over an eight-month period. (2) An overwhelming plurality (mean = 42 per cent) consider farm vehicles as the first choice to receive fuel. (3) The priorities voiced by the public are very similar to the government's allocation priorities.

There are some interesting week-to-week variations in opinion about who should get fuel first. The most significant variation is in the percentage of respondents favoring trucks, which increased steadily from 24 January to 14 February, reflecting the well-publicized actions of the truckers during that period. Hence, although support increased for only a few weeks and subsequently declined, the findings suggest that public preferences are sensitive to certain events.

Two types of questions were used to gather opinions on rationing issues. First, a series of paired comparisons measured preferences for gasoline rationing over alternate plans that included increased prices. The findings were stable from November to February, with 73 per cent of the respondents preferring rationing at $0.50 a gallon to the other alternatives with higher prices. Second, respondents were asked whether they felt gas rationing was necessary. The results of these findings are presented in Figure 1.4. Two statements best characterize these data.

TABLE 1.1

POLICY PREFERENCES

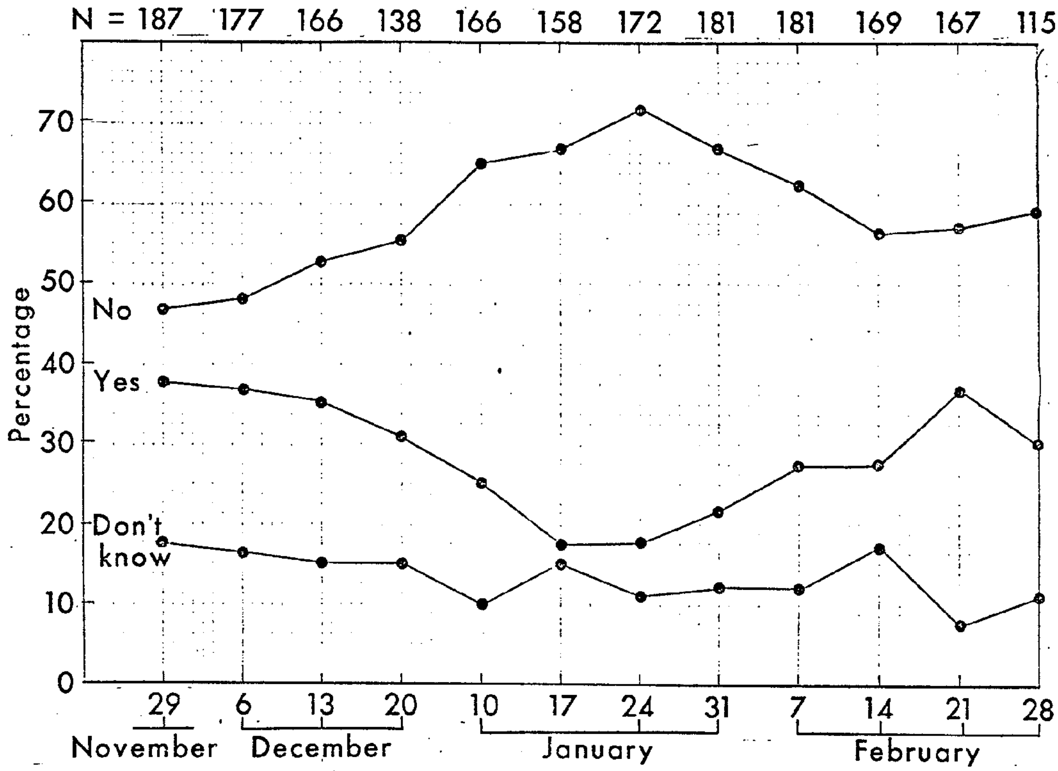
(Per Cent)

Use of Fuel or Type of Vehicle	Respondents Giving as First Choice in: Feb. 1974	Jan. 1974	Nov. 23-Dec. 20, 1973	July 1973
If there is not enough fuel for everyone, which uses do you think are most important?				
Heating homes	56	60	59	61
Farming operations	59	59	56	55
Factory operations	50	46	41	42
Commercial freight transportation	37	35	29	30
Mass transit	33	31	28	27
Business driving by private citizens	23	24	19	17
Pleasure driving	1	1	1	1
National defense	51	50	*	*
N	643	679	670	612
If the government must ration motor fuel, which type of vehicles should get it first?				
Farm work vehicles	40	44	39	47
Private cars	12	17	16	11
Urban mass transit	13	14	14	19
Trucks	17	11	9	6
Railroad freight trains	10	6	9	7
Buses for between-city trips	3	2	4	3
Commercial airlines	1	2	2	2
Passenger trains for between-city trips	2	1	2	1
Private airplanes	0	1	0	1
Taxis	1	0	1	2
Construction vehicles	1	0	1	1
N	638	675	664	596

*The question was not asked.

Figure 1.4

IS GASOLINE RATIONING NECESSARY?



First, the population has definite attitudes about rationing, as evidenced by the low percentage of "don't know" responses. Second, the percentage opposing rationing significantly increased in early January, but began a steady linear decrease by the third week in January.

The complex weekly fluctuations in these opinions are a result of at least three factors. The first factor is the respondent's prior experiences with and knowledge about rationing. In the first few weeks of the publicized energy crisis, there were numerous references to World War II, when rationing "wasn't all that bad"; in January, however, when high government officials expressed opposition to rationing, the public showed a concomitant response against rationing. The second factor is the respondent's exposure to gas shortages. Exposure was unrelated to feelings about the necessity of rationing in December and January, but was significantly related in February--if one experienced difficulty getting gas he was more likely to favor rationing. The third factor is the respondent's expectations of gas problems. Expectations of problems were significantly related to opinions about rationing in January and February, but not in December. Hence, if experiences and expectations of shortages become less pervasive, we predict that the percentage of respondents favoring rationing will decrease.

Four other findings related to rationing issues are of interest: (1) 50 per cent of the respondents thought that people in some regions of the country should get an extra amount of gas rations; (2) 90 per cent thought that people living in areas with little or no public transportation should get extra ration coupons; (3) 84 per cent thought that people who use their cars for business should get extra ration coupons; and (4) 76 per cent thought that ration coupons should expire at the end of one year.

Opinions about Daylight Savings Time have been collected every month since August 1973, except for January 1974. Before the enactment of legislation calling for year-round DST by Congress, the data showed high levels of public support for the plan. After DST was begun in January, we found a majority disliking the plan. However, the question asked was changed from a yes/no response alternative to the proposal for year-round DST to a like/dislike response to the new legislation. We are now collecting additional data to resolve the ambiguity between item and temporal change. That is, is approved similar to liking, or did the public really shift in feeling after the change to DST?[1]

Conservation[2]

Thermostat setting, lighting, and major appliance usage were taken as measures of household energy consumption. Overall, from last winter (1972-1973) to this winter (1973-1974), few report increased daytime temperatures and reduction rates are nearly uniform from -1° to -9°F. Table 1.2 shows the distribution of heating units according to the 1970 Census and our CNS sample. The last column shows the percentage of households, for each fuel type, reporting a daytime temperature setting this year that was less than the setting last year. The highest rate occurred for the fuel currently in shortest supply, fuel oil. These temperature reduction rates have been stable from November 1973 through February 1974.

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[1] This problem of real attitude shift versus wording change is resolved in Chapter 3.

[2] Chapter 2 presents a more extensive analysis of reports of conservation behavior and includes data collected during the March through May 1974 interviewing period.

TABLE 1.2

HOUSEHOLDS (OWNERS AND RENTERS) REDUCING DAYTIME TEMPERATURE FOR EACH TYPE OF FUEL USED FOR HOME HEATING

(These are cumulative results for November 23, 1973 to February 28, 1974)

Heating Fuel	CNS Sample		1970 Census		Households Reducing Temperature (Per Cent)
	N	Percentage Using Fuel	N	Percentage Using Fuel	
Natural gas . . .	869	56	35,013,745	55	58
Propane (liquid).	93	6	3,806,948	6	58
Fuel oil	392	25	16,473,470	26	75
Coal	18	1	1,820,952	3	33
Electricity . . .	163	11	4,876,038	8	53
Other	13	1	1,060,194	2	31

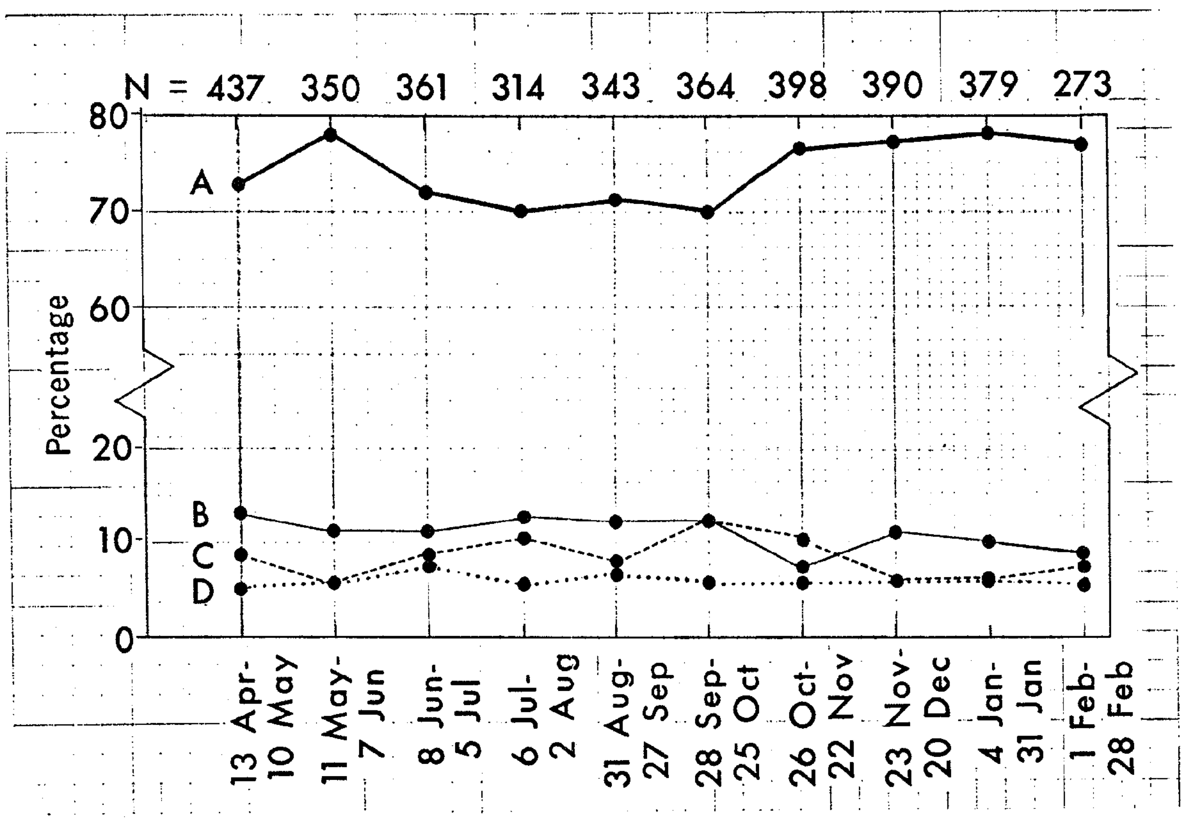
The median weekly reported daytime temperature this winter was 68°F. There were only minor weekly variations in the reports of last year's daytime temperature, which averaged 70.5°F. The percentage of households reporting that they turned off their lights or used major appliances less in order to save energy increased significantly following the Christmas holidays.

Reduction in car use was also measured as a conservation behavior. The percentage of car owners who reported cutting down their driving increased significantly following the Christmas holidays. In addition, respondents specified the kinds of driving that were reduced. Both driving for shopping and driving on social or recreational trips decreased after Christmas. Such rates imply a drop in the volume of retail buying and leisure spending, perhaps earlier than forecast. Also, low and stable rates of cuts in chauffeur driving and driving to work are consistent with the belief that these trips are more resistant to modal shifts. The trip-to-work statistics given in Figure 1.5 clearly show the absence of shifts away from the single-passenger auto trip to either public transportation or car pools.

We have explored the relations between reported conservation and a number of other variables in an attempt to predict conservation. We are unable to establish statistically significant relations between temperature reduction or the reduction in use of major appliances with any other nondemographic variables. However, reports of difficulty obtaining electricity over the past year and opinions about the importance of the current energy shortage significantly predict reports of shutting off lights. These relations are stable from November through February.

Figure 1.5

USUAL MODE OF TRANSPORTATION TO WORK



LEGEND

(A) Car, driver
(B) Car, passenger
(C) Walk (or bicycle, motorcycle, work at home)
(D) Public transportation (bus, train, subway, or taxi)

Cutting down on driving shows complex, statistically significant dependencies. First, the rate of cutting down on driving was higher for those not experiencing difficulty obtaining gas in November and December. However, during January and February, the rate of cutting down on driving was higher for those who did have difficulty getting gas. In January and February, respondents not experiencing difficulty in obtaining gas differed in their reports of reduced driving, depending on their expectations--those expecting difficulty obtaining gas next year were 1.5 times more likely to report reduced driving than those who did not expect difficulty (75 versus 53 per cent). There was no difference in rates of reduced driving between those expecting and those not expecting problems obtaining gasoline for respondents who did experience difficulty getting gas. Also, respondents who thought that the energy shortage was an important national problem were 1.25 times more likely to reduce their driving than those who did not think so if they had experienced difficulty obtaining gas, but only 1.17 times more likely if they had not experienced difficulty obtaining gas. These relations imply a base level of cutting down on driving at 41 per cent; this increases to 82 per cent if respondents experience difficulty obtaining gasoline, expect such problems to continue, and evaluate the shortage as important.

Household Income and Conservation

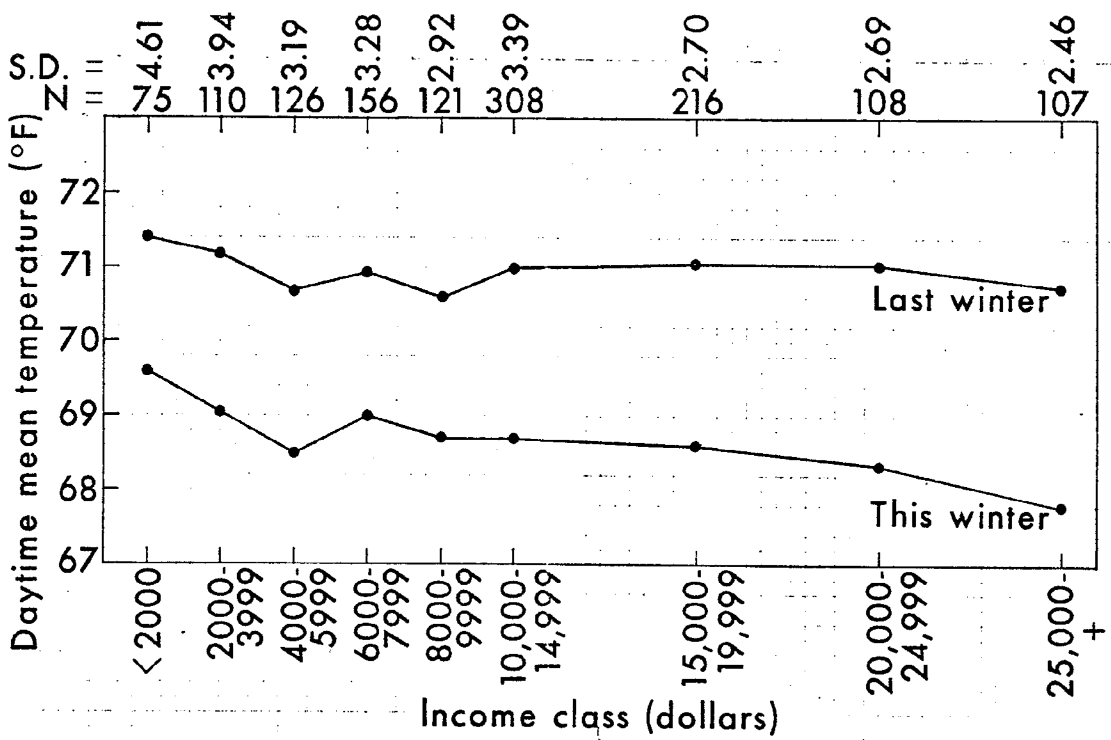
The percentage of eligible respondents who reported a lower daytime temperature this winter than last winter is plotted against household income in Figure 1.1. Note that the proportion reporting such a reduction in temperature varies positively with income. Furthermore, the mean reported daytime temperature for this winter, though not that for last winter, varies negatively with income (Figure 1.6). In addition, Figure 1.1 shows the percentage of car-owning households in each income class that reported a reduction in driving, one of the more important gasoline conservation measures.

The percentage of households in each income class reporting attempts to cut electricity use is also shown in Figure 1.1. While we have no estimate of the amount of the reduction in electricity used per household in each class, some clues may be provided by an investigation of the distribution of various appliances over income classes. Certain appliances (such as refrigerators) use electrical power at a fairly constant rate, whereas for others (such as televisions) there may be much greater variability in electrical input over time. Households possessing stocks of appliances more heavily weighted toward the latter type are more likely, <u>ceteris paribus</u>, to effect larger short-run reductions (both proportionally and absolutely) in electricity use. Since ownership of many such appliances varies positively with income, one might expect higher-income households to show larger reductions in electricity use. However, income-related differences in reaction to price change may mitigate, if not completely negate, the effect of differences in the composition of the stock of appliances. For example, the percentage of washer or dryer owners who reported reduced use of the appliance varies negatively with income over a range of income classes. We do not know whether, underlying this result, there is a more general tendency for higher-income households to cut use of some, but very few, of a vast array of appliances (and so to generally report trying to cut electricity

Figure 1.6

DAYTIME MEAN TEMPERATURE BY INCOME CLASS (CUMULATIVE RESULTS FOR THE INTERVIEWING PERIOD)

(To convert to ^{o}C, subtract 32 and divide the difference by 1.8.)



use). Such a tendency might indicate that when reduction does occur, the size of the reduction in electricity use by individual upper-income households is also less for any given appliance and, potentially, for all appliances taken together.

Appendix: CNS Sample Design

The selection of households and individuals for the CNS is based on the NORC Master Probability Sample of Households--a multistage, stratified, full-probability sample of all persons, 18 years of age and older, living in households within the 48 contiguous United States. In the first stage of sampling (which took place in 1972), 101 Primary Sampling Units (counties or groups of counties) were selected. Within each of these selected PSU's, two additional stages of sampling were employed to select six ultimate segments (portions of enumeration districts or block groups).

Within each ultimate segment, a listing of all dwelling units (DU's) was made by the NORC field staff. Specific sample addresses were selected by appropriately sampling from these ultimate segment listings. (Interviews must go to selected sample addresses, no replacement is allowed.) To insure against "frame bias" arising from DU's that were missed at the time of listing, or have come into existence since that time, we employ a half-open interval technique which uniquely links each unlisted DU to a DU for which there is a listing. Within each selected DU, a single respondent is selected with equal probability from a listing of all eligible respondents.

Each week, interviewing is conducted in approximately one-quarter of the 606 ultimate segments. The allocation of these segments is done in such a way that (1) each segment falls into the sample every fourth week; (2) each week, interviews are conducted in either one or two ultimate segments of each PSU; and (3) within any consecutive two-week period, exactly three segments from each of the 101 PSU's will be in the sample.

The allocation of segments to weeks has been accomplished by procedures which permit a sample from a single week to be treated as an individual probability sample of all U.S. households. In addition, the sum of any number of weekly samples (say, from week t to week t + k) may be viewed as a proper probability sample of all U.S. households.

Each weekly sample of households constitutes an essentially self-weighting (equal probability) sample of all U.S. households. Since the probability of selection for individuals within households depends on the total number of eligible individuals within the household, when the unit of analysis is the individual, the sample must be weighted to yield unbiased estimators.

Sampling Errors

We make use of the concept of design effect in order to discuss the sampling errors of estimates derived from the CNS. Design effect (DEFT) is the ratio of the actual sampling variability of the sample-derived estimate to the sampling variability that would have resulted if the sample design had been simple random element sampling. In the case of differences between means or proportions, design effect is the ratio of actual variance (including covariance between estimates) to the variance assuming two independent simple random element samples. Although DEFT may take a different value for each individual estimate, a great deal of empirical research has shown that this ratio tends to be very similar for substantively and statistically similar estimators based on a particular design.

We have estimated DEFT's for single proportions [single week DEFT $(p_w) = 1.17$; four successive weeks DEFT $(p_m) = 1.24$] as well as for differences between proportions for successive single weeks and four-week periods [differences between successive weeks DEFT $(p_{w1} - p_{w2}) = 1.11$; differences between successive four-week periods DEFT $(p_{m1} - p_{m2}) = 1.10$]. (The letters are m, four-week statistic; w, single-week statistic; and p, any proportion. An estimate of the sampling error (S.E.) of a proportion for a single week based on a sample size n_w is given by

$$\text{S.E. } (p_w) = \{ \text{ DEFT } (p_w) \times [p_w \times (1-p_w)/n_w] \}^{\frac{1}{2}}$$

The estimate of sampling error for the difference between proportions for successive weeks is given by

$$\text{S.E. } (p_{w1} - p_{w2}) = \{ \text{ DEFT } (p_{w1} - p_{w2}) \times [(p_{w1} \times (1 - p_{w1})/n_{w1}) + (p_{w2} \times (1 - p_{w2})/n_{w2})] \}^{\frac{1}{2}}$$

Estimates of sampling error for proportions for single and successive four-week periods are given by the formulas above, substituting the subscript m for w.

Although DEFT is influenced by all of the departures of the sample design and estimation procedures from self-weighting simple random sampling (that is, stratification, clustering, weighting, and so forth), we have found that the major influence on DEFT's (for single proportions) in the

CNS design seems to be effective ultimate cluster size. Numerous computations have confirmed our expectations that most of the gasoline-related attitudes and experiences show rather high intraclass (cluster) correlations. Fortunately, effective ultimate cluster size is close to unity for both single weeks and successive periods of four weeks. Since interviewing is administered in the same ultimate cluster every four weeks, the design effect for differences between monthly periods is appreciably lower than the design effect for a single four-week period.

CHAPTER 2

AN ANALYSIS OF CONSERVATION BEHAVIORS

Abstract

Some major questions during the energy shortages were focused upon the occurrences of voluntary conservation behavior--Who did conserve? To what degree? and In which domains of energy consumption? The discussion in this chapter attempts to provide a partial answer to these complex questions. Briefly, there appear to be four central findings: (1) large segments of the public reported conservation behavior in areas of household consumption--heating, electricity, and in automobile use; (2) as might be expected, given the short time period under consideration and the uncertainty surrounding the future of the oil embargo, most conservation measures were of such a nature that they could be readily instituted and just as readily abandoned; (3) the effects of the crisis on more basic energy-related decisions, such as where to live, size of house, and size of automobile to purchase are largely unknown, though some clues do exist; (4) there appear to be positive relationships between total family income and reports of conservation behaviors.

Introduction

Public reaction to the "energy crisis" has been a response to a mixture of many factors. We may put these factors into three basic categories: (1) moral suasion, (2) changes in the real price of activities that consume energy, and (3) changes in real income. Included in the category of moral suasion are public pronouncements on the gravity of the energy situation and appeals to patriotism as a reason for conserving fuels. Included in the category of price changes in energy-related activities are such events as changes in the real price of an energy resource, increases in the length of time spent waiting in queues for gasoline, and increases in inconvenience caused by restrictions on hours service stations are open. These categories may not be independent in their effects on behavior: public appeals to conserve fuels may increase awareness of the price changes that occur. Though changes in real income have no doubt taken place, many of these changes are transient and can be expected to have had only minor effects on long-term or permanent income. To the extent that consumption is a function of permanent income and not transitory income, the effects of income changes over the period of energy shortages during the winter of 1973-1974 may be assumed to be small and of little importance. Separating the effects of price changes, income changes, and moral suasion on fuel consumption is an interesting problem that is beyond the scope of this report; we would merely note that conservation behavior has been produced by a combination of these forces.

At the outset it should be noted that, in the short period of time under consideration, conservation possibilities are limited by the composition of the stock of energy-using devices. While there may be reports of extensive attempts to cut energy usage, truly significant savings may not be realized until elements of the present stock depreciate and are either not replaced or are replaced by more efficient devices.

The first part of this chapter will examine conservation in three energy-consuming activities: transportation (with special reference to the automobile), heating, and the use of electrical appliances. The second part of the chapter will deal with issues concerning the variation over income groups in the impact of, and the response to, the energy crisis.

Overview of Conservation Behaviors

Transportation

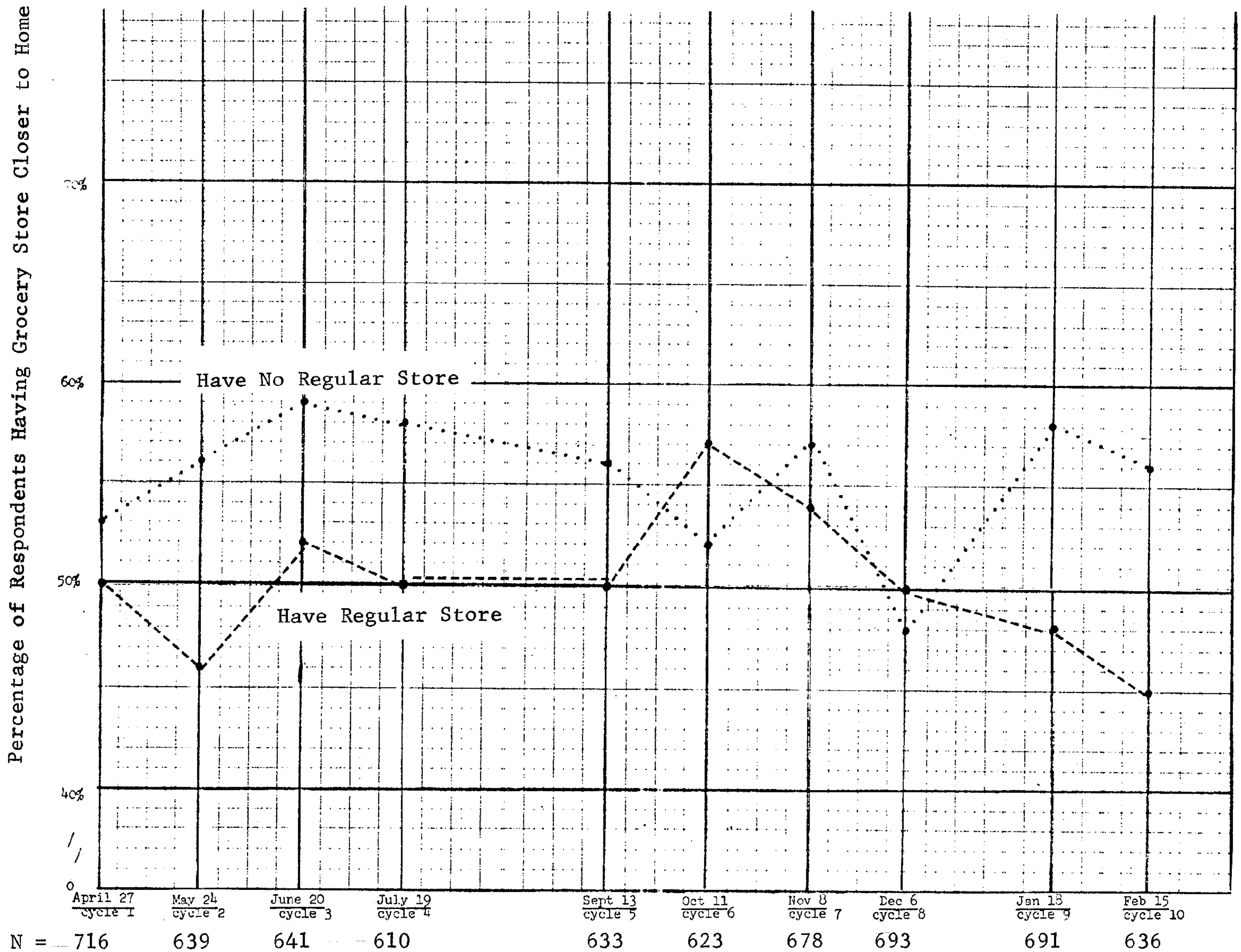
Data about the extent of travel and the use of various forms of transportation by private citizens provide important means of measuring conservation behavior. Two ways to reduce fuel used for transportation purposes are to decrease the average length per trip and to decrease the number of trips made (by all means of transportation).

Only a scant bit of evidence on the first reduction method--decreasing the average length per trip--is available. Respondents in Cycles 1-10 were asked if they had a regular store at which they do most of their grocery shopping. Respondents were then asked if there was another store closer to home at which they could purchase most of their groceries (or, if they indicated they had no regular store, a store closer than the one most recently used for major grocery shopping). As attempts are made to cut back on travel in general and on distances traveled in particular, one would expect more individuals to sacrifice the higher quality or lower prices they were presumably getting by traveling further to shop; if so, the proportion of respondents indicating that they have stores closer to home where they could do major grocery shopping should fall over time. In fact, the time series for those who had no regular grocery store shows no downward trend (Figure 2.1). For respondents who had a regular store, the series exhibits some rise until Cycle 6, but a downward trend thereafter.

To measure the use of the second conservation method--decreasing the number of trips made--respondents were asked in Cycles 2, 3, 4, 8, 9, and 10 to enumerate all trips made on a randomly chosen day. (For Cycles 2, 3,

Figure 2.1

PERCENTAGE OF RESPONDENTS HAVING A GROCERY STORE CLOSER TO HOME THAN REGULAR ONE/ONE AT WHICH MOST RECENTLY SHOPPED



and 4, only metropolitan respondents were asked this question. To maintain comparability, the results given for Cycles 8, 9, and 10 are also for metropolitan respondents only.) If reductions are being made in the number of trips (by _all_ modes of transportation), then one would expect a fall over time in the average number of trips made per respondent per day. This measure does show a slight downward trend, although the results are mixed (Figure 2.2).

It seems likely, a priori, that a major portion of the reduction would be in trips for social, recreational, and dining purposes. That is, while fairly close substitutes for leisure time activities requiring travel (e.g., going to the movies) may be available in the home (e.g., watching movies on television), a job requiring fewer trips to work may be less readily available.[1] Indeed, time series evidence does show a fall in the average _number_ of daily trips made for social, recreational, and dining purposes (Figure 2.2) as well as a decline in the _proportion_ of daily trips made for these activities (Figure 2.3; but note the slight rise after Cycle 8).

While the variables examined do move over time in the predicted manner, some care should be exercised in interpreting these and other findings presented in this chapter. Seasonal factors of unknown but potentially large magnitude are undoubtedly present: neither weather nor the distribution of holidays is uniform throughout the year. We cannot estimate the importance of these factors until the time series is extended into seasons previously covered.

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[1]With respect to the latter point, we find no evidence from Cycles 1-10 of any shift toward jobs requiring no trip to work.

Figure 2.2

DAILY TRIP DATA FOR METROPOLITAN RESPONDENTS

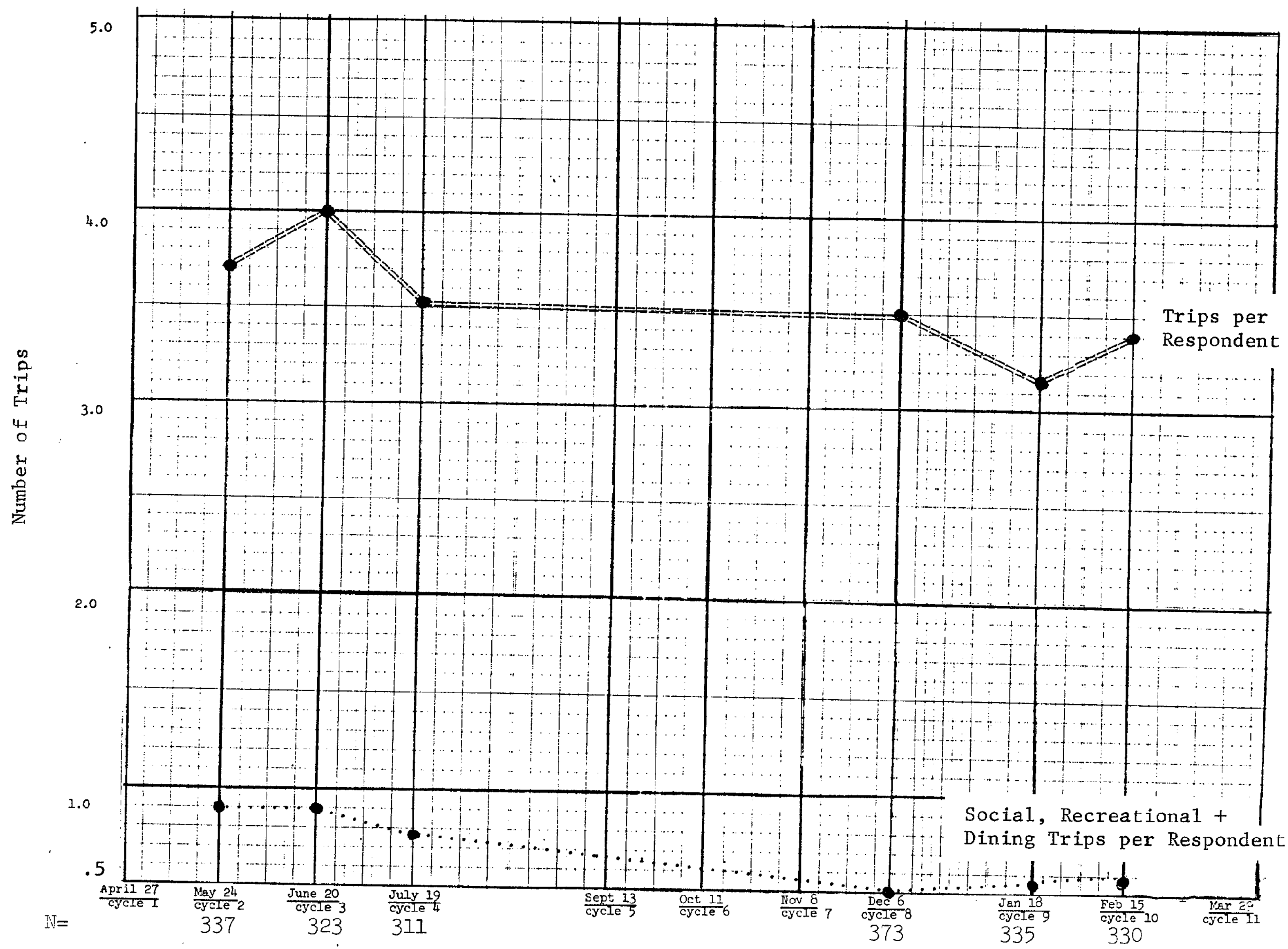
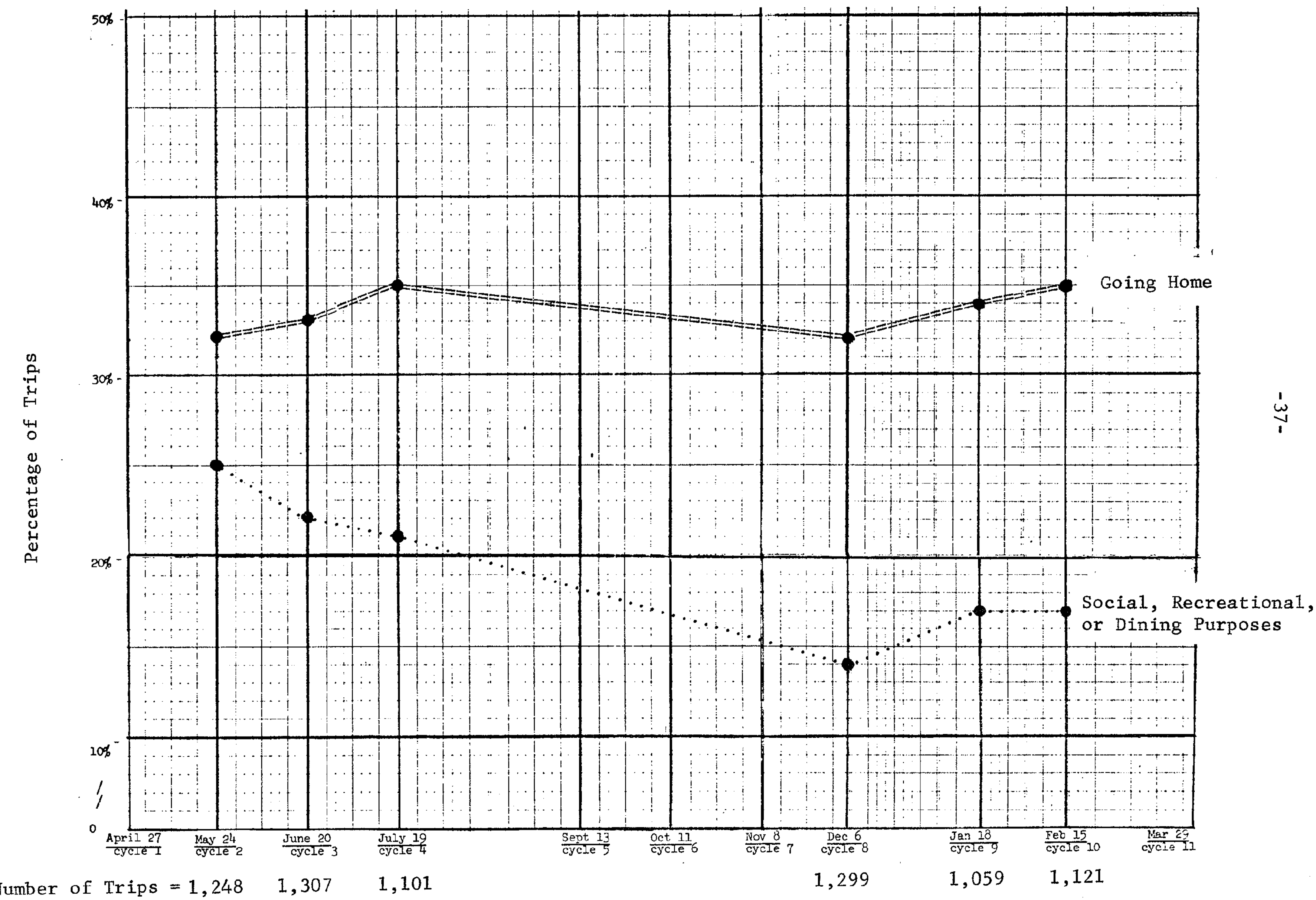


Figure 2.3

DAILY TRIP DATA FOR METROPOLITAN RESPONDENTS



Since the automobile is one of the more extensively used (but also more inefficient) forms of transportation, the degree of reduction in the number of automobile trips is of interest in its own right. Data from Cycles 2, 3, 4, 8, 9, and 10 show no clear trend in the number of auto trips per metropolitan respondent per day (Figure 2.4). The curve showing the average number of daily auto trips for social, recreational, and dining purposes falls until Cycle 8 and rises slightly thereafter, as does the corresponding measure for trips by all modes of transportation. The proportion of all auto trips made for social, recreational, or dining purposes also falls through Cycle 8 (Figure 2.5) and rises thereafter, in roughly the same manner as the corresponding measure for all modes of transportation.

Cycle 8, 9, and 10 questionnaires included direct questions concerning the amount and types of driving done. Sixty-four per cent (N=1,786) of eligible households[2] reported trying to save gas by cutting down on the amount of driving done.[3] As expected, the type of driving reduction reported most often (by 45 per cent of eligible respondents) was for social, recreational, or dining purposes. Reduction in driving could, of course, include decreasing the number of trips, decreasing the average distance traveled per trip, or shifting to alternative modes of transportation. However, reductions in the number of trips per se may be important, since 78 per cent

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[2]An eligible household is one having at least one car and at least one licensed driver.

[3]Reconciliation of this result with the previously noted lack of trend in number of auto trips per metropolitan respondent per day may lie in seasonal factors. In addition, cutting down driving by reducing distance traveled will not show up in data on the number of trips made. Finally, in the aggregate, the actions of those not cutting their driving may have offset part of the effect of those who did.

Figure 2.4

DAILY AUTOMOBILE TRIP DATA FOR METROPOLITAN RESPONDENTS

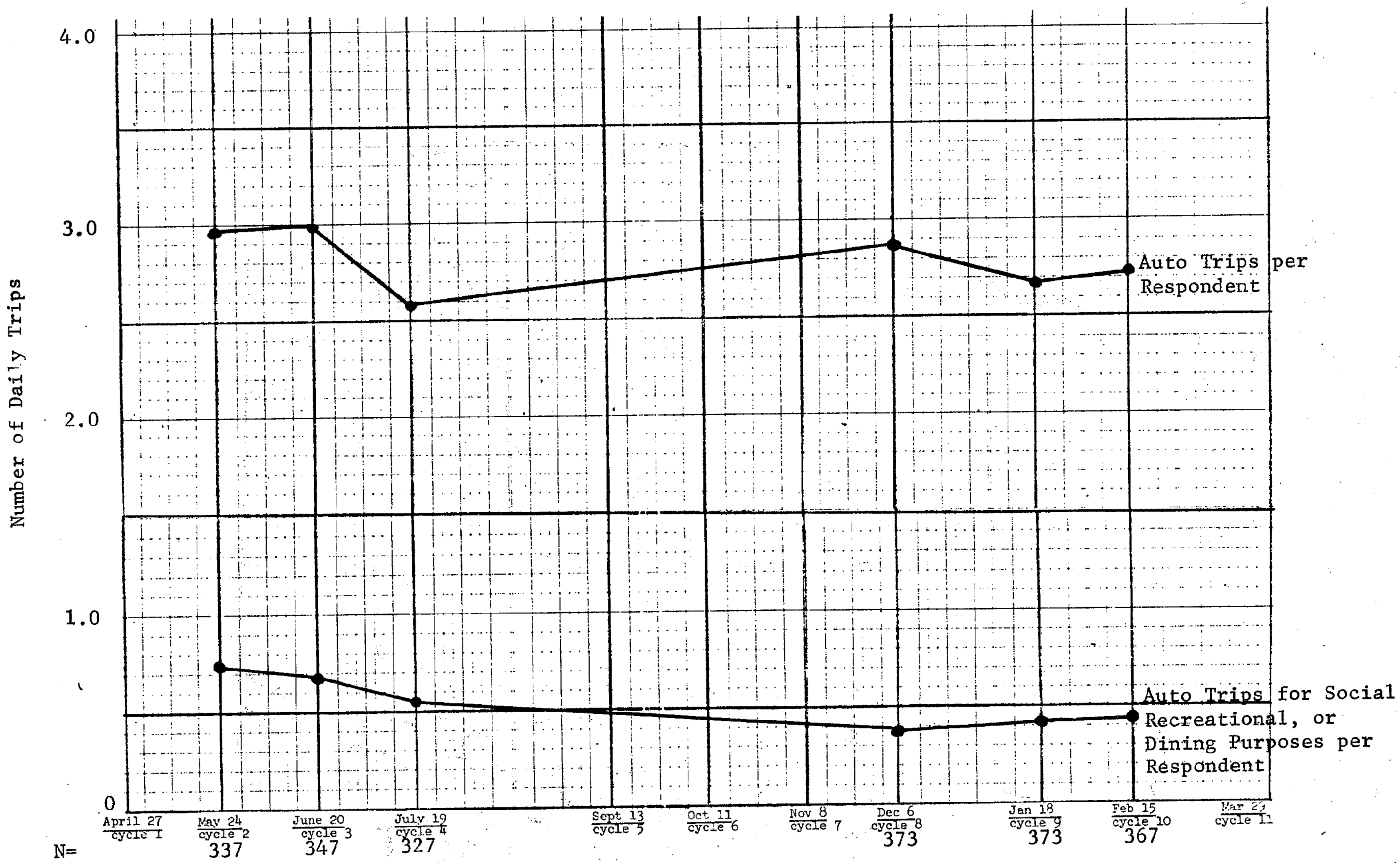
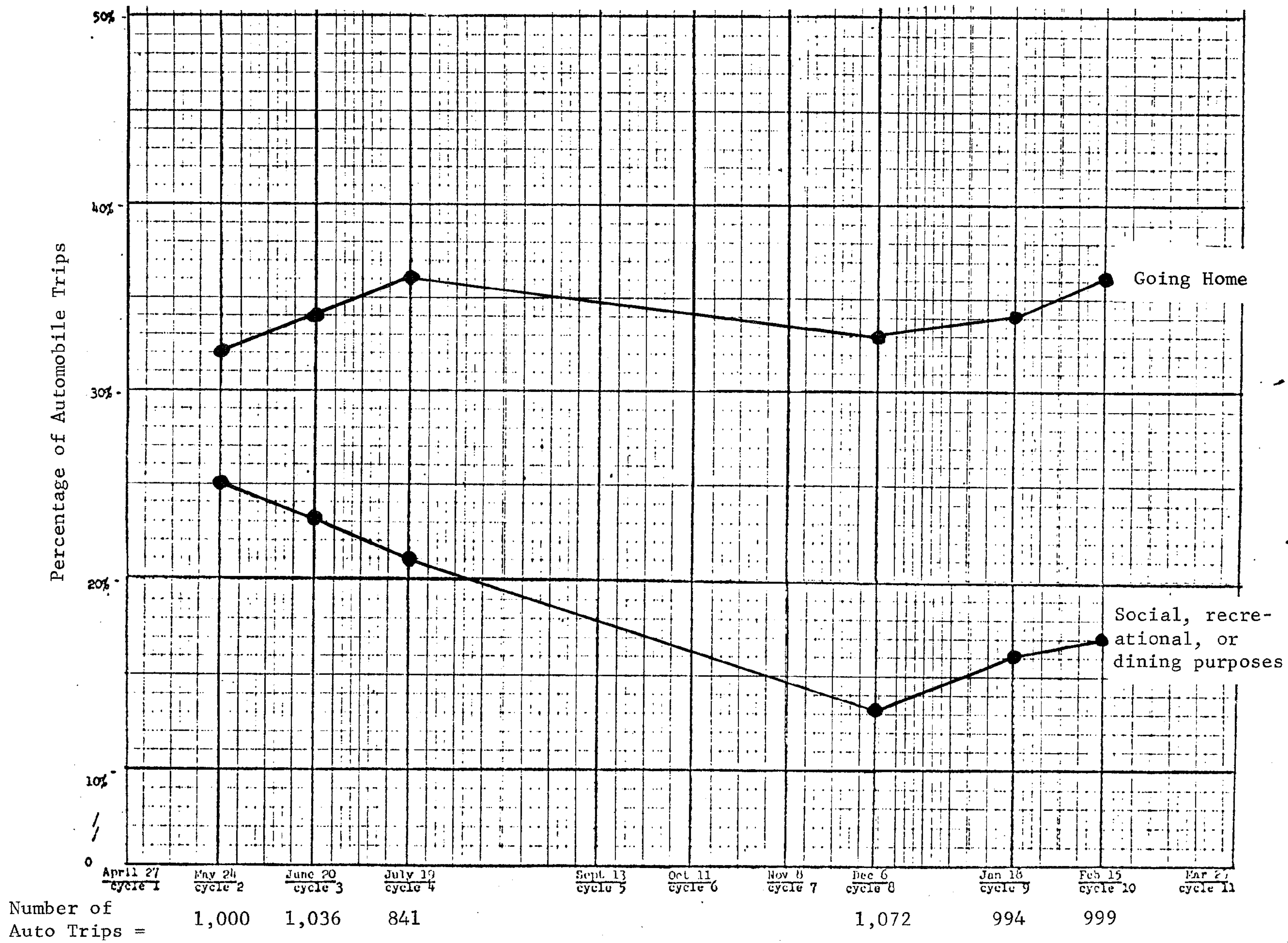


Figure 2.5

DAILY AUTOMOBILE TRIP DATA FOR METROPOLITAN RESPONDENTS



(N=1128) of those reporting a decrease in driving claimed that they were going out less. This result is consistent with the previously mentioned findings for auto trips made by metropolitan respondents.

One result of moral suasion and increases in fuel prices has apparently been some reduction in the amount of travel. A second effect that we might expect is a substitution of time and other goods for fuel in the travel that did occur. One form this substitution might take is expending more time and energy in planning trips so as to combine them. An inverse measure of the extent of this phenomenon is the ratio of number of trips home to total number of trips.[4] Data from Cycles 2, 3, 4, 8, 9, and 10 show no systematic change in this ratio over time (Figure 2.3; see Figure 2.5 for the corresponding findings for auto trips only). The relative stability of this ratio may simply reflect the fact that most trips are not amenable to combination (e.g., one may be unable to combine a trip to the store with a trip home from work if the store is not open nights), or that insignificant savings would result from such combinations because of the spatial distribution of destinations. Another form this substitution might take, in the realm of auto travel, is exchanging one's own time for gasoline by driving slower.[5] In Cycles 9 and 10, 54 per cent (N=1195) of all eligible households reported driving slower in order to cut gasoline consumption. A final substitution might involve bearing the added expense of having one's car tuned in order to improve mileage; 22 per cent (N=1195) of all eligible households in Cycles 9 and 10 reported having done so.[6]

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[4]"Trip home" refers to any daily trip described by the respondent between a "stopping place" and home.

[5]Over the course of the interviewing period, the 55 miles per hour speed limit was instituted as law in some states.

[6]Presumably these households are tuning their cars more frequently than before.

Although we have no direct evidence, it seems plausible that the costs of auto travel (including the costs of queuing for gasoline, inconvenience costs arising from shorter service station hours, etc.) have risen relative to the costs of travel by other means.[7] If indeed the relative cost of auto travel has risen and if the shift to other modes of transportation has been reinforced by appeals from government officials to use more efficient modes of travel, one would expect shifts away from auto use toward public transportation.[8]

We consider first the trip to work. A time series from Cycles 1 through 10 of the usual mode of transportation used in the trip to work indicates no major shift away from the use of the automobile (Figure 2.8). Part of the reason for the apparent lack of trend may lie in our inability to remove normal seasonal components. In addition, it is possible that the data evince a weaker response than a shift in the usual mode of travel. To investigate the possibility that respondents who reported that they usually use their automobiles for the trip to work also sometimes use

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[7]Estimating actual changes in the costs of using various modes of transportation would require knowledge of such factors as the price changes of the energy inputs used by various modes, the importance of energy inputs in the total costs of travel by each mode, and the ease of substitution of other goods for energy inputs in producing travel by each mode. Such an estimation procedure is beyond the scope of this report. Another factor, however, which lends support to the belief that the relative cost of auto travel has risen, may be of overriding importance in the short time period under consideration: modes of transportation subject to local or federal authority often operate under a rate-setting process that may be much slower (relative to gasoline prices) to reflect increases in costs of operation.

[8]Why public transportation is used infrequently to begin with is a separate question. At least part of the reason lies in the times required for travel by auto and by public transportation. As Figures 2.6 and 2.7 depict, the use of the auto apparently results in a substantial reduction in time required to travel any given distance to work. Table 2.1 gives the sample sizes for Figures 2.6 and 2.7.

Figure 2.6

MEAN TIME TO GET TO WORK BY DISTANCE TO WORK

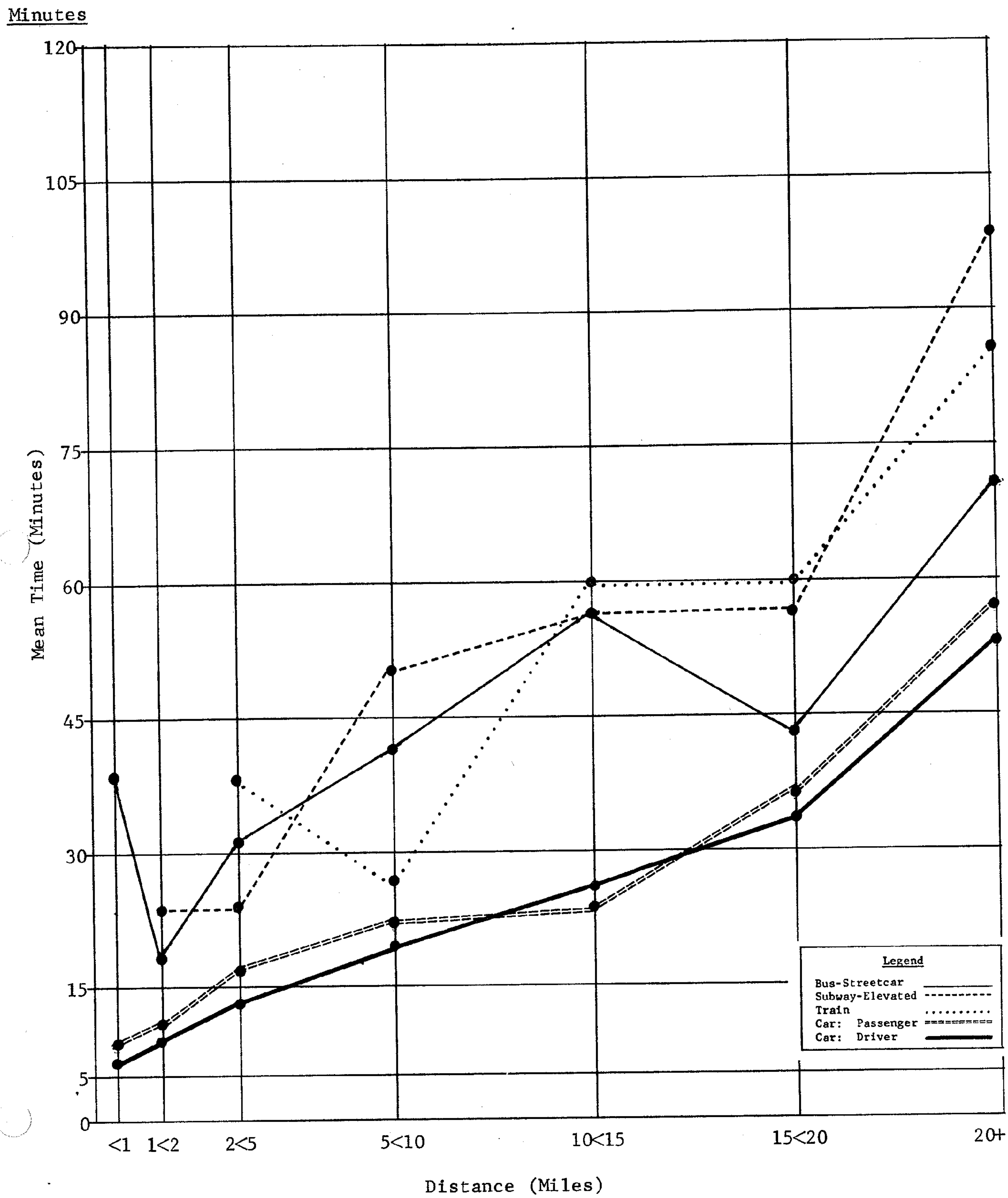


Figure 2.7

MEDIAN TIME TO GET TO WORK BY DISTANCE TO WORK

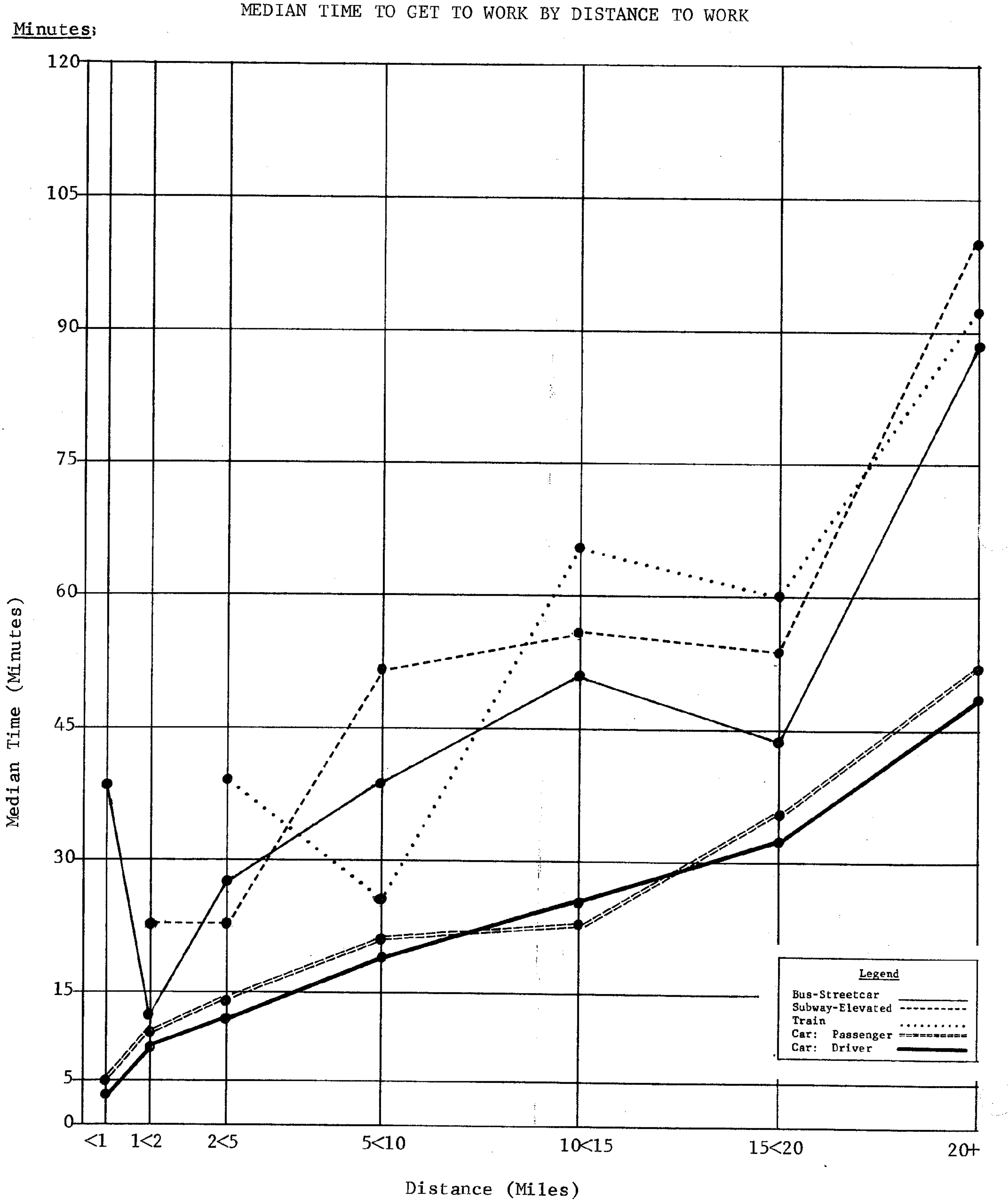


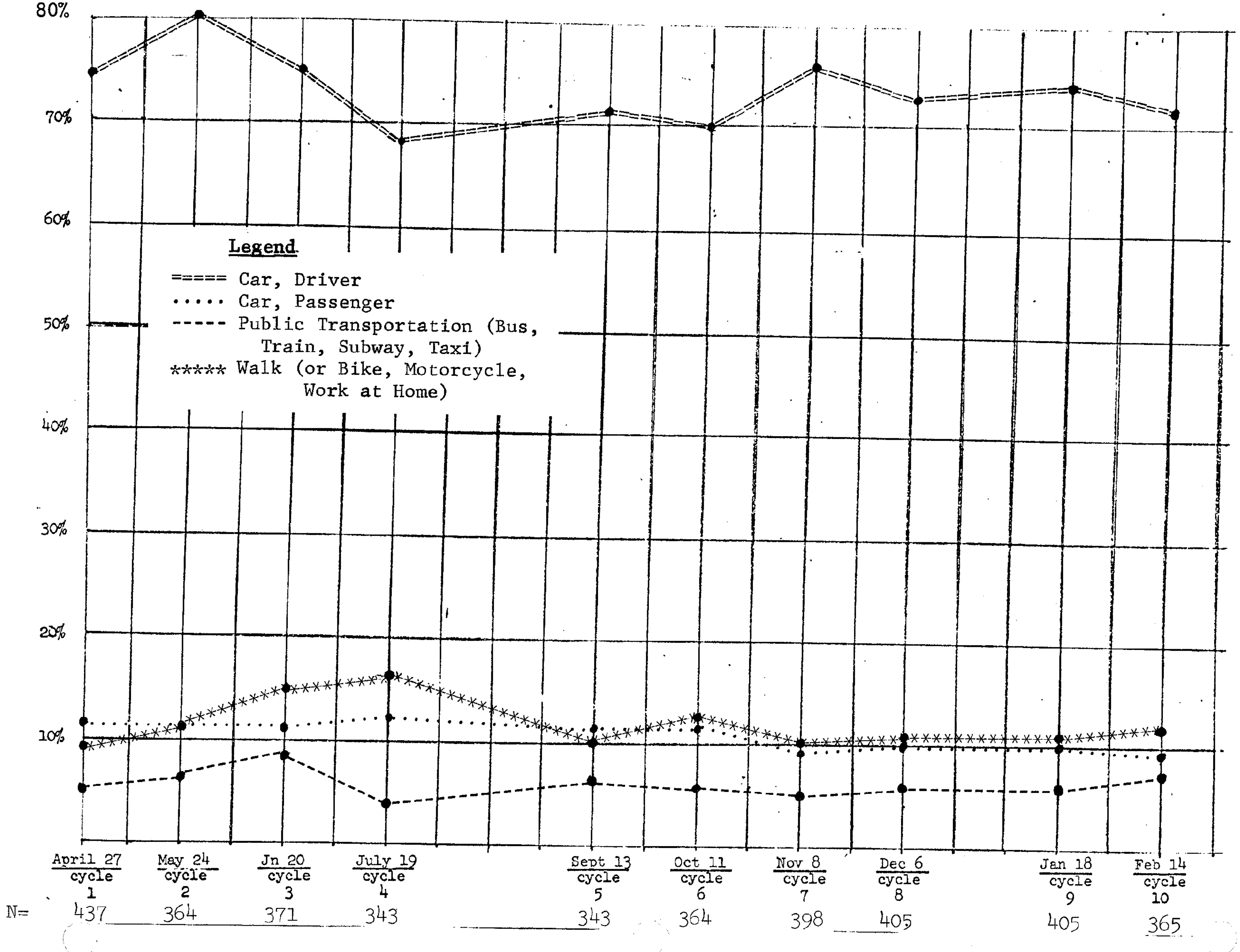
TABLE 2.1

SAMPLE SIZES FOR FIGURES 2.6 AND 2.7

Mode	Distance						
	Less than 1 mile	1 to less than 2 miles	2 to less than 5 miles	5 to less than 10 miles	10 to less than 15 miles	15 to less than 20 miles	20 miles and over
Bus-street car . .	1	11	37	32	13	4	16
Subway-elevated .	--	1	4	14	10	10	2
Train	--	--	1	3	4	4	23
Car, passenger . .	47	63	92	93	36	23	60
Car, driver . . .	240	365	610	612	405	166	322

Figure 2.8

USUAL MODE OF TRANSPORTATION FOR TRIP TO WORK



other means of travel, we computed the proportion of working respondents having bus, subway, elevated, or train service available for the trip to work who reported at least occasional use of one or more of these facilities for going to work. A time series of this ratio for Cycles 1 through 10 does show some upward trend (Use/Available in Figure 2.9).

This last result merits further comment. The proportion of working respondents who reported at least one mode of public transportation available fell over the interviewing period (Available/Available + Unavailable in Figure 2.9). In fact, this ratio fell to such an extent that the rise in the proportion, among those having public transportation available, who reported occasional use of public transportation therefore seems largely to be a product of falling reports of availability. This finding is puzzling. One would expect that the need for alternatives to auto travel would lead to finding other means of travel which, though previously existing, were as yet undiscovered or were tacitly assumed to be unavailable because the inconvenience or discomfort associated with their use outweighed their advantages over the auto. It is conceivable that these results reflect once again a strong seasonal component: a one-mile walk to the train may render the train "available" as a form of transportation in warm weather but "unavailable" in the winter.

Additional evidence of substituting other modes of transportation for the automobile for trips in general is provided from two sources of responses. The first is responses to a question about how households managed to reduce their driving. Of car-owning households in Cycles 8, 9, and 10: 7 per cent reported joining a car pool,[9] 3 per cent reported

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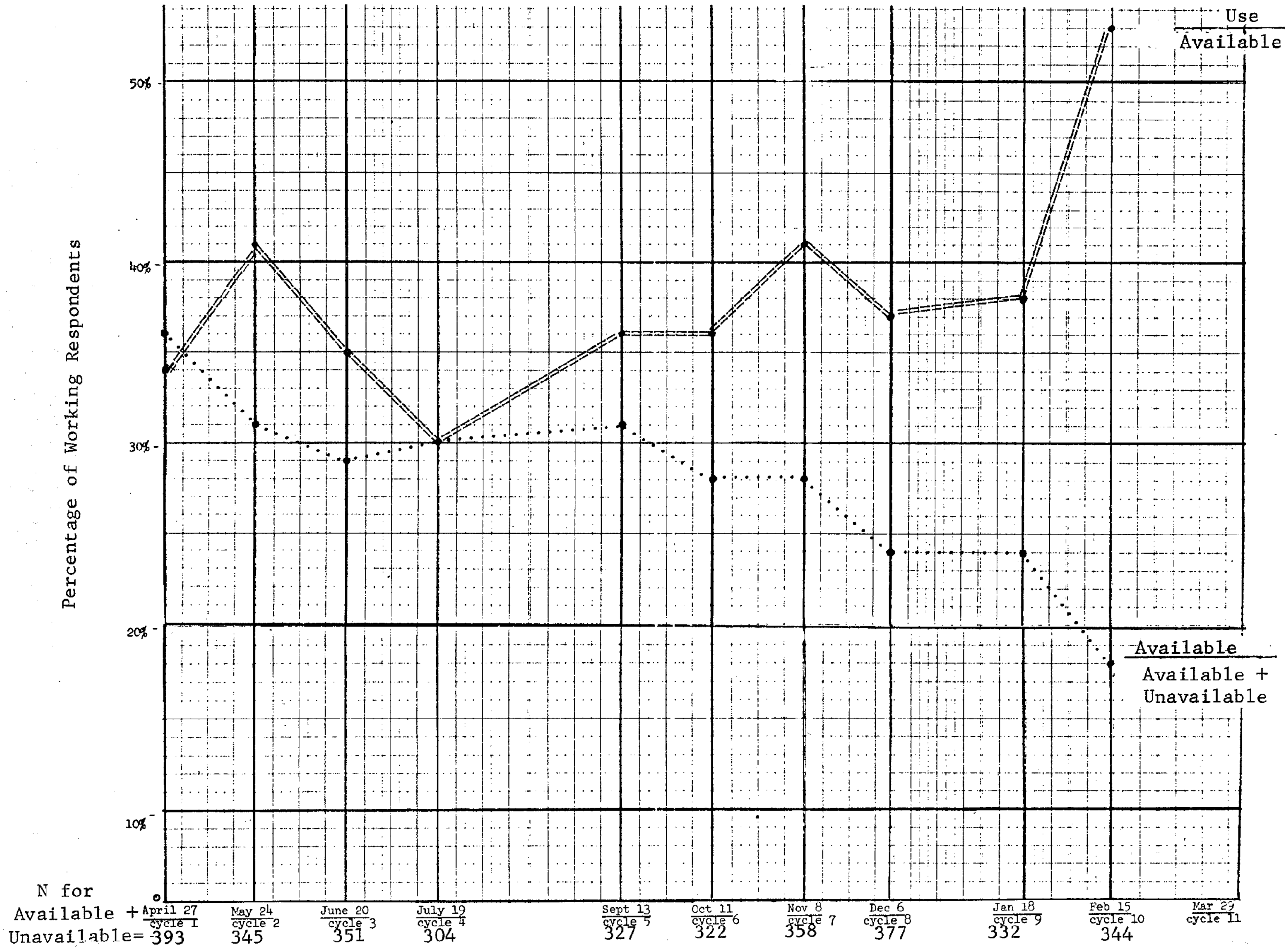
[9] It is interesting to note that the proportion of respondents who reported using car pools for the trip to work varies positively with distance to work (and therefore with the potential cost savings) and negatively with income (a measure of the implicit value of the respondent's time).

Figure 2.9

USAGE AND AVAILABILITY OF PUBLIC TRANSPORTATION FOR THE TRIP TO WORK



using mass transportation more, 11 per cent reported doing more walking, and 2 per cent reported bicycling more (N=1786). The second source is the enumeration of daily trips made by metropolitan respondents on Cycles 2, 3, 4, 8, 9, and 10. The proportions of all trips made by automobile and by public transportation are essentially constant across cycles (Figure 2.10). There is certainly no evidence of any major shift toward public transportation.

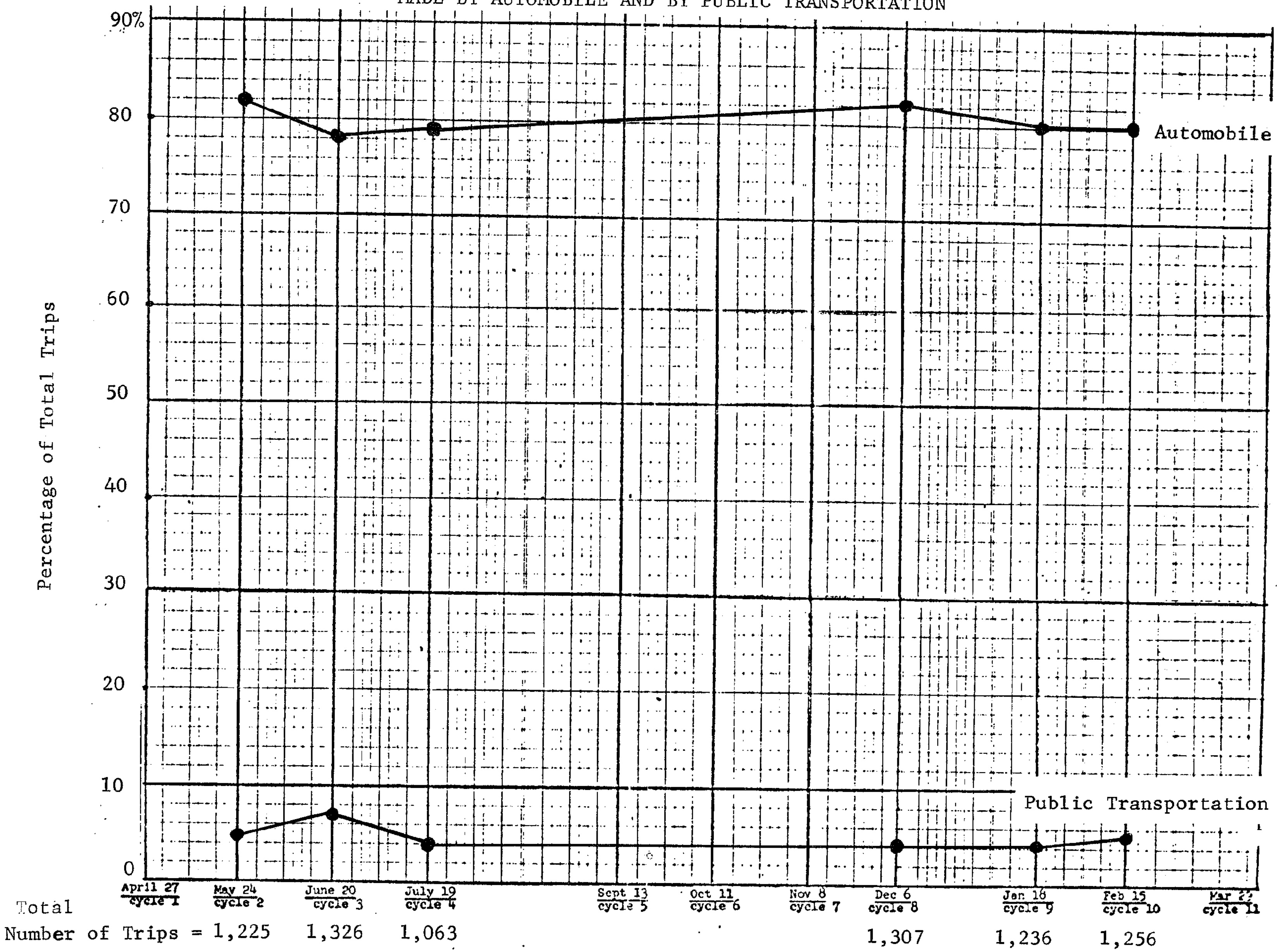
Conservation measures such as voluntarily reducing car speed and occasionally using mass transportation are actions that are readily employed and may be just as quickly discarded. Conservation measures such as buying a smaller car or moving closer to one's place of business are less rapidly reversed and are of interest for two reasons: (1) such behavior may indicate expectations of more severe gasoline price increases and/or increases of longer duration; and (2) to the extent that such actions result in changes in aggregates, such as the proportion of smaller and more efficient automobiles, they foretell the likelihood of a more permanent reduction in energy consumption.

Very little survey evidence is available on the practice of such long-run measures. In Cycles 9 and 10, 12 per cent of all eligible respondents (N=1195) reported that they bought or used a car that gets better mileage in order to save gas. Note that while buying a more efficient car may be considered a long-run conservation measure, merely using one already possessed is not.

In terms of decisions about place of residence, we have only indirect evidence of a change in the importance given to its distance from work and shopping areas. Each respondent was asked whether he liked, disliked, or was indifferent to the distance from his home to work and from his home to

Figure 2.10

PERCENTAGE OF METROPOLITAN RESPONDENTS' DAILY TRIPS
MADE BY AUTOMOBILE AND BY PUBLIC TRANSPORTATION



his usual grocery store. For each cycle or group of cycles, the percentage of respondents liking the distances to work or shop falls as distance increases (Figures 2.11 and 2.12). The slope did not change substantially over cycles, indicating that transportation costs were not assuming greater importance in the decision of where to live.

Heating

The heating of homes and apartments is a second important energy-consuming activity that offers opportunities for conservation behavior. The CNS contains reports of substantial proportions of the populace conserving heating fuels in various ways, mainly in the form of temperature reductions. In response to a question asking whether the respondent's household is trying to cut back on fuel used to heat their dwelling, 79 per cent of all respondents (N=1386) in Cycles 9 and 10 replied affirmatively. Respondents were then asked what methods were used to achieve this result. As would be expected, readily instituted (and quickly reversible) methods were most often employed: 72 per cent of all respondents reported lowering the temperature of their house or apartment, and 13 per cent reported closing off rooms.

Respondents in Cycles 8, 9, and 10 were asked to state the temperature at which they kept their house or apartment during winter 1972-73 and winter 1973-74 during the daytime and nighttime. Of the eligible respondents,[10] 61.3 per cent (N=1691) indicated a lower daytime temperature during winter 1973-74 than winter 1972-73; 34.9 per cent indicated no change in temperature; and 3.8 per cent reported a higher temperature during winter 1973-74. The preponderance of the cuts (81 per cent) fell in the range

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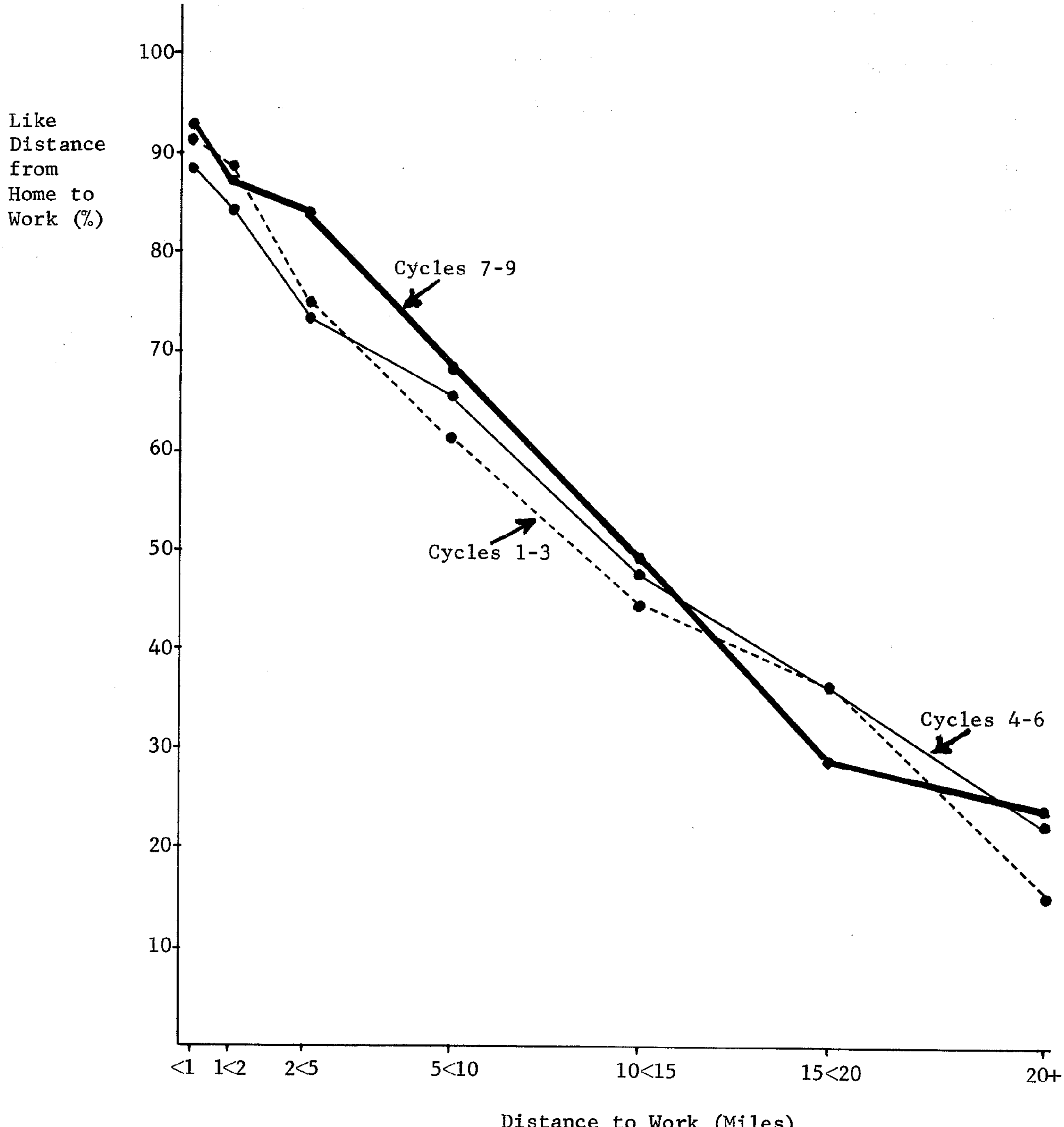
[10] An eligible respondent is one who is able to control the temperature of his dwelling.

Figure 2.11

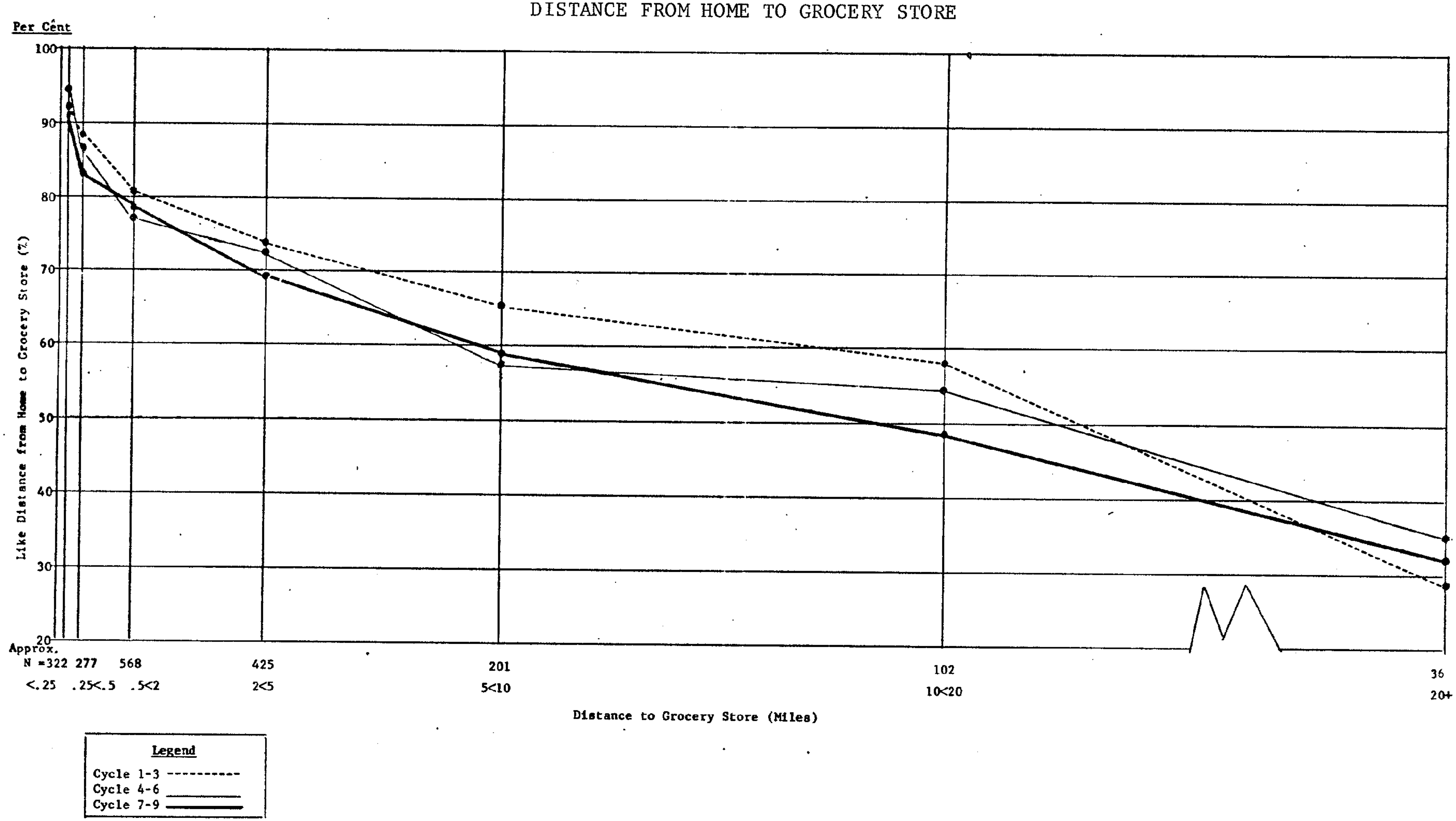
PERCENTAGE LIKING DISTANCE FROM HOME TO WORK
BY DISTANCE TO WORK



For each group of 3 cycles, approx. N= 151 137 225 221 136 64 127

Figure 2.12

PERCENTAGE LIKING DISTANCE FROM HOME TO GROCERY STORE BY DISTANCE FROM HOME TO GROCERY STORE



of -1 to -5 degrees. For nighttime temperatures, 45.9 per cent reported a lower temperature during winter 1973-74 than winter 1972-73; 47.8 per cent reported no change; and 6.3 per cent indicated a higher temperature during winter 1973-74. Of the cuts, 79 per cent fell in the range of -1 to -5 degrees. Overall, 65.6 per cent reported either a lower daytime or a lower nighttime temperature than the corresponding temperature during winter 1972-73.[11]

It is likely that increases in fuel prices have been an important cause of extensive fuel conservation. The owner-renter distinction may be of significance in this regard. First, many apartment buildings have no method for allocating heating costs among various tenants in direct proportion to how much fuel is actually used by each tenant. Since increases or decreases in fuel costs caused by the actions of any one tenant are shared jointly by a number of tenants, the incentives for conserving are reduced. Second, even if the tenant pays for his own heat, he may be unable to collect from the owner the investment necessary for capital improvements, and, in particular, for improvements that are expected to fully pay for themselves in fuel savings only after the tenant will have moved. Thus, it is not surprising that renters showed lower rates of conservation behavior than owners: among those able to control the temperature of their dwelling, owners reported lower daytime and nighttime temperatures during winter 1973-74 than winter 1972-73 at a significantly higher rate than renters (bottom row in Table 2.2). In response to a question asking whether an attempt is being made to cut use of heating fuel, owners replied affirmatively (83.6 per cent, N=959) at

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[11]As an interesting aside we note that, in response to a question about the comfort of the temperature of one's dwelling, the distribution of responses for those able to control the temperature was virtually identical to the distribution for those unable to control the temperature of their dwelling, and was the same for renters as for homeowners.

TABLE 2.2

PERCENTAGE OF ELIGIBLE HOUSEHOLDS WITH EACH TYPE OF HEATING FUEL REPORTING A LOWER TEMPERATURE 1973-74 THAN 1972-73

(Cumulative Results from Cycles 8, 9, and 10)

Type of Heating Fuel	Renters Only				Owners Only			
	Day Temperature Lower	Night Temperature Lower	Day or Night Temperature Lower	N	Day Temperature Lower	Night Temperature Lower	Day or Night Temperature Lower	N
Natural gas	52.4	37.8	57.9	225	60.5	44.5	65.0	691
Propane (LP), or bottled gas	60.0	52.0	70.8	25	55.3	40.5	61.3	75
Fuel oil . .	70.7	53.6	73.2	82	76.0	59.8	78.6	337
Coal	33.3	0.0	33.3	3	35.3	25.0	37.5	16
Electricity .	48.2	33.3	52.8	56	56.5	40.2	59.7	124
Other	20.0	20.0	20.0	5	33.3	36.4	44.4	9
Total . .	55.7	41.0	60.6	396	63.4	47.6	67.4	1,252

a significantly higher rate than renters did (73.7 per cent, N=365; Table 2.3). This latter group of renters includes a disproportionate number of those unable to control the temperature of their dwelling; restriction of the sample to include only those able to control the temperature of their dwellings, however, still yields a significantly higher rate for owners than renters (84.6 per cent, N=898, for owners; 77.5 per cent, N=284, for renters). This finding is entirely consistent with, and could have been anticipated from, the result on changes in temperature. Data on renters who do not pay directly for their heating would yield more striking differences and permit better estimation of the role of price change in inducing conservation behavior. Unfortunately, our data do not permit such a distinction to be made.

Since increases in heating costs of all kinds have undoubtedly varied by type of heating fuel, one would expect differences across fuel types in the practice of conservation measures. Considering homeowners alone, the percentage of eligible fuel oil users reporting a lower daytime or nighttime temperature during winter 1973-74 than winter 1972-73 was significantly higher than the percentage of natural gas, propane, or electricity users doing so (Table 2.2). Similarly, the percentage of fuel oil users (homeowners only) who reported trying to cut down on the amount of fuel used to heat their dwellings was higher than the percentages of users of other fuel types doing so, although the differences are often not statistically significant (Table 2.3). Even a cursory glance at Table 2.4 shows variation across fuel types in the practice of many specific conservation measures although, as suggested below, the employment of some of these measures may not be a function of fuel type alone.

TABLE 2.3

PERCENTAGE OF HOUSEHOLDS TRYING TO CUT DOWN ON AMOUNT OF FUEL USED TO HEAT HOUSE OR APARTMENT

(Cumulative Results from Cycle 9 [Jan. 4-31, 1974] and Cycle 10 [Feb. 1-28, 1974])

Heating Fuel	Rent/Occupy without Payment		Owners Only	
	Sample N	Percentage trying to cut down heating fuel	Sample N	Percentage trying to cut down heating fuel
Natural gas	195	72.3	520	83.8
Propane (LP), or bottled gas	26	88.5	59	83.1
Fuel oil	83	69.9	233	90.1
Coal	11	54.5	24	62.5
Electricity	44	86.4	94	84.0
Other	6	50.0	29	44.8
Total	365	73.7	959	83.6

Table 2.4 presents various options one may take to reduce fuel consumption. Some of these measures, such as closing off rooms or lowering temperatures, are actions which, like voluntarily driving slower, are quickly and easily reversed. Others represent investments that can be expected to yield fuel savings over time and, abstracting from depreciation, are unlikely to be reversed. Two such investments are adding storm windows or doors and putting weather stripping or sealer on windows. In Cycles 9 and 10, 6.5 per cent (N=958) of all homeowners (and 5.1 per cent of all respondents, N=1386) reported adding storm windows or doors; 8.9 per cent of all homeowners (and 7.8 per cent of all respondents) reported adding weather stripping or sealer to windows.

It would seem that households investing in storm windows or doors or weather stripping expected fuel price changes (or some other need to conserve fuel) of more severity or of longer duration than those who could have invested but did not do so. We have no data that directly reveal the anticipated path of fuel prices (in particular, heating fuel prices) over time; nevertheless, we shall attempt to test this assertion by examining responses on expectations of the future course of the fuel situation in general. (Note that these responses deal with fuel problems in general and not only with heating fuel).

All respondents were asked how many years they thought it would be "before we have as much energy as we need." While the respondents' exact interpretation of the question is unclear, the responses can be construed as measuring the expected duration of higher fuel prices (than, say, early 1973) in general. If heating fuel prices are an important component of an

TABLE 2.4

PERCENTAGE OF HOMEOWNERS WITH EACH TYPE OF HEATING FUEL INSTITUTING VARIOUS CONSERVATION MEASURES

(Cumulative Results from Cycles 9 and 10)

Type of Heating Fuel	Conservation Measure								N
	Get furnace fixed	Lower temperature	Change to different home heating equipment	Add storm windows or storm doors	Put weather stripping or sealer on windows	Use portable electric room heaters	Close off rooms	Other	
Natural gas	2.3	78.1	2.9	6.3	9.4	0.4	12.9	25.0	520
Propane (LP), or bottled gas	1.7	67.8	11.9	1.7	0.0	5.1	16.9	28.8	59
Fuel oil	1.3	85.8	5.6	7.8	11.6	0.9	15.5	24.6	232
Coal	0.0	33.3	4.2	16.7	8.3	0.0	20.8	12.5	24
Electricity	1.1	74.5	7.4	6.4	7.4	3.2	27.7	22.3	94
Other	0.0	17.2	6.9	0.0	0.0	0.0	0.0	24.1	29
Total	1.8	76.0	4.7	6.5	8.9	1.0	15.0	24.5	958

index of fuel prices in general, than those who have added storm windows/doors or weather stripping/sealer should report, on average, a greater number of years to reach energy sufficiecy than those who have not. The differences are in the expected direction and are suggestive, though not statistically significant: The group of respondents adding storm windows/doors replied with a mean equal to 8.970 years to reach energy sufficiency (N=66); those not adding replied with a mean of 6.792 years (N=1165). For those putting weather stripping or sealer on windows, the mean is 7.776 (N=98); for those not doing so, the mean is 6.834 (N=1133). We must note here that groups of respondents who did not report adding storm windows/doors or weather stripping/sealer undoubtedly contained both those who had already done so in previous years and those who could not do so for other reasons. Thus, in part, the response pattern may be a function of the distribution of dwellings by age and type. It would be desirable to eliminate these respondents from the group replying negatively, but the data do not permit this separation.

In another question relating to long-term expecations, respondents were asked how seriously they thought the problems caused by the energy shortage would be affecting them five years from now. Numerical values of responses varied from "0," indicating "no problems at all" anticipated, to "3," indicating "very serious problems" anticipated. To the extent that responses are indices of the expected level of all fuel prices (including heating fuel prices) in five years, respondents who reported adding storm windows/doors or putting on weather stripping/sealer should have expected more serious problems than those who didn't. In fact, the mean level for respondents adding storm windows/doors is significantly higher than the mean for those not doing so; for those adding weather stripping/sealer to windows, the mean is slightly and insignificantly lower than for those not doing so. This test suffers from the aforementioned composition problem: those not adding weather stripping/sealer include those having previously done so, and those unable to do so, as well as those able to but not doing so. This composition problem and the ambiguous meaning of the responses (for what we desire to measure) may well explain the latter anomalous result.

A final conservation measure of an investment nature is a change in home heating equipment. In Cycles 9 and 10, 4.7 per cent (N=958) of home-owners reported instituting such a change. To the extent that the change is merely to a more efficient system using the same heating fuel, the implications are the same as those for the other investments we have examined: the change implies expectations of heating fuel price changes (or energy problems) of more severity and/or longer duration. Thus, the reported mean number of years until "we have as much energy as we need" is 9.432 (N=44) for those changing equipment, a larger figure (but insignificantly) than the mean of 6.816 (N=1187) for those indicating no change in equipment. The mean measure of seriousness of problems five years from now is slightly and insignificantly lower for those changing than for those not changing their heating equipment. Once again we emphasize the existence of the composition problem for the group of respondents not changing equipment and the problem of interpreting responses.

Some changes in heating equipment involve a concomitant change in heating fuels. The likelihood of this type of change is in part a function of the complementarity of the equipment used for different fuels, as well as the age and type of home. The implications of this type of change are different: while it implies an expected difference over time in the price of the old and new heating fuels, it does not necessarily imply anything about the projected path of either fuel price individually.

The possibility of switching types of heating fuel highlights what has been implicit in all our findings: consumers must make judgments about the relative scarcity of various energy resources. Furthermore, the only good basis the consumer possesses for estimating tradeoffs is the price structure. When prices properly reflect social cost, minimization of total costs is an eminently reasonable decision rule. (Of course, in the short run, prices may not reflect social cost, especially in a regime of arbitrarily controlled prices.) Much of what is written in the popular press seems to imply that minimization of direct energy use in the home is the only proper decision, and that minimization of expected total costs is undesirable, if not disastrous, in its effects. Should one not consider the value of other inputs, such as labor? Are fuels the only scarce goods? Clearly they are not. Moreover, even if total energy resource use is to be minimized, one must consider the <u>indirect</u> use of energy needed to produce those goods (e.g., insulation) that save energy directly: one would not use more insulation when the extra savings in energy resources over the life of the insulation is less than the extra energy inputs required to produce the insulation. Finally, even if one knew the array of energy inputs required for all goods, how, in the absence of prices, is one to impute values to different energy resources? Prices, or their equivalent, are necessary to serve as a basis of comparison for all of the different types of scarce resources.

Appliances and Electricity Use

The third area of investigation is in the use of electricity, and electrical appliances in particular.[12] Respondents in Cycles 8, 9, and 10 were asked if they or anyone in their household had been trying to cut down on electricity use; 84 per cent (N=2014) replied affirmatively. Those who reported cutting down on electricity use were asked how they had

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[12] We shall use the term "appliance" to include electrically-powered facilities such as lights, in addition to what are referred to as appliances in everyday usage.

done so; coded responses were restricted to shutting off lights when not needed or using various appliances less often. The results from Cycles 9 and 10 are presented in Table 2.5. Replies that would imply a higher probability of a reduction in electricity consumption in the future (for example, a switch to more efficient appliances or a decision to permanently do without some previously planned-for appliance) are unavailable for analysis.

As in other areas of household consumption, electricity conservation may proceed along more than one dimension. The total reduction in electricity use is directly related to the number and type of appliances affected and the size of the reduction in the use of each. In Cycles 9 and 10, nine possible methods of cutting electricity use were coded, including the catch-all category of "other" (Table 2.5). Yet in Cycle 9, 94 per cent of all respondents (N=695) reported employing three or fewer methods of reduction (including 13.8 per cent who did not cut at all); and in Cycle 10, 93.5 per cent of all respondents (N=691) reported employing three or fewer methods of reduction (including 14.6 per cent who reported no cutbacks at all).[13]

Conclusion

CNS data reveal that large portions of the populace reported undertaking conservation actions. In the area of transportation, conservation came mainly in the forms of driving slower and in reduced use of the automobile for social, recreational, or dining purposes; there is little evidence of substantial inter-modal shifts. In the area of heating, the most pervasively practiced conservation measure was to reduce the temperature of one's

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[13]It is clear that in part these results are determined by the responses the survey allowed. First, the "other" category could contain many different and important conservation measures. Second, for many respondents, some of the coded responses would be inapplicable since they depend upon the possession of given appliances: one cannot use the dishwasher less if one has no dishwasher.

TABLE 2.5

PERCENTAGE OF HOUSEHOLDS REPORTING VARIOUS ELECTRICITY CONSERVATION ACTIONS

(Cumulative results from Cycles 9 and 10)
(N = 1382)

Activity	Per Cent
Shut off lights when not needed	80.6
Run air conditioner(s) less often	4.2
Run electric heater(s) less often	5.6
Run TV set(s) less often	19.0
Run clothes washer/dryer less often	15.2
Run dishwasher less often	7.2
Use iron less often	5.6
Use electric stove less often	11.0
Other	20.7

dwelling. Finally, electricity conservation most often took the form of shutting off lights when not needed.

Relative Impact of the Energy Crisis by Income Class

In this section, we shall analyze differences in conservation and consumption behavior over income classes. Such an analysis is important for at least two reasons. First, use of income as an explanatory variable may help to reveal the underlying structure of the conservation behavior found in the CNS data. Second, much of the concern expressed over the energy crisis has focused on the effects of the crisis on lower income groups; an analysis of consumption and conservation by income class will provide information in this area of interest.

We shall consider three of the goods most directly affected by the energy crisis: gasoline, heating fuel, and electricity. For each of these goods, we shall give evidence bearing on the questions of (1) differences in pre- and post-crisis consumption across income classes; (2) differences in price changes across income classes; and (3) differences across income classes in the use of substitute commodities. Whenever possible, we will estimate behavioral relationships in order to explain variation in the response of different income groups.

The Measurement of Income

The first step in an analysis of this type is the choice of the income measure to be used. We have chosen to use reported total family income for the year preceding the study as a rough measure of the return to capital, both human and non-human. Such a measure involves a number of important problems. First, it is gross of direct schooling and training costs (such as tuition payments), but net of indirect schooling and training costs (such as foregone earnings). Hence, individiduals having the same net real incomes and making equivalent investments in human capital may have different measured incomes. Second, and more important, our income measure makes no allowance for the fact that different respondents may be at different points on the same life cycle earning curve, or at the same income point on drastically different life cycle earning curves: a medical student with a $5,000 stipend will have the same measured income as a middle-aged laborer making $5,000 per annum, and a much lower measured income than the practicing physician. Third, our income measure includes income made by secondary workers even if they are only intermittent labor force participants, but must exclude the potential earnings of similar secondary workers if they happened not to be working in the year preceding the study.[14]

These difficulties could be avoided by use of an income measure derived from the expected present value of lifetime earnings for the household (the expected present value would be calculated on the basis of the age, education, and occupation of the head of household and spouse). However, besides being a more formidable computational task, such a measure could not take into account individual differences in training and ability within age-education-occupation groups. Thus, with the limitations of the measure in mind, we shall proceed, using total family income for the year preceding the study.

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[14]A fourth difficulty is that the incomes reported are for 1972 in the case of Cycles 1 through 9, and 1973 in the case of Cycles 10 through 12. The income variable is, however, categorized, and the income distribution on Cycles 1 through 9 is essentially identical to that on Cycles 10 through 12. Hence, we have attempted no correction.

Gasoline

Consumption

Auto travel accounts for the bulk of direct gasoline use by households. For a given household, gasoline consumption in time period t is C_t where

$$C_t = \sum_{i=1}^{n_t} Z_{it} M_{it} G_{it} \qquad (1)$$

where Z_{it} = number of trips made in car i in period t;

M_{it} = average number of miles per trip in car i in period t;

G_{it} = average gasoline consumption per mile for car i in period t;

and n_t = number of cars owned by the household in period t.

While our survey yields no evidence on the average gasoline consumption per mile (G_i) for cars owned by various households, we assume that this consumption is closely related to the age and size of car used and the type of driving done.

Comprehensive information on the average number of miles per trip (M_i) for each automobile for each respondent is unavailable; we do, however, have data on the distance traveled in making two types of trip--the trip to work and the trip to the grocery store. Working respondents in all cycles were asked the mode of transportation generally used[15] and the distance traveled in their journey to work. Among respondents who usually went to work by car, there is a slight, but significant,[16] positive association between

[15] Note that the proportion of working respondents who got to work by car tends to vary positively with income class, both before and during the crisis (see Table 2.9, p. 81).

[16] Unless otherwise noted, "significant" will mean rejection at the 0.01 level of the null hypothesis that the appropriate population parameter is zero.

distance to work and total family income[17] ($r = 0.0852$, $N = 3857$; see Table 2.6). We can obtain at least a rough idea of the relative contribution of trips to and from work to the value of M_i in the following manner. Metropolitan respondents in Cycles 2, 3, and 4, and all respondents in Cycles 8 through 11, were asked to describe all trips made (by any mode of transportation) on a randomly chosen day.[18] Assuming for simplicity that each trip to work entailed a trip home, trips to and from work account for roughly 31 per cent of all trips reported.

Shopping trips of all types account for approximately 25 per cent of all trips made, again assuming for simplicity that each shopping trip requires a trip home. Respondents in all cycles of the CNS were asked the distance to the grocery store at which the family usually shopped, or, if the family had no regular grocery store, the distance to the grocery store most recently used. Among car-owning households, there is a slight but significant negative relationship between income and distance to grocery store ($r = -0.07733$, $N = 6631$; see Table 2.7 for data including all households). While this gross measure of association is somewhat informative, it says little about underlying behavior patterns. We will therefore investigate the structural relationship that determines distance traveled to the grocery store, confining our sample to car-owning households.

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[17] Hereafter, we will use simply "income."

[18] Automobile trips account for approximately 83 per cent of all trips made.

TABLE 2.6

DISTANCE FROM HOME TO WORK BY TOTAL FAMILY INCOME

(Per Cent)

Distance to Work	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Less than 1 mile . . .	12.0	14.3	13.7	13.3	7.2	14.8	11.9	11.7	8.0	8.3	8.5	9.4	5.2	9.0 % 349 (N)
1-2 miles . .	16.0	20.4	16.4	15.9	15.8	15.4	13.0	14.8	11.9	11.6	12.7	8.9	11.1	12.5 481
2-5 miles . .	18.0	26.5	24.7	20.4	21.6	31.4	16.9	26.5	22.3	22.2	18.4	22.6	22.2	21.9 846
5-10 miles . .	24.0	18.4	13.7	22.1	22.3	16.0	21.5	24.5	25.7	24.2	23.5	19.4	20.1	22.5 869
10-15 miles .	8.0	6.1	12.7	12.4	12.9	11.8	18.1	9.7	12.4	14.8	15.9	15.4	19.8	14.7 567
16-20 miles	2.0	6.1	6.8	3.5	2.9	3.0	9.0	4.1	6.1	6.2	7.5	8.3	6.7	6.3 243
20 miles or more	20.0	8.2	11.0	12.4	17.3	7.7	9.6	8.7	13.6	12.6	13.5	16.0	14.9	13.0 502
Total N . . .	50	49	73	113	139	169	177	196	412	1,057	684	350	388	3,857
Total % . . .	1.3	1.3	1.9	2.9	3.6	4.4	4.6	5.1	10.7	27.4	17.7	9.1	10.1	100.0

TABLE 2.7

DISTANCE TO GROCERY STORE BY TOTAL FAMILY INCOME

(Per Cent)

Distance (In Miles)	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Less than $\frac{1}{4}$	20.7	22.4	22.3	22.7	20.0	21.1	17.7	16.5	14.9	13.6	15.3	9.4	12.2	16.1 % 1,243(N)
$\frac{1}{4}$ to less than $\frac{1}{2}$ . .	15.8	14.4	15.8	18.5	14.3	15.1	12.6	15.0	15.9	12.4	15.8	12.5	14.1	14.4 1,109
$\frac{1}{2}$ to less than 2 . .	27.7	29.4	25.3	27.8	25.6	22.7	25.9	29.4	30.4	32.1	30.4	38.1	33.4	30.1 2,317
2 to less than 5 . .	15.8	16.0	19.5	12.9	19.7	21.5	21.0	19.7	20.7	25.2	22.5	26.2	27.8	22.1 1,700
5 to less than 10 .	12.5	9.6	9.0	10.0	8.9	11.2	13.8	13.8	10.1	10.2	9.6	9.2	8.6	10.2 787
10 to less than 20 .	5.4	6.1	5.8	6.1	8.6	5.7	7.7	4.1	5.5	4.4	5.6	3.6	2.5	5.2 398
20 or more .	2.2	2.2	2.3	2.1	3.0	2.6	1.3	1.5	2.4	2.2	0.9	0.9	1.3	1.9 143
Total N . .	184	313	399	428	406	418	390	412	776	1,779	1,033	530	629	7,697
Total % . .	2.4	4.1	5.2	5.6	5.3	5.4	5.1	5.4	10.1	23.1	13.4	6.9	8.2	100.0

To begin, consider a relationship of the form:

$$D = \beta_0 + \beta_1 H + \beta_2 Y + \beta_3 L + \beta_4 R + \beta_5 P \qquad (2)$$

where D = distance (miles) traveled to grocery store;

H = number of people in the household;

Y = total family income (in thousands of dollars);

L = a dummy variable representing type of locale in which respondent resides, assuming the value 0 if non-rural, 1 if rural;

R = a dummy variable assuming the value 1 if the grocery store is the one usually frequented by the respondent and the value 0 if the respondent frequents no single grocery store;

P = the price per gallon of gasoline;

and the β_i, $i = 0,\ldots,5$ are coefficients to be estimated.

Since total savings in food expenditures increases with consumption, and since food consumption is positively associated with household size, one would expect, other things being equal, that larger households would be willing to travel farther to take advantage of lower food prices. Hence, we expect $\beta_1 > 0$.

If one assumes that the shadow price of time (i.e., the value of an individual's time) is positively correlated with total family income, or that higher income families choose to purchase more leisure at the expense of higher food prices, then higher income families should spend less time in traveling to the grocery store, other things being equal. Since time spent in travel is usually positively related to the distance traveled, we expect $\beta_2 < 0$.

Inclusion of the dummy variable, L, is an attempt to correct for inequalities in access to grocery stores. Rural residents will generally travel farther to shop; thus, we expect $\beta_3 > 0$.

If an important reason for not purchasing the major portion of groceries at a single store is that one is a "bargain hunter," then one might be expected to travel farther, if necessary, to take advantage of sales (again, other things equal). Hence, we expect $\beta_4 < 0$.

Given that gasoline usage is positively associated with distance traveled, gasoline prices should enter with $\beta_5 < 0$.

Equation (2) might be expected to fit tolerably well for a cross-section of households in the pre-crisis period. For later periods, however, and especially for the winter of 1973-1974, a very important element of the cost of obtaining gasoline is omitted--the cost of queuing.[19] If we assume that there was no market in which one could hire a substitute "queuer," the cost of waiting would have varied with the implicit value of time to the individual. If, once again, the implicit value of time, V, is positively related to total family income, $V = f(Y)$, $f' > 0$, the distance to grocery store relationship becomes

$$D = \beta_0 + \beta_1 H + \beta_2 Y + \beta_3 L + \beta_4 R + \beta_5 P + \beta_6 T\, f(Y) \qquad (3)$$

where T is the average queuing time required to purchase a gallon of gasoline. We expect, of course, that β_6 will be negative.

Note that T is <u>not</u> simply the average length of time each individual actually spent waiting in line. Long lines may have acted as a deterrent to automobile use even if one rarely or never waited in line; some may have completely avoided queuing by appropriate changes in buying and driving habits. Measures of T that depend on whether an individual actually waited

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[19]Queuing is only one way in which more time is required to purchase gasoline, and it is used for illustrative purposes. Other time-related symptoms of the crisis, such as limits on gallons purchased, may have similar effects on gasoline demand.

in line are therefore inadequate. Measures of T based on the proportion of respondents in the given respondent's Census region who experienced queuing would leave out substantial intraregional variation, and, would, in addition, assume a positive relationship between average effective queue length and incidence of queuing.

Because of the difficulties involved in obtaining a good measure of T, and because of further estimation problems introduced by inclusion of f(Y) in the last term of equation (3), we seek instead indirect evidence on the value of β_6. We shall estimate[20] equation (2) separately for the pre-crisis and crisis periods, leaving out the gasoline price variable (P), for which we lack suitably comprehensive data. For the crisis period, the coefficient of income will include part of the effect of queuing. For example, if the implicit value of time is proportional to income [i.e., V = f(Y) = aY], then, for the crisis period, the estimated relationship is

$$\begin{aligned} D &= \beta_0 + \beta_1 H + \beta_2 Y + \beta_3 L + \beta_4 R + \beta_6 Ta\, Y \qquad (4) \\ &= \beta_0 + \beta_1 H + (\beta_2 + \beta_6 Ta) Y + \beta_3 L + \beta_4 R \\ &= \beta_0 + \beta_1 H + \beta_2^* Y + \beta_3 L + \beta_4 R \end{aligned}$$

where $\beta_2^* = \beta_2 + \beta_6 Ta$. For the pre-crisis period,

$$D = \beta_0 + \beta_1 H + \beta_2 Y + \beta_3 L + \beta_4 R \qquad (5)$$

Assuming T is unrelated to Y, we expect to find $\beta_2^* < \beta_2$.

We divide the interviewing period into two parts: Cycles 1 through 7 (April 13, 1973 to November 22, 1973) are designated as the pre-crisis period, and Cycles 8 through 12 (November 23, 1973 to

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[20]All estimates are carried out using data on the household level, and all coefficients are unstandardized.

May 30, 1974) are designated as the crisis period. The pre-crisis regression estimate[21] of equation (5) is

$$D = 2.20 + \underset{(0.0415)^{**}}{0.112H} - \underset{(0.00986)}{0.0155Y} + \underset{(0.160)^{**}}{4.48L} - \underset{(0.174)}{0.0598R}$$

$$R^2 = 0.18, \; N = 3849$$

The crisis period estimate of equation (4) is

$$D = 2.56 + \underset{(0.0506)^{**}}{0.207H} - \underset{(0.0112)^{**}}{0.0375Y} + \underset{(0.190)^{**}}{4.88L} - \underset{(0.194)^{**}}{0.673R}$$

$$R^2 = 0.21, \; N = 2782$$

All estimated coefficients in both regressions have the predicted signs. (In the pre-crisis regression, however, only those for household size and locale are significant.) Also, as predicted, the estimated coefficient of the income variable is more negative in the crisis regression, though the difference is not statistically significant.

Two factors, both associated with omitted variables, could account for the lack of significant change in the income coefficient. First, as discussed below, there is some evidence of a slight negative correlation between income and the change in gasoline prices that occurred after the beginning of the crisis. Higher income families may, therefore, have reduced distance traveled to grocery shopping by less than otherwise expected[22] because they suffered less severe price increases. Second, the values of T for the crisis period may be negatively associated with income. As we have defined T, it cannot be measured with our data;

[21] Standard errors are in parentheses. We shall use "**" to denote significance at the 0.01 level, and "*" to denote significance at the 0.05 level, in a two-tailed test.

[22] If, indeed, there was overall reduction of distance at all.

however, if the incidence of trouble obtaining gasoline is any indication, the values of T varied fairly widely over income classes, the lowest and highest income groups being hit most severely (this is discussed in detail in a later section on changes in the cost of gasoline). Thus, variation in T over income classes may be causing the income coefficient to fall less than otherwise expected.[23]

Returning to our original task, that of examining variations across income groups (and over time) in gasoline consumption by examining components of equation (1),

$$C_t = \sum_{i=1}^{n_t} Z_{it} M_{it} G_{it} ,$$

we now consider the variation in car ownership over income classes--that is, difference in the range of summation in equation (1). For the sample as a whole, the number of cars owned by a household is positively and significantly correlated with income (r = 0.4899, N = 7713; see Table 2.8).

The stock of automobiles is less likely to show major changes going from the pre-crisis to crisis period than, for example, the number of trips made by automobile. This result can be expected both because the stock of automobiles is partly a function of the past stock, and because the demand for additions to that stock is in part a function of expectations about the <u>future</u> course of gasoline prices and gasoline availability. Furthermore, changes in the stock are difficult to interpret if the stock is measured as the number of automobiles possessed. A shift from large luxury cars to an equal number of smaller, more efficient models represents a shift to less "automobileness," but this change would go unnoticed in an

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[23] In addition, higher income families may have found it easier to accept less luxury (in the form of driving more efficient autos) than to alter their shopping habits, or may have reduced the number of shopping trips to the same store. Also, income-related seasonal factors may be working in either direction.

TABLE 2.8

NUMBER OF CARS IN HOUSEHOLD BY TOTAL FAMILY INCOME

(Per Cent)

Number of Cars		Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
None . .		51.6	54.9	43.4	29.9	24.3	15.1	12.6	12.3	7.0	3.5	0.9	0.8	0.3	12.5% 964
One . .		33.2	38.8	42.9	54.2	50.5	54.5	57.6	53.2	52.4	39.8	26.2	23.0	16.2	40.0 3,087
Two . .		14.1	5.7	11.8	14.0	22.8	25.1	25.2	25.9	34.2	46.8	58.0	57.5	53.7	37.6 2,898
Three .		0.0	0.3	1.8	1.6	2.5	4.1	2.3	4.1	5.5	7.1	11.8	14.2	21.3	7.4 569
Four . .		0.5	0.3	0.3	0.2	0.0	1.0	2.3	1.9	0.6	2.0	2.4	3.6	5.6	1.9 145
Five . .		0.5	0.0	0.0	0.0	0.0	0.2	0.0	0.5	0.3	0.7	0.8	0.9	2.9	0.6 50
Total	N	184	317	399	428	408	418	389	413	781	1,782	1,035	530	629	7,713
	%	2.4	4.1	5.2	5.5	5.3	5.4	5.0	5.4	10.1	23.1	13.4	6.9	8.2	100.0

examination based solely on the number of autos possessed. (It would, of course, appear as a change in gasoline consumption per mile, G_{it}, if these data were available.)

The final component in the decomposition of gasoline consumption [equation (1)] is the number of auto trips, Z_{it}. In Cycles 2, 3, and 4, respondents residing in metropolitan areas were asked to enumerate all trips made (by the respondent) on a randomly chosen day of the previous week. The same question was asked of all respondents in Cycles 8 through 11. Z_{it}, as we have defined it in equation (1), refers to all auto trips made (by anyone in the household) in a specific automobile, i. Using the number of auto trips made by the respondent as an estimate of Z_{it} is likely to result in underestimation of the household value of Z_{it} for single-car households, and, <u>perhaps</u>, in overestimation of the household Z_{it} for multiple-car households. On the other hand, using the number of auto trips made by the respondent as an estimate of the household $\sum_{i=1}^{n_t} Z_{it}$ would probably result in underestimation for single-car households, and in more severe underestimation for multiple-car households. With these qualifications in mind, we can attempt to estimate a behavioral relationship determining the reported number of auto trips made by the respondent.

We shall estimate the reported number of auto trips made by metropolitan respondents[24] in the following manner

$$A = \beta_0 + \beta_1 Y + \beta_2 H \qquad (6)$$

where A is the reported number of auto trips made by the respondent and Y and H are, as previously defined, total family income in thousands of dollars and household size, respectively.

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[24] We eliminate non-metropolitan respondents in order not to bias our comparison of later cycles with the earlier cycles in which only metropolitan respondents were queried.

We shall estimate equation (6) separately for the pre-crisis period (Cycles 2 through 4) and the crisis period (Cycles 8 through 11). Once again, we are forced to omit the price of gasoline variable (P) for lack of data. We must also omit the queuing cost term, but hope to pick up the effect of the latter in the change in the income coefficient, β_1, between the two periods.

A priori, we expect to find $\beta_1 > 0$. Auto use is related to participation in leisure-time activities that we expect to have fairly high income elasticities. On the other hand, one can expect that the pure income effects will be mitigated by the effects of income on the value of time, assuming driving to be a relatively time-intensive activity. (Of course, one could then substitute activities requiring less distance traveled, and this might result in little reduction in the number of trips.) Overall, the former is expected to dominate, with the result that β_1 will be positive.

Number of household members may be a rough indicator of the demands placed on the automobile: larger households may require more trips to the dentist, more shopping trips, and the like. On the other hand, larger household size, holding income constant, may mean fewer demands on the automobile for leisure purposes. The net effect is ambiguous as is the expected sign of β_2.

Estimating equation (6) by ordinary least squares, for the pre-crisis period we obtain

$$A = 1.75 \quad + \underset{(0.0110)^{**}}{0.0851Y} \quad + \underset{(0.0498)}{0.0398H}$$

$$R^2 = 0.065, \; N = 981$$

For the crisis period, we obtain

$$A = 1.85 + \underset{(0.00997)^{**}}{0.0801Y} + \underset{(0.0431)}{0.00775H}$$

$$R^2 = 0.059, \ N = 1436$$

The estimated coefficient of income is, as expected, positive and highly significant for both periods; the estimated coefficient of household size is positive, but not significant.[25] Once again, we note a fall in the estimated coefficient of income from the pre-crisis period to the crisis period, and again, the difference is not statistically significant. Also, we note again that differences over income classes in gasoline price changes or in the necessity to queue may explain lack of a significant decrease in $\hat{\beta}_I$. Changes to shorter trips and more efficient automobiles may also account for lack of a significant change in $\hat{\beta}_1$, but we cannot now verify this.[26]

To summarize the results thus far, it seems reasonable to conclude that higher income households made more automobile trips (per household) both before and during the energy crisis than lower income households since higher income households tend to own more cars; tend, in greater proportion,

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[25] We note in passing that scaling up the number of reported auto trips by multiplying by $\sqrt{n_t}$ (the square root of the number of cars possessed by the household), and then regressing the result on Y and H, yields larger and more significant coefficients and results in a better fit in terms of R^2. However, since this effort to obtain an estimate of $\sum_{i=1}^{n_t} Z_{it}$ contains such a large arbitrary element in the form of the scaling factor, we have not included the detailed results.

[26] There may, of course, also be an income-related seasonal effect influencing our results in either direction.

to get to work by automobile, and to make more daily automobile trips.[27] Distance traveled per trip is less clear--higher income households tending to drive farther to work but less far to do grocery shopping--but one would expect the former to dominate in terms of overall gasoline usage.

Conservation

In our examination of automobile use, there were very weak indications of a positive association of conservation behavior with income. We will now examine this association in more detail.

One method of conserving gasoline is switching from the automobile to another means of transportation for the trip to work. Working respondents on all cycles were asked the mode of transportation usually used to get to work. The results show little overall change from the pre-crisis to the crisis period and rather unsystematic shifts by income class, with the bulk of reductions in car use occurring in the lower to middle income groups (Table 2.9).

Rather than changing one's mode of getting to work entirely, one might respond to the energy crisis by using public transportation more frequently, while still generally relying on the automobile. On all cycles, working respondents were asked if they had train, bus, or subway/elevated service available for getting to work. For each mode that was considered "available," they were asked whether they ever used that mode for traveling to work. There is some evidence of a slight shift to occasional use of

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[27] For Cycles 8 through 11, daily automobile trip data are available on <u>all</u> respondents. A simple regression of number of automobile trips on income and household size was run for all respondents (metropolitan and non-metropolitan) in Cycles 8 through 11. The resulting estimate of the income coefficient was still significantly positive, though lower (0.0529) than in the comparable regression run on metropolitan respondents only. Results after the inclusion of a dummy variable (L) representing locale indicated that a significantly lower number of automobile trips was made by rural residents.

TABLE 2.9

PER CENT USING CAR AS MODE OF TRANSPORTATION TO WORK BY TOTAL FAMILY INCOME (CYCLES 1-7; 8-12)

Use Car for Trip to Work	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Cycles 1-7 (4/13-11/22, 1973)	75.0	54.9	57.4	67.6	79.7	77.7	79.5	86.5	83.6	88.1	90.0	91.8	88.5	84.5
N	36	51	68	105	118	130	132	141	299	750	420	231	227	2,708
Cycles 8-12 (11/23, 1973-5/30, 1974) .	63.9	87.5	74.5	82.8	67.1	77.7	72.5	76.5	82.8	84.5	91.0	90.7	83.7	83.3
N	36	24	47	58	70	94	102	102	204	489	344	162	227	1,959

public transportation, but the changes seem rather unsystematic by income class (Table 2.10). What shift there was may, in fact, have been due to seasonal factors and unrelated to the energy crisis.

The investigation of inter-modal shifts in the trip to work is interesting but reveals only one dimension of conservation behavior. To focus on other methods of gasoline conservation, we refer to a set of questions asked of all eligible respondents on Cycles 9 through 12. Each eligible respondent was asked if anyone in the household had been trying to cut down on gasoline usage in the previous month, and if so, by what means (Table 2.11). If the respondent indicated conservation by a reduction in driving, he was asked how this was managed (Table 2.12).

An examination of Table 2.11 reveals some positive association of conservation practices with income. In each case, the proportion of affirmative responses is significantly higher for the highest income group than for the \$2,000-\$2,900 income group. Once again, however, the relationships are far from monotonic. There are a number of possibilities that might explain this tendency for conservation behavior to vary positively with income class[28] (given the slight negative correlation of gasoline price change with income). Among them are: (1) Higher income households would have had to queue more often than lower income households, had they maintained their old driving habits. (2) Higher income households placed a greater value on their time and were therefore less willing to queue than lower income households.[29]

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[28] An affirmative response does not, however, indicate the intensity with which conservation actions were pursued. For example, to say that one had cut down on driving gives no information on the degree of reduction. We must leave aside this possibility for variation in considering the yes/no responses.

[29] Lest one believe that the positive relationship between income and the proportion of respondents driving slower to cut down on gas use (Table 2.11) is conclusive evidence that this possibility is invalid, it should be remembered that driving slower ceased to be a variable of choice (legally)

TABLE 2.10

PER CENT USING PUBLIC TRANSPORTATION FOR TRIP TO WORK BY TOTAL FAMILY INCOME (CYCLES 1-7; 8-12)

Item	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Cycles 1-7 (4/13-11/22, 1973):														
At least one mode of public trans. is sometimes used	14.3	40.0	47.1	40.7	40.0	33.3	32.1	32.6	36.7	35.0	33.6	43.1	38.7	36.3
No public trans. is ever used but all are available . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.8	0.0	1.4	1.3	0.9
No public trans. is ever used; at least one mode is available. .	85.7	60.0	52.9	59.3	60.0	66.7	67.9	67.4	62.0	63.1	66.4	55.6	60.0	62.8
N	7	10	17	27	25	36	28	46	79	217	119	72	75	758
Cycles 8-12(11/23, 1973-5/30, 1974):														
At least one mode of public trans. is sometimes used	40.0	25.0	36.4	25.0	82.4	31.8	65.4	47.8	51.4	32.8	28.1	37.8	53.1	41.1
No public trans. is ever used but all are available . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.6	0.0	0.0	0.7
No public trans. is ever used; at least one mode is available. .	60.0	75.0	63.6	75.0	17.6	68.2	34.6	52.2	48.6	65.5	70.3	62.2	46.9	58.2
N	10	4	11	12	17	22	26	23	37	119	64	37	49	431

TABLE 2.11

PER CENT USING VARIOUS METHODS TO CUT DOWN ON USE OF GASOLINE BY TOTAL FAMILY INCOME

Method	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Trying to cut down on gas in last month	76.2	71.7	65.7	66.3	74.7	70.4	81.7	74.1	75.5	76.4	82.6	83.4	85.7	77.9
N	21	46	70	101	99	115	115	116	216	538	362	181	265	2,245
Tuned-up car . . .	9.5	15.2	8.6	16.8	20.2	24.1	25.2	13.8	25.6	22.9	27.9	24.9	35.8	24.2
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Drove slower . .	47.6	45.7	34.3	37.6	42.4	44.0	52.2	47.4	54.9	50.2	56.4	58.6	64.2	52.1
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Bought/used car with better mileage . . .	0.0	8.7	8.6	4.0	6.1	10.3	14.8	12.9	10.7	12.8	15.2	14.4	20.0	12.9
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Cut amount of driving . . .	57.1	58.7	60.0	51.5	62.6	56.9	70.4	60.3	65.1	66.0	69.9	72.4	76.2	66.5
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245

(3) Higher income households found it easier than lower income households to substitute activities not requiring the use of an automobile. This explanation may be particularly relevant in explaining the positive association between income and the proportion reducing driving by going out less (Table 2.12). (4) Certain conservation measures, such as tuning one's car or using a more efficient auto, resulted in larger savings for higher income households by virtue of their doing more traveling than lower income households. In fact, all of these factors may have been operating simultaneously.

Incidence of Changes in the Cost of Gasoline

We turn now to an examination of the gasoline price changes effected by the energy crisis and the incidence of queing and other trouble in obtaining gasoline. First, we consider the nominal change in gasoline prices. Eligible respondents[30] in Cycles 10 and 11 were asked the price per gallon of gasoline that they were currently paying, as well as the price they had been paying in October of 1973. Gasoline prices reported for October 1973 were positively (and significantly) correlated with income ($r = 0.1267$, $N = 1118$); the current gasoline price showed a slight positive correlation with income ($r = 0.0539$, $N = 1133$, significant at the 7 per cent level in a two-tailed test). The difference in gasoline prices (current price minus October price) had a slight negative correlation with income ($r = -0.0591$, $N = 1112$, significant at the 5 per cent level in a two-tailed test). This slight negative association may, in part, explain the absence of a significant drop in the estimated income coefficient between the pre-crisis and crisis period regressions we have examined.

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as states instituted lower speed limits. In addition, it could be that using one's time for queuing is more distasteful than using one's time for driving.

[30] Eligible respondents were those in households owning at least one automobile.

TABLE 2.12

PER CENT USING VARIOUS METHODS TO CUT DOWN ON AMOUNT OF DRIVING BY TOTAL FAMILY INCOME

Method	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Joined car pool	4.8	4.3	2.9	5.9	3.0	6.0	9.6	6.9	7.9	6.7	9.4	7.7	15.1	8.1
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Used public transportation more	0.0	0.0	0.0	2.0	2.0	0.9	3.5	4.3	1.9	2.2	2.2	3.9	4.2	2.5
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Walked more . .	19.0	6.5	14.3	7.9	19.2	11.2	17.4	18.1	14.4	11.0	8.3	13.8	12.1	12.2
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Bicycled more .	0.0	2.2	4.3	1.0	1.0	5.2	4.3	4.3	7.0	4.1	5.0	7.7	5.7	4.7
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245
Going out less .	38.1	50.0	48.6	38.6	55.6	46.6	53.9	51.7	52.6	55.9	58.6	55.2	61.9	54.6
N	21	46	70	101	99	116	115	116	215	538	362	181	265	2,245

Eligible respondents in Cycles 8 through 12 were asked if they had had any trouble obtaining gasoline in the previous month. If so, they were asked to specify the problems encountered. For Cycles 8 through 12 as a whole, the incidence of reported problems varies over income classes,[31] though generally not monotonically (Table 2.13). In fact, it often appears that the highest and lowest income groups were most severely hit, the middle income groups less so. For example, the incidence of queing experiences was significantly lower in the $5,000-$5,999 income class than in the $25,000 or over income class (Table 2.13); the results were similar for trouble (of any kind) obtaining gasoline (Table 2.14). Furthermore, a cycle-by-cycle examination of the incidence of trouble obtaining gasoline indicates both substantial variation over time in the experience of each income class and differences over time in the relationship of incidence to income class (Table 2.15). These observations point up a problem in the regression estimates performed on data gathered from Cycles 8 through 12: we have aggregated over time periods that were very different in important respects. Their dissimilarity may account for the lack of significant differences in the estimated income coefficients between the pre-crisis and crisis period regressions.[32]

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[31]Note that we are considering only eligible respondents, i.e., only those in car-owning households.

[32]It is well known that there were significant interregional differences in the incidence of trouble obtaining gasoline (Table 2.16; Figure 2.13 gives the Census Regions). While we have not pursued the matter in depth, it is possible that some of the income-related differences in impact of the energy crisis reflect regional income differences. If, however, these regional income differences merely reflect regional differences in price levels, then use of income as a measure of financial well-being loses some of its validity.

TABLE 2.13

PER CENT REPORTING DIFFERENT TYPES OF TROUBLE OBTAINING GASOLINE BY TOTAL FAMILY INCOME

Item	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Station not open as much . . .	31.3	22.8	16.7	16.5	16.9	19.0	23.3	17.8	23.7	22.0	23.5	31.9	35.5	23.8
N . . .	32	57	96	127	124	142	150	152	283	682	459	216	301	2,821
Station not giving as much gas as wanted	18.8	19.3	7.3	7.1	12.9	10.6	6.0	14.5	14.5	16.0	15.3	26.4	28.2	16.2
N . . .	32	57	96	127	124	142	150	152	283	682	459	216	301	2,821
Station had no gas . . .	21.9	28.1	19.8	22.0	19.4	15.5	19.3	18.4	20.8	21.7	21.6	31.0	30.9	22.7
N . . .	32	57	96	127	124	142	150	152	283	682	459	216	301	2,821
Long wait at station . . .	9.5	17.4	14.3	13.9	13.1	11.2	18.3	16.2	15.7	19.2	19.9	24.3	24.9	18.7
N . . .	21	46	70	101	99	116	115	117	216	537	366	181	265	2,250

TABLE 2.14

PER CENT REPORTING TROUBLE GETTING GAS IN LAST MONTH BY TOTAL FAMILY INCOME

Item	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Trouble getting gas . .	37.5	35.1	26.0	26.0	26.6	24.6	29.3	31.6	33.2	34.9	34.6	46.8	43.9	34.5
N . .	32	57	96	127	124	142	150	152	283	682	459	216	301	2,821

TABLE 2.15

PER CENT REPORTING TROUBLE GETTING GASOLINE IN LAST MONTH, BY CYCLE, BY TOTAL FAMILY INCOME

Trouble Getting Gas	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Cycle 8 (11/23-12/20, 1973) .	36.4	9.1	7.7	7.7	12.0	19.2	14.3	14.3	19.4	22.1	9.7	31.4	19.4	17.3
N	11	11	26	26	25	26	35	35	67	145	93	35	36	571
Cycle 9 (1/4-1/31, 1974). .	0.0	25.0	31.6	30.8	39.1	30.2	33.7	38.2	48.1	42.1	42.9	52.2	65.2	43.5
N	4	8	19	26	23	43	31	34	52	145	98	46	69	598
Cycle 10 (12/1-12/28, 1974) .	66.7	63.2	50.0	60.9	38.5	31.8	51.6	56.4	54.2	58.7	58.9	67.2	68.3	57.9
N	9	19	16	23	26	22	31	39	48	121	107	58	60	579
Cycle 11 (3/15-4/11, 1974). .	33.3	37.5	43.8	25.0	40.9	33.3	20.0	30.0	37.3	40.5	46.1	52.8	46.5	40.1
N	6	8	16	24	22	27	25	20	59	131	76	36	71	521
Cycle 12 (5/3-5/30, 1974). .	0.0	18.2	10.5	10.7	7.1	4.2	21.4	8.3	14.0	15.0	11.8	19.5	9.2	12.9
N	2	11	19	28	28	24	28	24	57	140	85	41	65	552

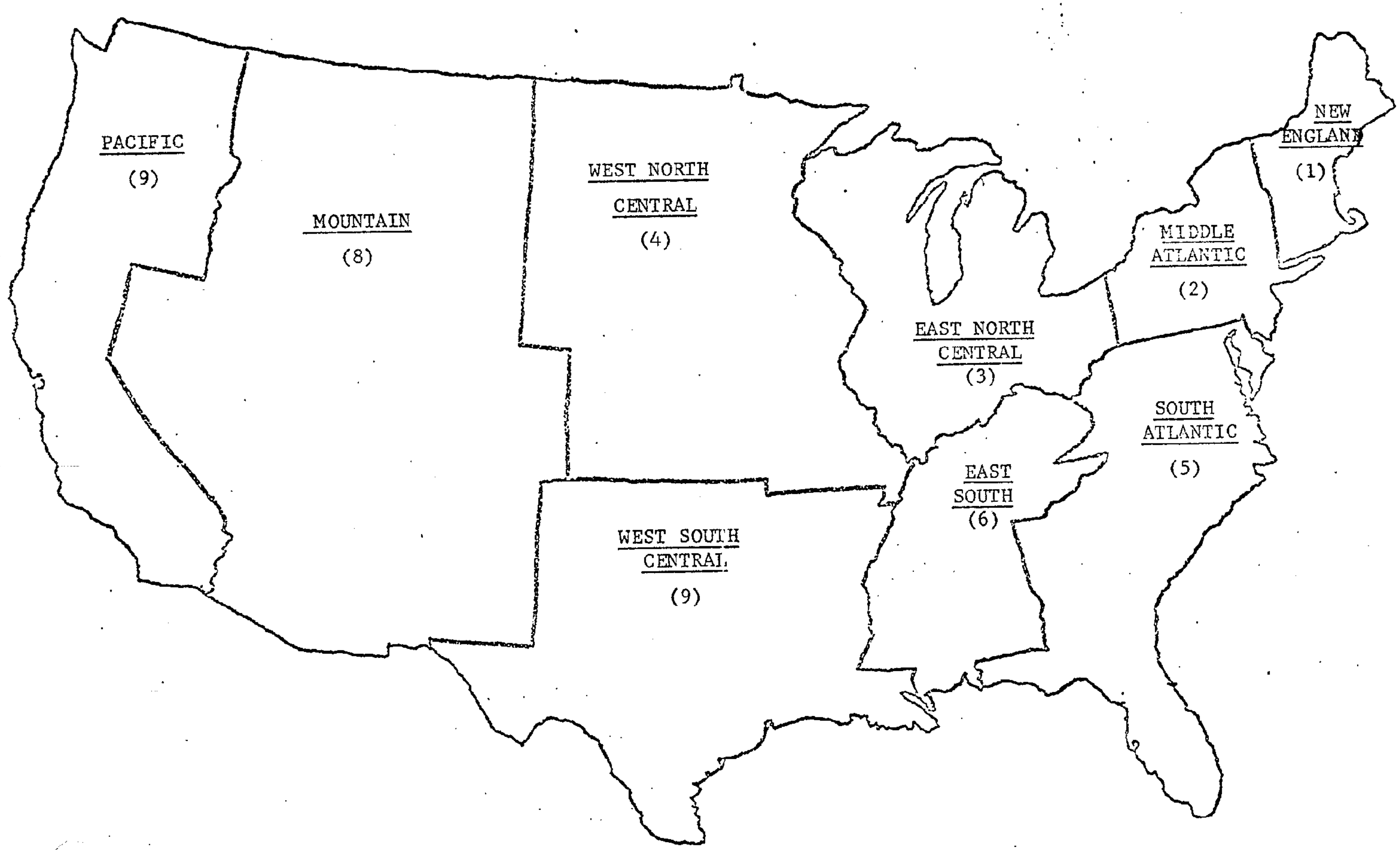
TABLE 2.16

PER CENT REPORTING TROUBLE GETTING GAS IN PAST MONTH AND LONG WAIT AT GAS STATION BY CENSUS REGION

Item	New England	Mid Atlantic	East North Central	West North Central	Scuth Atlantic	East South Central	West South Central	Mountain	Pacific	Total
Trouble getting gas. . .	61.2	38.1	28.7	20.3	36.5	36.6	33.8	16.7	42.4	34.4
N . .	129	509	717	241	575	183	228	132	370	3,084
Long wait	52.5	27.5	10.6	6.7	21.4	11.3	9.8	7.4	26.2	18.6
N . .	101	396	567	194	471	142	173	108	290	2,442

Figure 2.13

CENSUS REGIONS



To summarize, it is likely that higher income households made more auto trips per time period both before and during the energy crisis than did lower income households.[33] There is some evidence of a slight negative association between crisis-induced gasoline price increases and income; experience of trouble obtaining gasoline seems to have fallen most heavily on the highest and lowest income groups. Finally, there are indications of more extensive conservation behavior by upper income households.

Heating Fuel

A second area in which consumers were affected by the energy crisis was in the use of home heating fuels. We shall attempt to examine the variation over income classes in the use of heating fuel, in the extent of price change per unit of fuel, and in conservation behavior.

Consumption

It seems reasonable to assume that X, a household's consumption of heating fuel over a given time period, may be expressed as a function of a number of variables, as follows:

$$X = f(T,S,Q,C) \tag{7}$$

where T = temperature setting (degrees);

S = size of home (volume);

Q = a measure of quality of insulation;

C = outdoor temperature (degrees).

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[33]And, in fact, probably consumed more gasoline (per household) in each period, though our data alone do not warrant this conclusion.

One would expect, other things being equal (outdoor temperature, size of home, insulation quality), that a higher temperature setting would require larger fuel inputs, and hence $\frac{\partial X}{\partial T} > 0$. Similarly, holding temperature setting, insulation quality, and outdoor temperature constant, a larger home would necessitate higher fuel consumption. Thus, $\frac{\partial X}{\partial S} > 0$. Given the size of home to be heated, the temperature setting, and the outdoor temperature, higher quality insulation should permit less heat loss; thus, one would expect $\frac{\partial X}{\partial Q} < 0$. Finally, a given temperature setting will be easier to maintain (given the size of home and quality of insulation) the warmer the temperature outdoors; therefore, $\frac{\partial X}{\partial C} < 0$.

Consider first the variation in size of home (S) over income classes. One measure of size of home is the number of rooms. There exists a positive and significant correlation between income and number of rooms for both homeowners ($r = 0.4233$, $N = 5168$; see Table 2.17) and renters ($r = 0.2287$, $N = 2358$; see Table 2.18). Of course, this measure of size of home ignores variation in the size of rooms; it seems highly unlikely, however, that room size would vary in a manner to completely offset the positive association of number of rooms with income.

One would expect insulation quality (Q) to be highly related to the general quality of the home. The price of the house divided by the number of rooms (for homeowners), or the monthly rent per room (in the case of renters), should provide a rough measure of general housing quality.[34] For homeowners, the correlation of income with the price of

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[34] Two problems exist in using our survey data for this purpose. First, the categorization of housing prices and monthly rentals is likely to give an inaccurate picture if one value is used to represent each category, especially for the highest valued homes and the highest monthly rentals. In those cases, as the number of rooms rises and the true value of home rises, the categorized price remains constant and the measured estimate of quality falls. Second, the price of house includes the value of the property on which it is built.

TABLE 2.17

NUMBER OF ROOMS IN HOUSE OR APARTMENT BY TOTAL FAMILY INCOME (HOMEOWNERS ONLY)

(Per Cent)

Number of Rooms	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
3 or less	8.6	5.0	7.9	3.9	4.0	3.7	3.2	2.6	2.1	1.1	0.4	0.9	0.5	2.0 % 104(N)
4	42.9	28.3	27.2	19.1	27.4	17.8	18.9	17.9	16.4	9.5	6.5	2.7	2.2	12.4 639
5	21.4	30.8	26.7	31.3	31.8	32.2	37.4	31.9	31.7	28.9	22.2	15.0	7.5	25.3 1,310
6	12.9	25.8	23.3	27.0	20.2	28.1	26.1	27.2	24.6	31.9	31.3	31.1	18.0	27.4 1,416
7	7.1	6.9	6.4	9.6	11.2	10.3	9.5	12.8	13.3	15.8	20.4	20.2	18.3	15.1 778
8	5.7	2.5	5.0	5.7	2.2	5.0	2.3	5.5	8.5	8.2	11.6	15.9	26.0	10.1 523
9 or more	1.4	0.6	3.5	3.5	3.1	2.9	2.7	2.1	3.5	4.6	7.8	14.3	27.5	7.7 398
Total % N	1.4 70	3.1 159	3.9 202	4.5 230	4.3 223	4.7 242	4.3 222	4.5 235	9.3 483	24.6 1,269	16.2 835	8.5 441	10.8 557	100.0 5,168

TABLE 2.18

NUMBER OF ROOMS IN HOUSE OR APARTMENT BY
TOTAL FAMILY INCOME (RENTERS ONLY)

(Per Cent)

Number of Rooms	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
3 or less	51.5	51.1	41.6	30.8	28.2	31.3	29.4	38.2	24.7	26.8	21.5	8.5	14.7	30.4 % 717(N)
4	26.8	30.4	31.5	33.5	34.8	33.7	28.1	29.4	31.5	26.0	31.2	22.0	26.5	29.8 703
5	14.4	11.1	19.7	18.1	25.4	16.9	26.1	19.4	29.7	29.7	28.5	34.1	14.7	23.8 561
6	5.2	3.7	5.6	8.8	7.2	12.0	10.5	10.0	8.6	13.1	11.3	13.4	29.4	10.2 241
7	2.1	3.7	0.6	4.9	2.8	5.4	2.6	1.2	3.2	2.9	2.2	15.9	5.9	3.4 81
8	0.0	0.0	0.6	3.8	1.1	0.6	1.3	1.2	1.4	1.2	4.3	2.4	1.5	1.5 36
9 or more	0.0	0.0	0.6	0.0	0.6	0.0	2.0	0.6	0.7	0.2	1.1	3.7	7.4	0.8 19
Total %	4.1	5.7	7.5	7.7	7.7	7.0	6.5	7.2	11.8	20.4	7.9	3.5	2.9	100.0
Total N	97	135	178	182	181	166	153	170	279	481	186	82	68	2,358

house divided by the number of rooms is positive and significantly different from zero ($r = 0.3797$, $N = 4881$). For renters, the correlation of income with monthly rent per room is also positive and significantly different from zero ($r = 0.2713$, $N = 2302$).

Data on temperature settings (T) are available for Cycles 8 through 11. Respondents able to control the temperature of their houses or apartments were asked the temperature at which they kept their dwellings during the daytime, during both the winter of 1972-1973 and the winter of 1973-1974. (We assume that this reported temperature is a thermostat setting or the equivalent of one.) While it is certainly possible that some variation in temperature settings results from differences in taste, and that the distribution of tastes may not be the same over income classes, it also seems likely that some of the variation is connected with housing quality and regional factors (mainly outdoor temperatures). In order to discover the relationships among these variables, we will examine a simple model of reported daytime temperatures.

Assume that in winter each dwelling is heated in a non-uniform fashion. Given imperfect insulation and localization of heat sources, a temperature gradient will exist throughout the dwelling as one moves from the source of heat to the sources of heat loss. Comfort would then depend on the temperature distribution over the area of the dwelling (over a given area, comfort would vary inversely with the deviation--in absolute value--of actual temperature from the "ideal" temperature). We make three assumptions: (1) temperatures less than ideal are weighted more heavily (negatively) in the comfort function than temperatures greater than ideal;

(2) there exists a point heat source with temperature measurement occurring at the source; and (3) there exists a temperature gradient that is the same in all directions from the source.[35] Using these assumptions, the steeper the temperature gradient is, the higher the measured temperature must be to provide equivalent comfort.

For a given outdoor temperature, the temperature gradient will tend to be steeper as the quality of insulation is lower. For a given quality of insulation, the lower the outdoor temperature, the steeper the gradient will tend to be. We are therefore led to estimate temperature setting as a function of housing quality and outdoor temperature by

$$T = \beta_0 + \beta_1 Q + \beta_2 C + \beta_3 Y \tag{8}$$

where T = reported daytime temperature setting;

Q = an index of housing quality: price per room (in thousands of dollars) for homeowners, monthly rent per room for renters;

C = a dummy variable to correct for differences in outdoor temperatures, assuming the value 0 if respondent is located in the South Atlantic, East South, or West South Central Census regions, and assuming the value 1 otherwise;

Y = total family income (in thousands of dollars)

Given the above, we expect to find $\beta_1 < 0$. Since regional differences in housing construction, and in insulation in particular, are unlikely to compensate completely for regional outdoor temperature differences, we expect $\beta_2 > 0$.

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[35] The conclusion drawn depends heavily on the assumptions made, and especially on the point at which temperature measurement occurs. It is urged that these assumptions be judged on the agreement between their implications and the empirical evidence.

We have included income (Y) for two reasons. First, it may yield evidence of income-related differences in taste with regard to higher indoor temperatures. (On this basis, we have no expectations about the sign of β_3.) Second, the income variable may pick up differences in housing quality related to residential location. Assume that there is a positive association between household income and the average income of the neighborhood in which one resides. If, in a higher income neighborhood, there are neighborhood-specific characteristics (low crime rates, good schools, prestige, and the like) unrelated to structural housing quality, that are components of the value of land (and therefore part of the reported price of the house), then a given price per room may represent a lower quality dwelling than it would in a lower income neighborhood. Thus, we would expect to find $\beta_3 > 0$.

Estimating equation (8) by ordinary least squares, once using the reported daytime temperatures for the winter of 1972-1973, and once using the reported daytime temperatures for the winter of 1973-1974, we obtain for homeowners:

$$T_{1972-1973} = \underset{}{70.926} - \underset{(0.0469)^{**}}{0.162Q} + \underset{(0.225)^{**}}{0.734C} + \underset{(0.0145)}{0.0216Y} \qquad R^2 = 0.018,\ N = 1140 \tag{9}$$

$$T_{1973-1974} = 68.840 - \underset{(0.0482)^{*}}{0.106Q} + \underset{(0.231)^{**}}{0.914C} - \underset{(0.0149)^{**}}{0.0388Y} \qquad R^2 = 0.027,\ N = 1140 \tag{10}$$

For renters, the results are:

$$T_{1972-1973} = 72.011 - \underset{(0.0121)^{*}}{0.0292Q} - \underset{(0.539)}{0.334C} - \underset{(0.0367)}{0.00938Y} \qquad R^2 = 0.020,\ N = 382 \tag{11}$$

$$T_{1973-1974} = \underset{(0.0136)}{68.170 - 0.0159Q} + \underset{(0.602)}{0.321C} + \underset{(0.0411)}{0.0394Y} \qquad (12)$$

$$R^2 = 0.005, \; N = 382$$

The estimated coefficients of Q and C in equations (9) and (10) (for homeowners) conform to expectations with respect to sign and are significantly different from zero. The estimated coefficient of income, while positive but statistically insignificant in equation (9), is negative and significant in equation (10). [The interpretation of the negative estimated coefficient of income in equation (10) will be dealt with later when we examine the difference in reported daytime temperatures between the winter of 1972-1973 and the winter of 1973-1974.]

The estimated coefficients of Q and C in equations (11) and (12) (renters only) are, with one exception [the coefficient of Q in (11)], not statistically significant, and in one case [coefficient of C in (11)] even of a different sign than anticipated. Since, as mentioned previously, it is often the case that renters do not pay for precisely the amount of fuel they use, the incentives for fuel conservation are different for them than for homeowners. This factor may be reflected in different behavioral relationships for homeowners and renters.[36]

To summarize, to the extent that fuel consumption is positively related to size of home, higher income households are likely to consume more fuel than lower income households. On the other hand, it is likely that higher income households have higher quality homes (and, presumably, better insulation) and thus waste less fuel. After correction for housing quality and region, reported temperature settings by homeowners for winter

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[36] It is important to note that home ownership varies positively with income class (Table 2.19).

TABLE 2.19

TYPE OF PAYMENT FOR HOUSE OR APARTMENT (OWN, RENT, OR NO PAYMENT) BY TOTAL FAMILY INCOME

(Per Cent)

Type of Payment	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Owned or buying	38.6	50.0	50.4	53.7	54.7	58.1	56.9	56.9	61.8	71.2	80.8	83.2	88.4	67.0 5,171
Rented	52.7	42.5	44.4	42.5	44.4	39.7	39.2	41.2	35.7	27.0	18.0	15.5	10.8	30.5 2,358
No payment	8.7	7.5	5.2	3.7	1.0	2.2	3.8	1.9	2.4	1.9	1.3	1.3	0.8	2.5 190
Total % N	2.4 184	4.1 318	5.2 401	5.5 428	5.3 408	5.4 418	5.1 390	5.4 413	10.1 781	23.1 1,783	13.4 1,035	6.9 530	8.2 630	100.0 7,719

1973-1974 were negatively related to income. For the winter of 1972-1973 in the case of homeowners, and for both winters in the case of renters, the effect of income was not significantly different from zero.

Finally, while there is some evidence that the southern Census regions (South Atlantic, East South, and West South Central) have a somewhat lower income distribution than the others (Table 2.20), these regional differences may merely reflect regional price level differences and not differences in real income. It may be unwise, therefore, to make any connection between the disproportionate numbers of poor in the South and the presumed tendency of southerners to require less heating fuel.

We turn now to a discussion of variation by income class in the magnitude of fuel price changes. Since price change undoubtedly varied by fuel type, and since fuel types are not randomly distributed over income classes (Table 2.21 for homeowners, Table 2.22 for renters), it is possible that price changes were more severe for some income classes than for others. It appears that, among homeowners, natural gas tends to be used widely by upper income households, with fuel oil a distant second, and electricity third. Among lower income homeowners, natural gas is less popular though still most widely used, followed more closely by fuel oil in second place, and then by liquid propane, coal, and other fuels seeing little use in upper income households. Among renters, the rankings of fuel popularity are similar to those of homeowners for the higher income households; for lower income households, however, natural gas is very widely used, followed by fuel oil as a distant second. Such a cursory analysis cannot hint at the direction of price change variation over income class; a detailed analysis cannot be presented here.

TABLE 2.20

CENSUS REGION BY TOTAL FAMILY INCOME

(Per Cent)

Census Region	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
South Atlantic, East South Central, West South Central	58.2	45.6	34.4	37.6	37.3	37.3	40.3	34.9	31.5	26.5	26.3	28.1	24.6	31.8% 2,455(N)
All other Census regions	41.8	54.4	65.6	62.4	62.7	62.7	59.7	65.1	68.5	73.5	73.7	71.9	75.4	68.2 5,266
Total N	184	318	401	428	408	418	390	413	781	1,783	1,036	531	630	7,721
%	2.4	4.1	5.2	5.5	5.3	5.4	5.1	5.3	10.1	23.1	13.4	6.9	8.2	100.0

TABLE 2.21

TYPE OF FUEL USED TO HEAT HOME BY TOTAL FAMILY INCOME (HOMEOWNERS ONLY)

(Per Cent)

Type of Fuel	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Natural Gas	38.1	37.3	44.1	55.7	42.9	60.9	37.0	50.6	50.3	53.8	57.1	61.7	63.8	53.9% 934(N)
Propane, Bottled Gas	9.5	13.7	10.3	7.6	14.3	8.7	9.9	12.6	8.8	5.6	3.7	1.3	2.9	6.5 112
Fuel Oil	23.8	23.5	25.0	19.0	27.1	15.9	34.6	19.5	28.6	28.2	25.9	25.5	18.8	25.1 435
Coal	14.3	5.9	4.4	7.6	4.3	2.9	3.7	4.6	2.0	1.0	2.0	0.0	0.5	2.4 41
Electricity	0.0	5.9	5.9	5.1	5.7	10.1	13.6	11.5	8.8	10.2	11.2	10.7	12.1	9.9 172
Other	14.3	13.7	10.3	5.1	5.7	1.4	1.2	1.1	1.4	1.2	0.0	0.7	1.9	2.3 40
Total N	21	51	68	79	70	69	81	87	147	411	294	149	207	1,734
Total %	1.2	2.9	3.9	4.6	4.0	4.0	4.7	5.0	8.5	23.7	17.0	8.6	11.9	100.0

NOTE: Raw Chi Square = 195.30986 with 60 Degrees of Freedom; Significance = 0.0000

TABLE 2.22

TYPE OF FUEL USED TO HEAT HOME BY
TOTAL FAMILY INCOME (RENTERS ONLY)

(Per Cent)

Type of Fuel	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Natural Gas	77.4	60.5	61.5	51.2	47.8	38.8	46.7	58.3	56.8	57.3	62.5	75.0	55.0	56.6% 365(N)
Propane, Bottled Gas	0.0	4.7	5.8	4.7	8.7	10.2	8.9	4.2	2.7	8.2	1.6	0.0	0.0	5.3 34
Fuel Oil	12.9	16.3	15.4	16.3	30.4	30.6	22.2	18.8	20.3	20.9	18.8	15.0	30.0	20.6 133
Coal	3.2	4.7	1.9	14.0	2.2	2.0	0.0	2.1	0.0	0.9	1.6	0.0	0.0	2.3 15
Electricity	3.2	7.0	11.5	7.0	10.9	14.3	17.8	14.6	18.9	12.7	15.6	10.0	15.0	12.9 83
Other	3.2	7.0	3.8	7.0	0.0	4.1	4.4	2.1	1.4	0.0	0.0	0.0	0.0	2.3 15
Total N %	31 4.8	43 6.7	52 8.1	43 6.7	46 7.1	49 7.6	45 7.0	48 7.4	74 11.5	110 17.1	64 9.9	20 3.1	20 3.1	645 100.0

NOTE: Raw Chi Square = 85.7226 with 60 Degrees of Freedom; Significance = 0.0163

Conservation

One of the most commonly reported methods of conserving heating fuel was reducing the temperature of one's dwelling. The monetary gains involved in a given temperature reduction can be expected to vary positively with the size of home and inversely with the quality of home (i.e., the gains are a positive function of the effective volume heated), and also to vary positively with the price of the volume of heating fuel saved. If, before the energy crisis, the cost of heating fuel required to heat a given dwelling was esentially invariant with respect to fuel type, then the gains from conservation will vary positively with the proportional <u>change</u> in heating fuel price.

Using as the dependent variable (ΔT) the reported daytime temperature of the respondent's dwelling during the winter of 1972-1973 minus the reported daytime temperature during the winter of 1973-1974, we estimate:

$$\Delta T = \beta_0 + \beta_1 S + \beta_2 Y + \beta_3 C + \beta_4 Q + \beta_5 N + \beta_6 L + \beta_7 F + \beta_8 E \qquad (13)$$

where S = number of rooms in house or apartment;

> N, L, F, E are dummy variables assuming the value 1 if the heating fuel used is natural gas, liquid propane, fuel oil, or electricity, respectively, and the value of 0 otherwise;
>
> and Y, C, and Q are respectively, as previously defined, total family income (in thousands of dollars), a regional (North-South) dummy variable, and a measure of housing quality (price per room in thousands of dollars or monthly rent per room).

As explained above, we expect $\beta_1 > 0$ and $\beta_4 < 0$. Without information on the extent of price change between the two winters for various heating fuels, we have no expectations about the signs of β_5, β_6, β_7, and β_8. The regional variable (C) is included merely to correct for a possible difference between the two years in the severity of the northern winter relative to the southern winter, and for possible regional (North-South) variation in fuel price changes; we have no expectations regarding the sign of β_3. The income variable (Y) is included to see if there is any independent effect of income on conservation behavior. In addition, Y may again serve as an inverse measure of housing quality, given Q, because of its presumed relationship with residential location. On this basis, one would expect $\beta_2 > 0$.

Using ordinary least squares regression to estimate equation (13) for homeowners and for renters separately, for homeowners we obtain:

$$\Delta T = \underset{(0.0688)}{0.414 + 0.0505S} + \underset{(0.0154)^{**}}{0.0555Y} - \underset{(0.223)}{0.193C} - \underset{(0.0451)}{0.0544Q} \tag{14}$$

$$+ \underset{(0.708)}{1.200N} + \underset{(0.809)}{1.191L} + \underset{(0.721)^{**}}{2.089F} + \underset{(0.767)^{*}}{1.506E}$$

$$R^2 = 0.035, \; N = 1134$$

And for renters we obtain:

$$\Delta T = 3.349 + \underset{(0.209)}{0.113S} - \underset{(0.041)^{*}}{0.083Y} - \underset{(0.599)}{0.844C} + \underset{(0.018)}{0.007Q} \tag{15}$$

$$-\underset{(2.078)}{0.183N} - \underset{(2.315)}{0.067L} + \underset{(2.131)}{1.294F} - \underset{(2.178)}{1.608E}$$

$$R^2 = 0.047, \; N = 353$$

For equation (14), the signs of the estimated coefficients of S and Q are as predicted, though neither is significantly different from zero. On the other hand, the income variable (Y) has a positive and statistically significant estimated coefficient, indicating a positive association of temperature reduction with income. It may well be that the lack of significance of the estimated coefficient of S is explained by the fact that S exhibits a great deal of collinearity with Y. Indeed, a simple regression (for homeowners) of ΔT on S results in a highly significant and positive estimated coefficient for S. It seems reasonable to believe that the more important causal factor is size of home (S) rather than income (Y),[37] although, as mentioned above, there is a reason for believing income should have a positive influence through its relationship to residential location.

Notice also that in equation (14), the dummy variables for fuel oil (F) and electricity (E) both have relatively large and significantly positive estimated coefficients. This finding may be construed as evidence that fuel oil and electricity exhibited large relative price increases from the winter of 1972-1973 to the winter of 1973-1974.[38]

Finally, we note again the lack of parallelism between the estimate for homeowners in equation (14) and that for renters in equation (15), the only significant coefficient in the latter estimation being that for income (and indicating a <u>negative</u> association between temperature reduction and income).

While reduction in temperature was the most commonly used method of conservation, other techniques were also employed. Respondents in Cycles 9 and 10 were asked if they had been attempting to cut down on

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[37] This result probably explains the negative relationship between income and reported temperature in equation (10).

[38] It is encouraging to note that the results mentioned in the first portion of this chapter tend to confirm our hypothesis that fuel oil exhibited a large relative price increase. Among homeowners, the proportion reporting attempts to cut use of heating fuel is significantly higher for fuel oil users than, for example, for coal or natural gas users (Table 2.3).

heating fuel use since September of 1973. If they replied affirmatively, they were asked the methods they employed to effect such a reduction.

The set of responses to the general question about attempts to cut the use of heating fuel reveals a pattern for homeowners that is, on the whole, consistent with our previous findings. A weak and irregular positive association of conservation behavior with income class emerges,[39] with significant differences existing between various income groups in the proportion replying affirmatively (Table 2.23). The responses referring to the employment of specific conservation measures are harder to interpret, for a condition of their use is often some previously existing deficiency (Table 2.24; homeowners only).

The results for renters on the question about attempts to cut use of heating fuel since September of 1973 reveal a great deal of unsystematic variability, in part a product of the small sample sizes (Table 2.23).

In summary, it is quite likely that, among homeowners, fuel conservation varied positively with income, in part because of the positive relationship between home size and income. Among renters, the results are more ambiguous, with the possibility of a negative relationship between fuel conservation and income.

Electricity and Appliances

We note first that the possession of many electrical appliances (e.g., clothes washers and dryers, dishwashers, color television sets; see Figure 2.14) varies positively with income; and it is not unreasonable to

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[39] Note again that the positive association with income class may exist mainly because of the positive relationship between income and size of home.

TABLE 2.23

PER CENT REPORTING TRYING TO CUT DOWN ON HEATING FUEL
SINCE SEPTEMBER, 1973 BY TOTAL FAMILY INCOME

Owners/Renters	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Homeowners .	69.2	78.8	67.6	75.0	84.2	83.8	82.9	76.4	78.3	85.5	89.8	90.0	87.7	84.0
N	13	33	37	40	38	37	41	55	69	200	167	90	114	934
Renters . . .	70.6	70.4	74.2	57.7	64.3	73.5	81.5	50.0	64.9	73.5	65.6	66.7	80.0	68.8
N	17	27	31	26	28	34	27	30	37	68	32	12	15	384

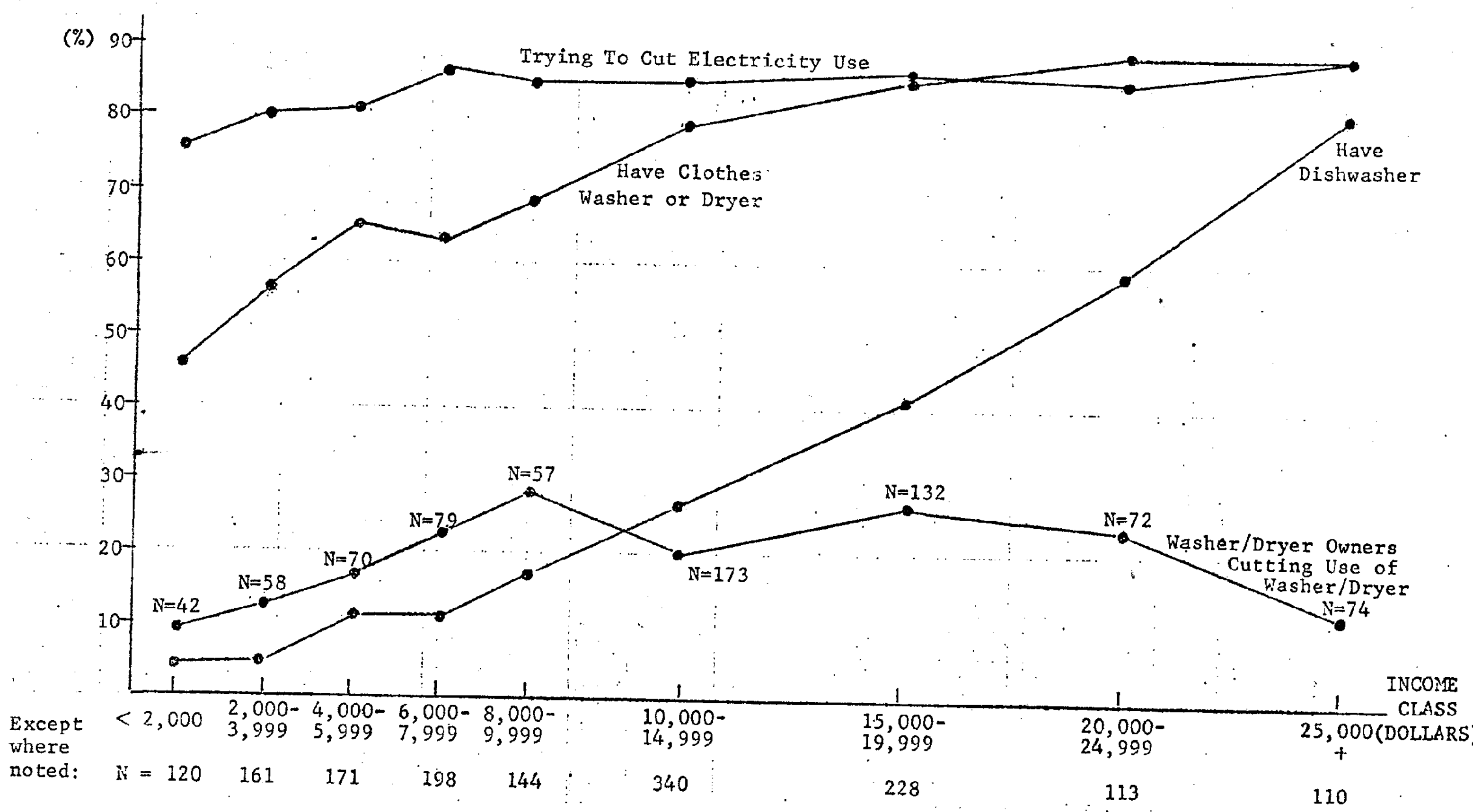
TABLE 2.24

PER CENT USING VARIOUS METHODS TO CUT DOWN ON HEATING FUEL BY TOTAL FAMILY INCOME (HOMEOWNERS ONLY)

Method	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Getting furnace fixed	0.0	0.0	0.0	0.0	2.6	2.7	0.0	3.6	1.4	3.0	2.4	1.1	0.9	1.8
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934
Changing heating equipment	7.7	3.1	2.7	0.0	7.9	0.0	0.0	5.5	8.7	2.5	7.7	7.8	6.1	5.0
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934
Adding storm windows/doors	0.0	3.1	0.0	12.5	0.0	8.1	9.8	1.8	10.1	7.5	5.4	7.8	10.5	6.9
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934
Putting sealer on windows	0.0	3.1	2.7	7.5	7.9	10.8	17.1	1.8	8.7	12.0	8.9	11.1	14.0	9.7
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934
Closed off rooms	7.7	15.6	16.2	17.5	21.1	8.1	19.5	10.9	23.2	14.0	14.3	16.7	10.5	14.9
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934
Other methods used	15.4	3.1	13.5	15.0	23.7	40.5	26.8	27.3	21.7	21.5	31.5	21.1	35.1	25.1
N	13	32	37	40	38	37	41	55	69	200	168	90	114	934

Figure 2.14

CONSERVATION OF ELECTRICITY BY HOUSEHOLD INCOME



assume that household electricity consumption generally varies positively with income.[40] What are the determinants of the number and type of conservation actions undertaken? Since the possession (or implicit rental) of a certain appliance is a prerequisite for the institution of each of the specific conservation measures, and since the ownership of many appliances varies positively with income, an analysis of conservation by income class may be informative. It is often alleged that higher income households are better able to reduce the use of appliances since more of their appliances are "luxuries." Such an allegation says nothing about the willingness of higher income households to conserve. In fact, there are reasons for believing that among the group of owners of a given appliance, higher income households are less likely to reduce use of that appliance under the stimulation of a given change in the cost of electricity use.

Data from Cycles 8, 9, and 10 show a positive association between income class and the proportion of respondents in each class trying to cut electricity use (Figure 2.14). The proportion of respondents employing each of the specific conservation measures varies rather erratically by income class (Table 2.25), except for appliances where ownership varies most strongly with income (such as dishwashers). Here, the positive association with income class emerges. If we correct for the distribution of appliances by considering only those owning the relevant appliance, there is no clear

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[40] If the price changes in electricity induced by the energy crisis fell unevenly on different income groups, it seems likely that such variation in impact would have been produced by interregional variation in price change in combination with interregional income differences. Data from CNS do not directly address the problem of uncovering possible variation (by region or by income class) in the change in electricity prices; we shall, therefore, leave this problem aside for now, hoping to find evidence concerning it through an examination of conservation behavior.

TABLE 2.25

PER CENT USING VARIOUS METHODS OF CUTTING DOWN ON ELECTRICITY USE BY TOTAL FAMILY INCOME

Method used	Under $1,000	$1,000 to 1,999	$2,000 to 2,999	$3,000 to 3,999	$4,000 to 4,999	$5,000 to 5,999	$6,000 to 6,999	$7,000 to 7,999	$8,000 to 9,999	$10,000 to 14,999	$15,000 to 19,999	$20,000 to 24,999	$25,000 or over	Total
Shutting off Lights	74.5	78.3	69.4	75.2	69.4	80.6	79.0	73.1	73.3	81.9	78.8	83.7	82.0	78.2
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using TV Less Often	8.5	16.9	17.3	14.9	18.4	22.3	21.0	23.1	16.9	17.8	15.9	18.4	15.5	17.6
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using Washer/ Dryer Less Often	4.3	9.6	8.2	4.0	8.2	16.5	15.2	10.2	15.1	15.9	20.5	19.9	13.0	14.2
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using Dishwasher Less Often . .	2.1	1.2	1.0	1.0	2.0	1.9	1.9	1.9	4.7	7.6	11.0	18.4	14.0	7.0
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using Iron Less Often	6.4	6.0	6.1	7.9	4.1	7.8	4.8	3.7	4.1	3.9	5.3	7.1	4.5	5.1
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using Electric Stove Less Often	4.3	14.5	16.3	10.9	11.2	7.8	6.7	12.0	9.9	10.8	4.9	8.5	10.5	9.7
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948
Using Toaster/ Toaster Oven Less Often . .	3.0	0.0	1.5	0.0	2.9	3.5	1.4	3.1	1.7	2.7	1.1	1.1	0.0	1.7
N	33	55	65	62	68	57	69	65	115	261	185	94	131	1,260
Other Method . .	10.6	19.3	10.2	20.8	17.3	16.5	23.8	18.5	14.5	22.7	21.9	22.0	24.5	20.1
N	47	83	98	101	98	103	105	108	172	409	283	141	200	1,948

association between the proportion reducing use and income class; the highest proportion reducing use, however, generally occurs in the \$6,000-\$10,000 income range.

To pursue our investigation of the role of income, we construct a conservation index of sorts by counting, for each respondent, the number of electricity conservation measures reported.[41] While we would hope that this index would reflect the total reduction in electricity use, it is not clear whether it will even approximately perform this function. A simple indication that one is reducing the use of one or another appliance says nothing about the extent of reduction in electricity use. In order for our index to give a completely accurate portrayal, it is necessary that each indicated conservation measure represent the same reduction in electricity use; this condition is not likely to be met. But it is sufficient, for our index not to give a perverse view, that there be a lack of negative correlation between the number of conservation measures indicated and the reduction in electricity use that each one represents.

Having given ample warning concerning the interpretation of the index (I), we attempt to isolate some of the determinants of I by ordinary least squares[42] estimation of

$$I = \beta_0 + \beta_1 Y + \beta_2 J + \beta_3 H + \beta_4 W \tag{16}$$

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[41] Since Cycle 9 allowed nine possible measures while Cycles 10 and 11 allowed ten (with the additional choice of using the electric toaster/toaster oven less often), we shall consider Cycle 9 separately from Cycles 10 and 11 in all analyses.

[42] In this case, as in some of the other estimations we have made, ordinary least squares may not be the best estimation procedure to use. First, the dependent variable can assume only a very limited number of discrete values. Second, it seems possible, on a priori grounds, that the true relationship is non-linear. However, some attempts using elementary transformations of the variables resulted in little improvement in fit.

where J = a dummy variable for region, assuming the value 1 if the respondent lives in New England or Middle Atlantic Census regions, and the value 0 otherwise;

W = a dummy variable assuming the value 1 if the head of household's spouse is working, and 0 if not working;

and, as before, Y and H are total family income (in thousands of dollars) and number of people in the household, respectively.

By including the regional variable (J), we hope to uncover possible interregional differences in the structure of electricity supply and demand. Previous work has revealed a much higher incidence of trouble obtaining electricity in the New England and Middle Atlantic regions than in the rest of the country. At the same time, there have been reports of substantial increases in electricity prices in these regions. More substantial price increases would, of course, lead one to expect $\beta_2 > 0$. If, in spite of these large price increases, brownouts continued to occur, they might indicate a less elastic demand for electricity. On that basis, one would expect $\beta_2 < 0$.

Many electrical appliances are labor-saving devices that enable the spouse to take other employment. If hours worked by the spouse are not flexible, then one would expect working spouses to be less likely to forego use of these appliances. Hence, we expect $\beta_4 < 0$.

A larger number of members in the household may imply greater time savings in the use of labor-saving devices, and hence a higher probability of possession of certain appliances. In addition, a larger household may also offer more possibilities of substituting the time of its various members for the use of an appliance. We expect $\beta_3 > 0$.

Higher income households will generally possess more appliances and will therefore have more conservation possibilities available to them. In addition, it may be easier to substitute for appliances having high income elasticities than for those with low income elasticities. Therefore, while time savings may be of more value to higher income households, we expect $\beta_1 > 0$.

Estimation of equation (16) for Cycle 9 yields:

$$I = 1.546 + \underset{(0.008)}{0.013Y} - \underset{(0.135)}{0.162J} + \underset{(0.041)}{0.048H} - \underset{(0.114)}{0.123W} \qquad (17)$$

$$R^2 = 0.014, \; N = 472$$

And for Cycles 10 and 11:

$$I = 1.364 + \underset{(0.0057)^{**}}{0.015Y} - \underset{(0.102)^{**}}{0.324J} + \underset{(0.027)^{*}}{0.065H} - \underset{(0.087)}{0.149W} \qquad (18)$$

$$R^2 = 0.031, \; N = 878$$

Note that the signs of the coefficient estimates are the same in both equations (17) and (18), though only in the latter case are any significantly different from zero. Note also that, while not significant, the sign of $\hat{\beta}_4$ is as anticipated, and that the sign of the estimated coefficient of H may indicate the importance of the "ease of substitution" effect. The negative sign of the estimated coefficient of J may indicate <u>smaller</u> price changes in the Northeast, may indicate less elastic demand in this region of the country, or may indicate a lower saturation of electrical appliances, though the latter seems unlikely. Finally, the effect of income (Y) is positive as expected: higher income households do appear to practice conservation behavior more extensively, at least in the number of conservation measures undertaken. As pointed out above, this result may merely reflect the greater number of appliances owned by upper income groups, and therefore more opportunities to conserve.

In summary, whether or not we control for the ownership of appliances, the proportion reducing the use of a given appliance generally varies in a seemingly random fashion over income class and, for a given income class, varies erratically over different type of appliances. On the other hand, there does appear to be some positive association between income class and the number of conservation actions undertaken.

Conclusion

CNS data on the possession and use of automobiles; the size, quality, and indoor temperature of dwelling; and the possession of electrical appliances point to a positive relationship between total family income and consumption of the relevant fuel in the pre-crisis period. However, this conclusion may not be drawn unequivocally on the basis of our data alone.

Sets of questions dealing directly or indirectly with use of the automobile, as well as a series of questions concerning conservation behavior in the use of gasoline, heating fuel, and electricity, suggest a positive association of conservation with total family income. On a priori grounds alone, it seems unlikely that the positive association between conservation and income would be enough to reverse the presumed pre-crisis positive relationship between fuel consumption and income.

CHAPTER 3

PUBLIC REACTION TO YEAR ROUND DAYLIGHT SAVINGS TIME

Abstract

During the period from August 1973 to May 1974, the American public experienced three different schedules of Daylight Savings Time: summer Daylight Savings Time (through October); no Daylight Savings Time (November through December); and experimental Year Round Daylight Savings Time (January through May). Analyses of data collected about public reactions to these different schedules indicated three major findings: (1) a majority of the public preferred a DST plan with eight months on DST and four months off DST (November to February); (2) opposition to Year Round Daylight Savings Time was based primarily upon the concern for the safety of school children; and (3) reported energy savings during the experimental Daylight Savings Time period were minimal.

The Continuous National Survey collected data on public responses to Year Round Daylight Savings Time (YRDST) issues from August 31, 1973 to May 30, 1974 (Cycles 5 to 12).[1] These data include not only basic evaluative opinions, but also the various reasons reported to support such opinions, and the incidence of behavioral changes attributable to YRDST. In this chapter we will present the major findings of our analysis of Daylight Savings Time data with particular emphasis on the examination

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[1]This chapter contains analysis for only Cycles 5 through 11. Additional analysis of DST data for Cycles 5 through 12 appear in the Appendix, Section E, Policy Preferences.

of changes in public opinion over the eight-month interviewing period. The time trend analyses are particularly interesting, not only because we are able to discern shifts in attitudes associated with seasonal changes, but also because our data span three unique time periods with respect to DST: (1) from August through October 1973, during which time most of the country was on summer DST, (2) November through December 1973, when there was no DST, and (3) February through May 1974, a period in which experimental Year Round DST was in effect. To provide a broader context for examining the data on behaviors and attitudes relevant to YRDST issues--the main focus of this chapter--we begin with an historical perspective on the issue.

An Historical Perspective on Public Opinion Towards DST

Although the country has had summertime experience with DST since World War I, the first public opinion survey question about DST did not appear until May, 1937, when Gallup reported that 57 per cent of the public approved of DST. A similar figure (60 per cent) was reported from a survey conducted by Gallup in the spring of 1940. While the question wording does not specify the time referent, the context of the question suggests that the respondents were interpreting the question as referring to approval of DST only for the summer months. The spring 1940 survey, in fact, went on to ask about Year Round DST and reported that 40 per cent of the public were in favor of it.

Support for YRDST, at least as a wartime measure, hovered about the 50 per cent figure throughout the period of 1941-45, while the nation experienced wartime, but fell drastically at the end of the war. Only about 15 per cent of the population favored continuing YRDST after the conclusion of World War II. Note that prior to World War II, when no one had had actual experience with DST in the winter months, support for YRDST was nearly as high as it was during the war. The sharp drop in support for YRDST after the World War II experience suggests that the prospect of wintertime DST is more appealing than the experience of it. Wartime support appears to have been conditioned by the general spirit of sacrifice brought forth by the war effort. Indeed, the questions were phrased in terms of support for YRDST "as long as the war lasts." Once this appeal to the crisis situation was removed, support dropped to a low level.

One conclusion stands out from the analysis of the public opinion data from the late 1930's and the early 1940's. The breakdown of opinion by region and community size indicates much stronger support for DST in the East and East Central states and in large cities, with the regional differences probably reflecting the highly urban character of these states. Systematic public opinion data support the common belief that differences in opinion about DST in the past were largely a reflection of an urban-rural opinion split. Farmers and small town dwellers oppose DST, even in the summer, and city dwellers favor DST, perhaps even in winter, although this extension of the argument has not been seriously pursued in light of the low level of post-World War II support for YRDST. Data from state polls, such as the Minnesota and Texas polls, tend to support the view that DST is primarily an urban-rural issue. With the increasing urbanization of the country, it would not be surprising to find that general levels of support for DST have risen and that the gap between urban and rural opinions has narrowed.

By 1947, YRDST was a dead issue and survey organizations stopped asking about it. For the next quarter of a century, sporadic interest in bringing some order into the chaos of local option on summer DST awakened the interest of national and state pollsters and a few questions were asked. For most of the period, however, it was not an issue of high enough salience to warrant the interest of commercial polling agencies. Only with the advent of the energy crisis did public interest in YRDST increase.

Daily Behaviors and Preferences For Sunlight

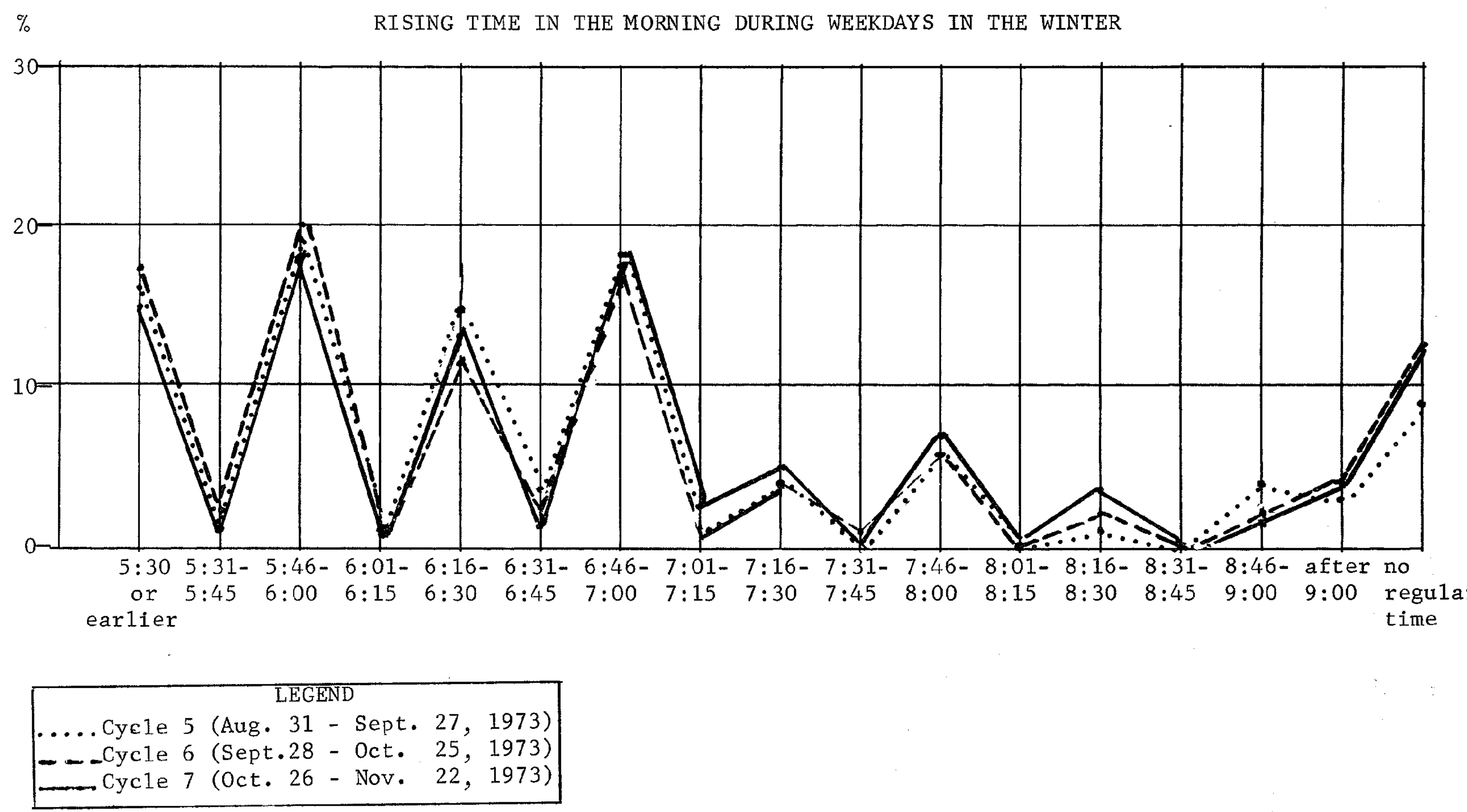
An adequate comprehension of the social impact of YRDST requires a knowledge of the extant behavioral patterns in this country that are most likely to be affected by changes in the designated hours of sunlight. Although there are several areas of ignorance in our understanding of the structure of YRDST-relevant behavioral events, we have collected data on three different daily activities that help explain general reactions to YRDST.

One activity measured was the time that respondents reported getting up on work day mornings during the winter. This behavior is undoubtedly related to personal attitudes toward YRDST, i.e., preference for light in the morning at or soon after rise-time; it is also significant in considerations of national energy (particularly electrical) conservation issues, i.e., minimal energy savings are to be expected if most persons are active at home before sunrise. Figure 3.1 illustrates the distributions of rise-time reported by respondents during the three-month interviewing period, August 31 - November 22, 1973.[2] Three findings are of importance: (1) 10 per cent of the sample reported not getting up at a regular time; (2) the dispersion and levels of percentages for the

[2]The sample sizes for various aggregations employed in the analysis of this chapter are as follows: Cycle 5: N = 644; Cycle 6: N = 631; Cycle 7: N = 688; Cycle 8: N = 700; Cycle 10: N = 696; Cycle 11 (for Tables 3.4, 3.13, and 3.14): N = 610; for all other tables and figures, Cycle 11: N = 249 (the sample size for the last two weeks of that cycle, March 29 - April 11, 1974). No data on YRDST issues were collected in Cycle 9.

Figure 3.1

RISING TIME IN THE MORNING DURING WEEKDAYS IN THE WINTER



categorized fifteen-minute time periods are almost identical across the three months; and (3) approximately 70 per cent of the sample reported a rise-time at or before 7:00 A.M. These findings suggest two salient characteristics of the early morning behavioral patterns of the country. First, most people get up at a regular time, and a large majority of the public rise before 7:00 A.M. Second, although these data are not longitudinal in character, their degree of stability across the three months (each month of data representing a mini-national probability sample) imply that rise-time is probably consistent throughout the year.

A second activity measured was the time that persons reported leaving home in the morning to go to work in the winter (Figure 3.2). Similar to the reports of rise-time, there is a strong consistency in the distributions of leave-home time across the three-month period. However, there is considerably more variation in leave-home time in comparison to the time people rise, and over 40 per cent of the sample reported no regular leave-home time. When juxtaposed to the rise-time distributions, perhaps the most significant aspect of the leave-home time findings is that over 50 per cent of the sample leave home around 8:00 A.M.[3] This result, in conjunction with the rise-time data, has two implications for the analysis of YRDST from the perspective of potential energy savings: (1) a large majority of the working population are active in the morning at home for at least an hour (from 7:00 A.M. to 8:00 A.M.), and, therefore, early morning household energy consumption within this segment of the population is directly associated with the amount of sunlight during this hour of

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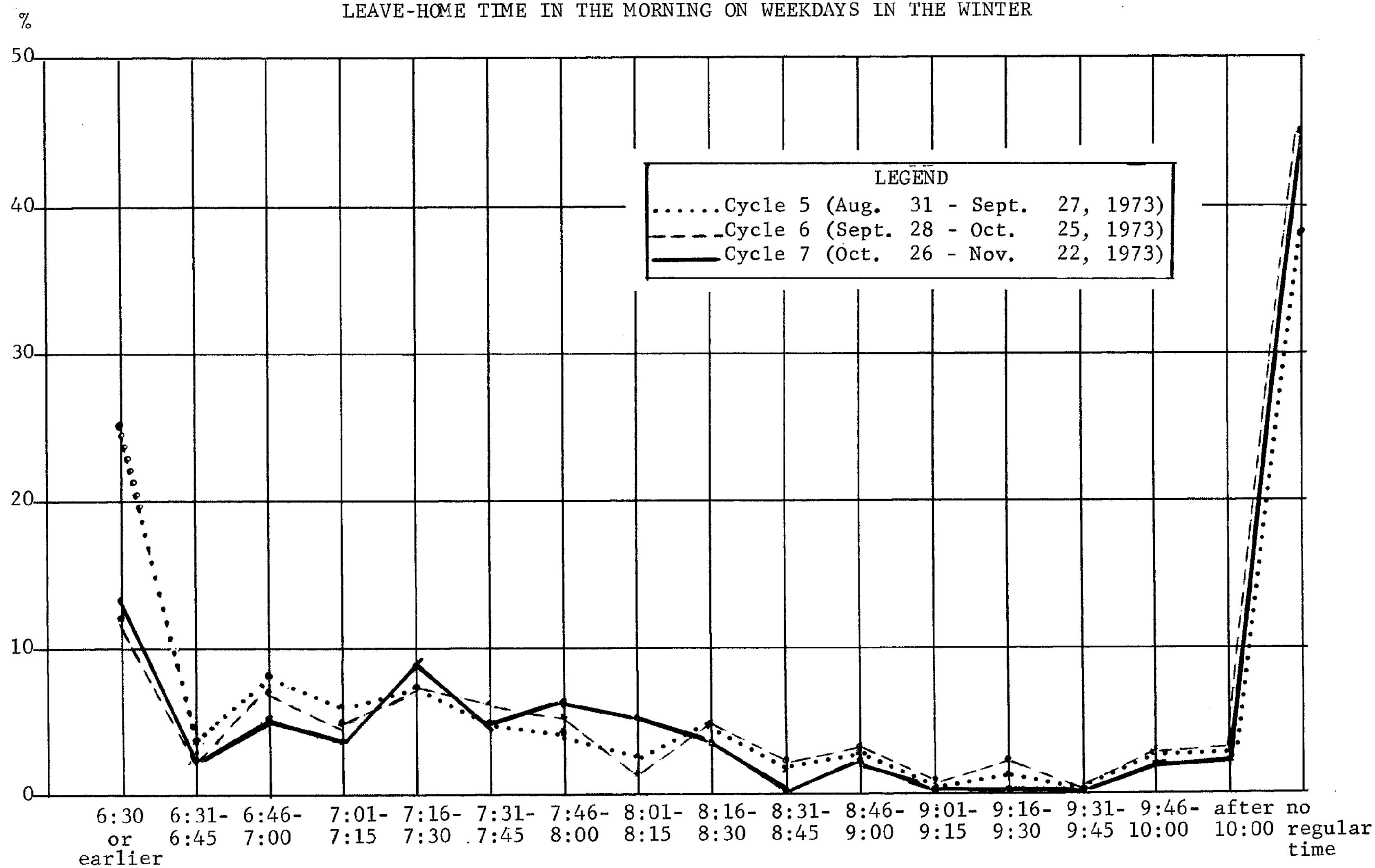
[3] If it is assumed that the distribution of average leave-home time for those respondents who report no regular time is uniform across the reported regular leave-home time categories, then over <u>73 per cent</u> of the working population leave home before 8:00 A.M.

Figure 3.2

LEAVE-HOME TIME IN THE MORNING ON WEEKDAYS IN THE WINTER



activity; and (2) early morning household energy consumption by the non-working population is highly related to the amount of time between 7:00 A.M. and sunrise.

A third behavioral activity measured was the time respondents come home from work. The relationship between this time and potential energy savings from YRDST is not as straightforward as the associations explicated above between rise-time, leave-home time, and the time of sunrise. The following two diagrams schematize the major alternative sequences of events in the evening for the working population.[4]

	A		B		C
(1)	Come home from work	→	Indoor activities at home	→	Go to bed

	A		B		C		D
(2)	Come home from work	→	Outdoor activities (e.g. recreation)	→	Indoor activities at home	→	Go to bed

Theoretically, if sunset occurs after point "A" in either chain of events, decreased household energy consumption (e.g., electrical heating and lighting) could occur. At the same time, the incidence of outdoor activities may increase with concomitant increments in gasoline consumption if motor vehicles are used. Hence, calculation of the difference between home-from-work time and the time of sunset is crucial in the estimation of potential energy savings from YRDST.

Figure 3.3 gives the reports of what time respondents arrived home from work. Similar to the other data described above, the distributions for home-from-work time are almost identical across the three-month

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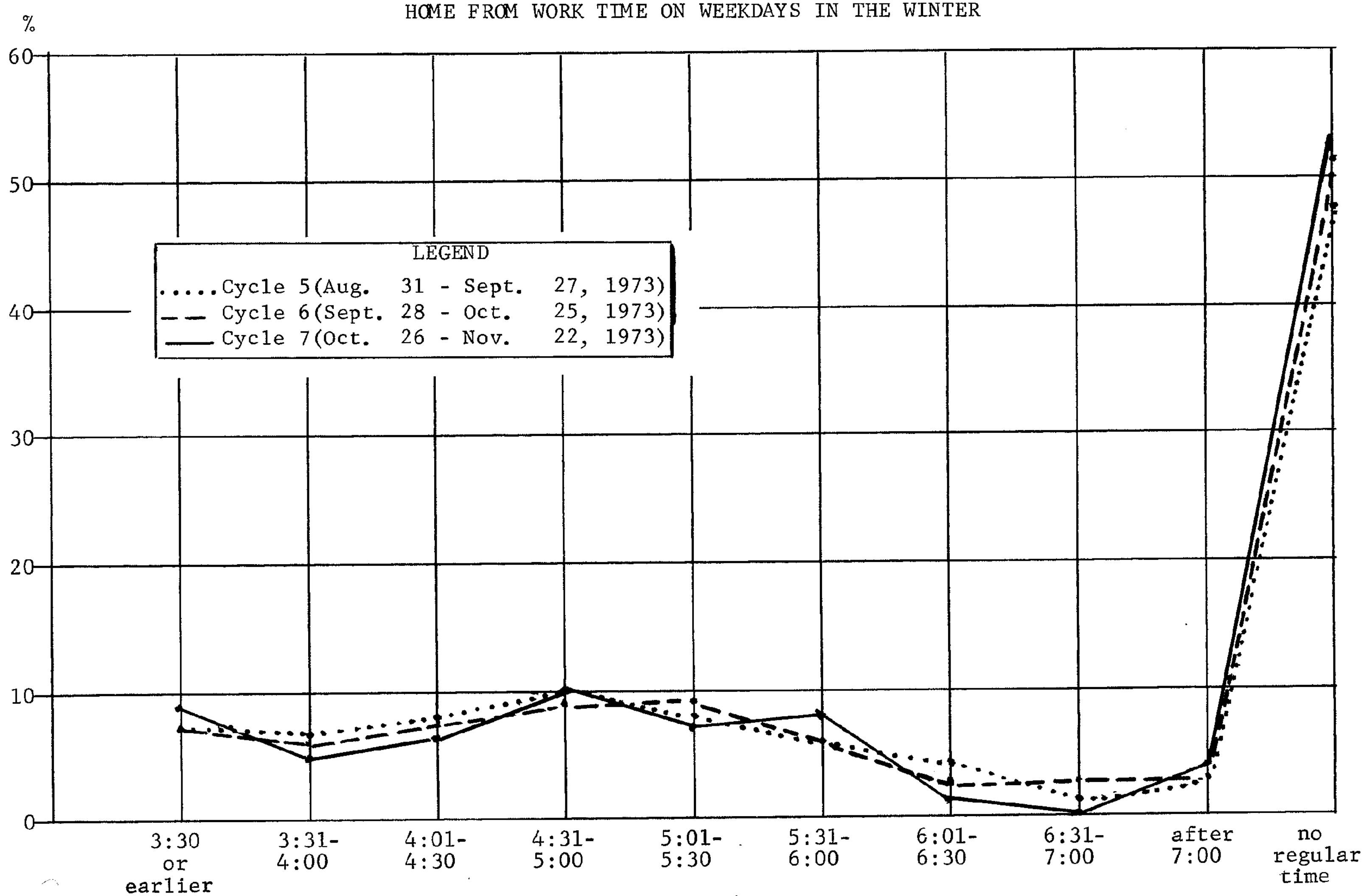
[4] Obviously, events B through C in (1) and B through D in (2) are also generalizable to the non-working population.

Figure 3.3

HOME FROM WORK TIME ON WEEKDAYS IN THE WINTER



interviewing period. Although the range of times is from 3:30 P.M. to 7:00 P.M., most of the working population reported that they are home from work before 6:00 P.M. Although we do not have information on either sunset time or the time at which respondents usually go to bed, data from the National Time Budget 1965-1966[5] suggest that the average amount of time spent sleeping in this country is eight hours. Utilizing these data together with our findings about rise-time, a good estimate of when most people go to bed would be 11:00 P.M. It can then be inferred that the amount of sunlight between 6:00 P.M. and 11:00 P.M. will be one important factor in determining actual energy savings from YRDST. A second factor, mentioned previously, is the extent to which the public engages in fuel-consuming activities because of the extra hour of sunlight in the evening.

Complementing the information on schedules of daily behavioral events, we also collected data on preferences for the relationship between sunlight and clock-time. Table 3.1 presents the results of a comparison between preferences for light in the the morning or light in the evening. The trend of percentages through August - November, 1973, indicates that respondents value light in the evening more than morning-light. This finding is probably due to the fact that during these months, sunrise occurs before most of the public's rise-time or leave-home time. The amount of evening-light experienced during the summer, however, rapidly decreases during this period. The significant increase in the

[5] See John D. Robinson and Phillip E. Converse, "66 Basic Tables of Time-Budget Data for the United States." Ann Arbor, Michigan: Survey Research Center, Institute for Social Research, University of Michigan, 1966.

TABLE 3.1

PREFERENCES FOR SUNLIGHT[a]

(Per Cent)

Response Category	Cycles and Dates			
	5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	11:3/29-4/11
Light in the morning when I want	39	36	31	43
Dark in the evening when I want	62	65	69	57

[a]The question was worded as follows: "Which is more important to you, to have it get light in the morning when you want, or to have it get dark in the evening when you want?"

per cent of respondents in March and April, 1974, who indicate that morning light is more important can be attributed to the occurrence of rise-times and leave-home times before sunrise during these months and also to the widespread concern for the safety of school children.

Two other types of preferences were also measured, "What time in the morning would you like it to get light outside during the winter?" and "What time in the evening would you like it to become dark outside during the winter?" The distribution of responses to these two questions are presented in Figures 3.4 and 3.5, respectively. The distribution of preferred time in the morning is very similar across the three months, and as would be expected from the rise-time data, over 87 per cent of the sample indicated at or before 7:00 A.M. as the most desirable time for sunrise. The distributions of preferred time in the evening have more variation between the three months and more dispersion within each month than the preferred morning time distributions. Generally, a majority of the sample prefer darkness between 6:30 P.M. and 8:00 P.M. When compared with the home-from-work data, these findings suggest that the

Figure 3.4

WHAT TIME IN THE MORNING WOULD YOU LIKE IT TO GET LIGHT OUTSIDE DURING THE WINTER?

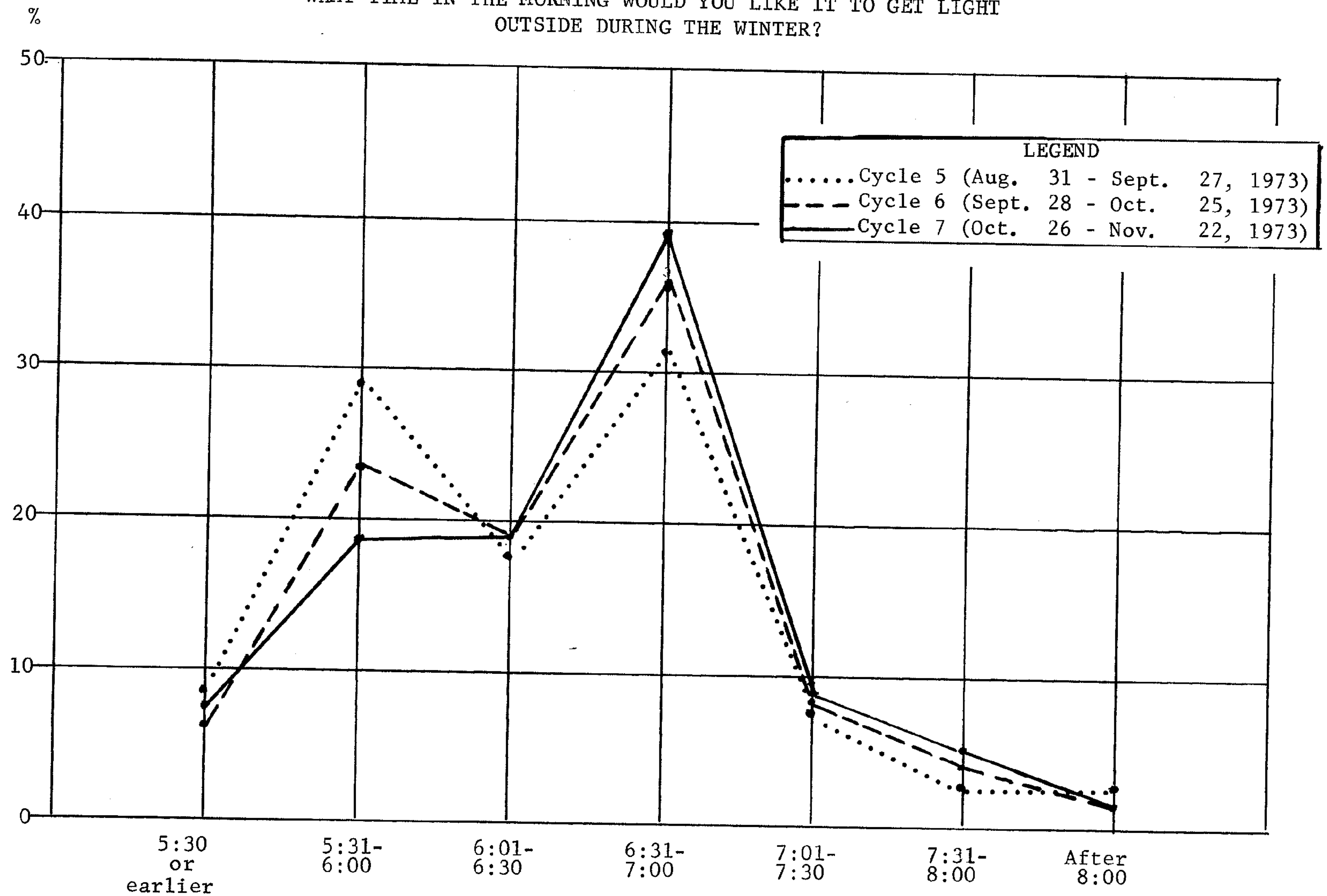
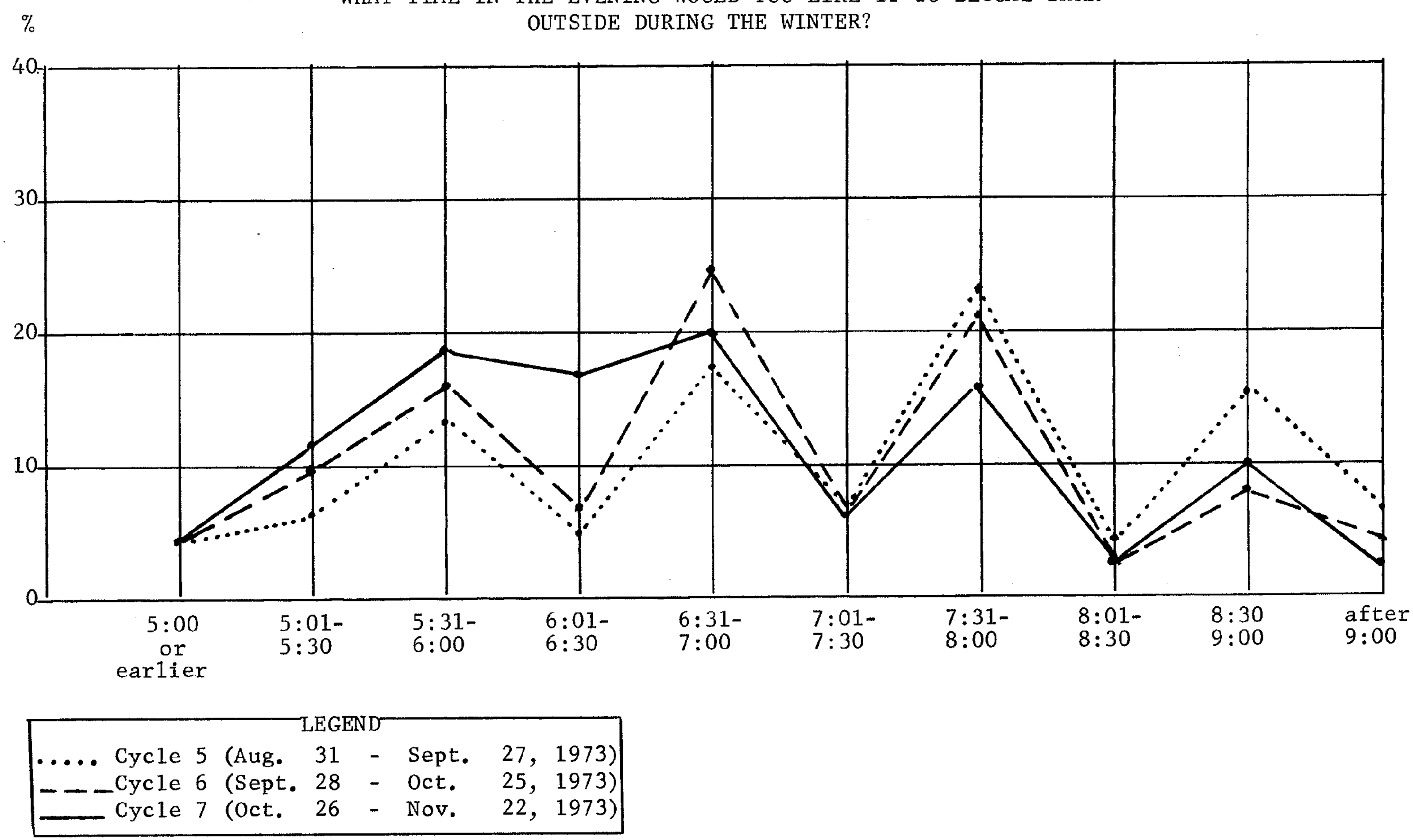


Figure 3.5

WHAT TIME IN THE EVENING WOULD YOU LIKE IT TO BECOME DARK OUTSIDE DURING THE WINTER?



public prefer between half an hour and an hour and a half of sunlight in the winter after coming home from work. It is most probable, however, that this amount would increase significantly during the summer months when the warmer weather would allow greater opportunities for outdoor recreation.

Basic Evaluations of Year Round Daylight Savings Time

Our analysis of public evaluations of YRDST from August 1973 through April 1974 is complicated by three factors. First, as mentioned previously, the public experienced three types of sunlight schedules during this eight-month period: summer DST, no DST, and the experimental YRDST. Second, there were seasonal changes, and therefore significant variation in the actual amount of sunlight across the interviewing period. Third, there were four changes in the wording of questions that were employed to assess the basic evaluative opinions about YRDST. Therefore, any inferences drawn from our data about the structure of public attitudes toward YRDST during this period must necessarily include the possible effects of these three factors.

Table 3.2 shows the percentage of respondents who approved or disapproved of remaining on DST all year round. In the August through November 1973 interviewing period, four findings are particularly important: (1) The pattern of percentages for the "approve," "disapprove," and "don't care" categories are almost identical for the first two months, when most of the country was experiencing summer DST. (2) In the period after summer DST, however (which terminated on October 28), there was a significant increase (from 50 per cent to 60 per cent) in the percentage who approved remaining on DST for the whole year. (3) The percentage of those who disapproved decreased from an average of 25 per cent to 15 per

TABLE 3.2

APPROVE VS. DISAPPROVE OF YEAR ROUND DAYLIGHT SAVINGS TIME[a]

(Per Cent)

Response	Cycles and Dates				
	5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	10[b]:2/1-2/28	11:3/29 4/11
Before Legislation:					
Approve	50	47	60	--	--
Disapprove	25	26	15	--	--
Don't care	23	23	23	--	--
Don't know	3	4	3	--	--
After Legislation:					
Approve	--	--	--	37	45
Disapprove	--	--	--	47	37
Don't care	--	--	--	16	16
Don't know	--	--	--	1	2

[a]The questions were worded as follows:

Before Legislation--"Some people think that we should have Daylight Savings Time all year round, that is, not turning the clocks back an hour at the end of October. Would you approve or disapprove of remaining on Daylight Savings Time all year round, or don't you care one way or the other?"

After Legislation--"As you know, the United States Congress put our country back onto Daylight Savings Time this winter as part of a two-year experiment to try to save energy. Some people think that we should continue to have Daylight Savings Time all year round, that is, not turn the clocks back at the end of next October. Would you approve or disapprove of remaining on Daylight Savings Time all year round next year, or don't you care one way or the other?"

[b]The "approve/disapprove" question about YRDST was not asked in February 1974 (Cycle 10). Although the "like/dislike" and "approve/disapprove" dimensions appear to be very similar (note the degree of association in the table presented below), it was desirable to estimate percentages that would be comparable to data collected in previous cycles. The estimates of these percentages were obtained through a matrix multiplication of the vector of Cycle 10 results in Table 3.4 and the table presented below. The assumption that allows for this estimation procedure is that the relationship between "like" and "approve" is the same for the Cycle 10 sample as that obtained empirically in the Cycle 11 sample.

Response	Approve	Disapprove	Don't Care	Don't Know
Like very much . . .	86	6	5	4
Like somewhat . . .	42	30	28	0
Dislike somewhat . .	12	70	16	2
Dislike very much .	10	83	8	0
Don't care	34	10	49	7

cent. (4) The percentages who answered "don't care," however, remained stable at a level of 23 per cent. This pattern of increasing support for YRDST when the country shifted back to Standard Time is probably not directly associated with experiences of YRDST, since the last period in which YRDST existed was during World War II. Instead, it reflects a general attitude about the personal advantages (e.g., opportunities for recreation) of the extra hour of sunlight in the evening and a minimal concern about the disadvantages of an extra hour of darkness in the morning.

The percentage who preferred Year Round DST instead of summer DST increased to a level of almost 80 per cent in November and December of 1973 (Table 3.3). This result suggests not only that an overwhelming majority of the public were sensitized to a decreasing amount of sunlight in the evening, but also reflects the fact that the fuel shortages became widespread during this period. Hence, proposed legislation that had the potential to mitigate the effects of such shortages would obviously receive strong public approval.

TABLE 3.3

PREFER YEAR ROUND DAYLIGHT SAVINGS TIME[a]

Response Category	11/23-12/20, 1973
	Per Cent
Yes	79
No	21

[a]The question was worded as follows: "As you know, we recently switched from Daylight Savings Time to Standard Time. That means that it now gets light an hour earlier in the morning than before we switched over. It also means that it now gets dark an hour earlier in the evening than before we switched over. Would you prefer to be on Daylight Savings Time all year round instead of just being on it for part of the year?"

The estimated percentages for February 1974, one month after the institution of two-year experimental YRDST, indicate a 23 per cent decrease in those who approved YRDST, a three-fold increase (15 per cent to 47 per cent) in the percentage who disapproved of YRDST, and a significant decrease (23 per cent to 16 per cent) in the percentage of those who reported that they "don't care." The reasons for this dramatic shift in opinions toward YRDST will be discussed in the following section. It is sufficient to note here that a general lack in the belief of YRDST as actually saving energy, and concern for the safety of school children are the two most important factors in causing this observed change in support for YRDST.

During March and April of 1974 there was an increase (37 per cent to 45 per cent) in the percentage who approved of YRDST to a level comparable with attitudes of the September and October, 1973 sample. There was also a significant decrease from February to March and April, 1974, in the percentages who disapproved of YRDST (47 per cent to 37 per cent). The results of the "like or dislike YRDST now" question (Table 3.4) asked in these months also indicate a similar general increase in support of YRDST. Note, however, that the level of disapproval is approximately 10 percentage points above the September and October percentage who disapproved. Similar to the February respondents, 16 per cent of the March and April sample reported that they "don't care." This change in approval of YRDST during the March and April interviewing period probably reflects the decrease in the amount of darkness in the early morning at that time. The similarity of the percentages approving YRDST in the September/October and March/April sample may reflect the fact that the amount and pattern

TABLE 3.4

LIKE OR DISLIKE YRDST[a]

(Per Cent)

Response Category	Cycle and Dates	
	10:2/1-2/28	11:3/15-4/11
Like it very much	24	33
Like it somewhat	18	21
Dislike it somewhat	20	17
Dislike it very much	30	21
Don't care	9	9

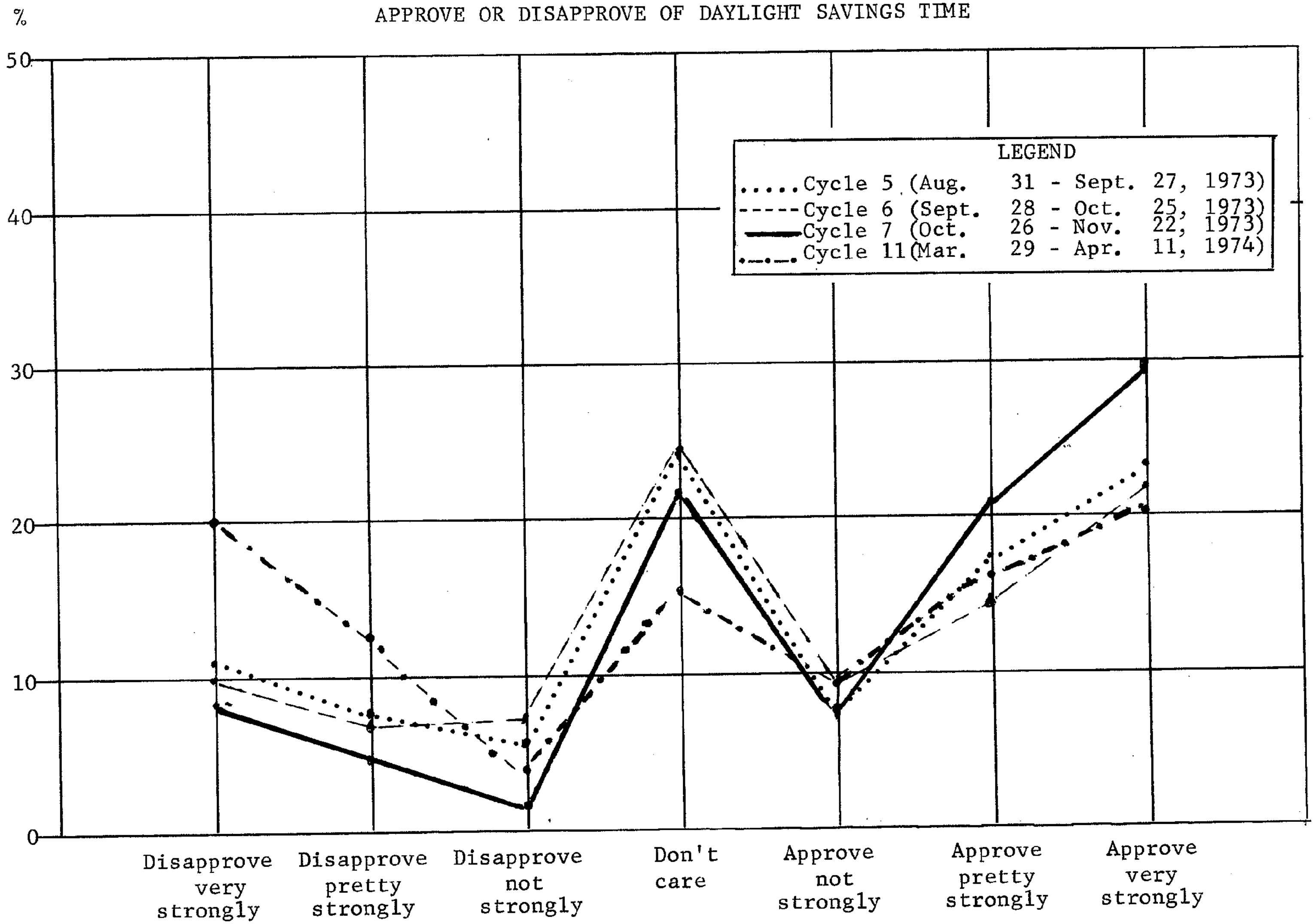
[a]The question was worded as follows: "As you know, we recently switched from Standard Time to Daylight Savings Time. That means that it it now gets light an hour later in the morning than before we switched over. It also means that it now gets dark an hour later in the evening than before we switched over. How do you feel about being on Daylight Savings Time now? Would you say that you like it very much, like it somewhat, dislike it somewhat, or dislike it very much?"

of sunlight is almost identical for these two time periods. The discrepancies in percentages who "don't care" or "disapprove" between these periods can be attributed to the widespread publicity of the experimental YRDST plan, and specifically its hypothesized adverse effects upon the safety of school children.

Findings from the data about the strength of the approval and disapproval attitudes reported above are presented in Figure 3.6. The distributions of results for each of the three months during the period of August through November are very similar: within both the disapprove and approve groups, there is a positive linear increase in the percentages along the continuum from weak to strong opinions. Note, however, that the

Figure 3.6

APPROVE OR DISAPPROVE OF DAYLIGHT SAVINGS TIME



slope of the approve line is much greater than the disapprove line; i.e., in general, opinions of approval are much stronger than opinions of disapproval. In the March and April interviewing period, the total percentage who approved of YRDST is also greater than the percentage who disapproved. The distributions within the two groups, however, are almost identical, i.e., there is a large linear increase in percentages from the weak to strong opinions. It should be noted not only that the percentage of disapproval has increased from August/November to March/April, but also that the strength of this nonsupportive attitude is greater than earlier pre-YRDST disapproval.

A central issue in the analysis of public opinion about YRDST is the amount and direction of the change in evaluations before and after experimental YRDST was instituted. Although the data reviewed above indicate shifts in attitudes at a national level, these are not panel data and hence do not yield information about changes in opinions at the individual level. The results of an attempt to assess the before and after structures of individual opinions toward YRDST are presented in Table 3.5. Unfortunately, the distributions of "retrospective feelings" are quite discrepant from the attitudes actually measured in December 1973 (See Table 3.3). In fact, the percentages of retrospective feelings are very similar to the approve-disapprove percentages (Table 3.2) of the same interviewing period (Cycle 11), and hence probably reflect only current attitudes about YRDST.

In summary, there appeared to be increasing support for YRDST from August through December 1973, but in February through April 1974, after YRDST had been instituted, disapproval of YRDST significantly increased. Recall, however, that in the March/April period there was a noticeable

TABLE 3.5

RETROSPECTIVE FEELINGS ABOUT DST REPORTED IN MARCH 29-APRIL 11, 1974[a]

(Per Cent)

Variable	Response			
	In Favor	Against	Didn't Care	Don't Remember
Favor YRDST, December 1973 vs. approve YRDST now:				
Approve	80	13	33	29
Disapprove	12	76	5	29
Don't care	6	10	56	14
Don't know	1	1	6	29
Before YRDST	42	40	17	1

[a]The questions were worded as follows:

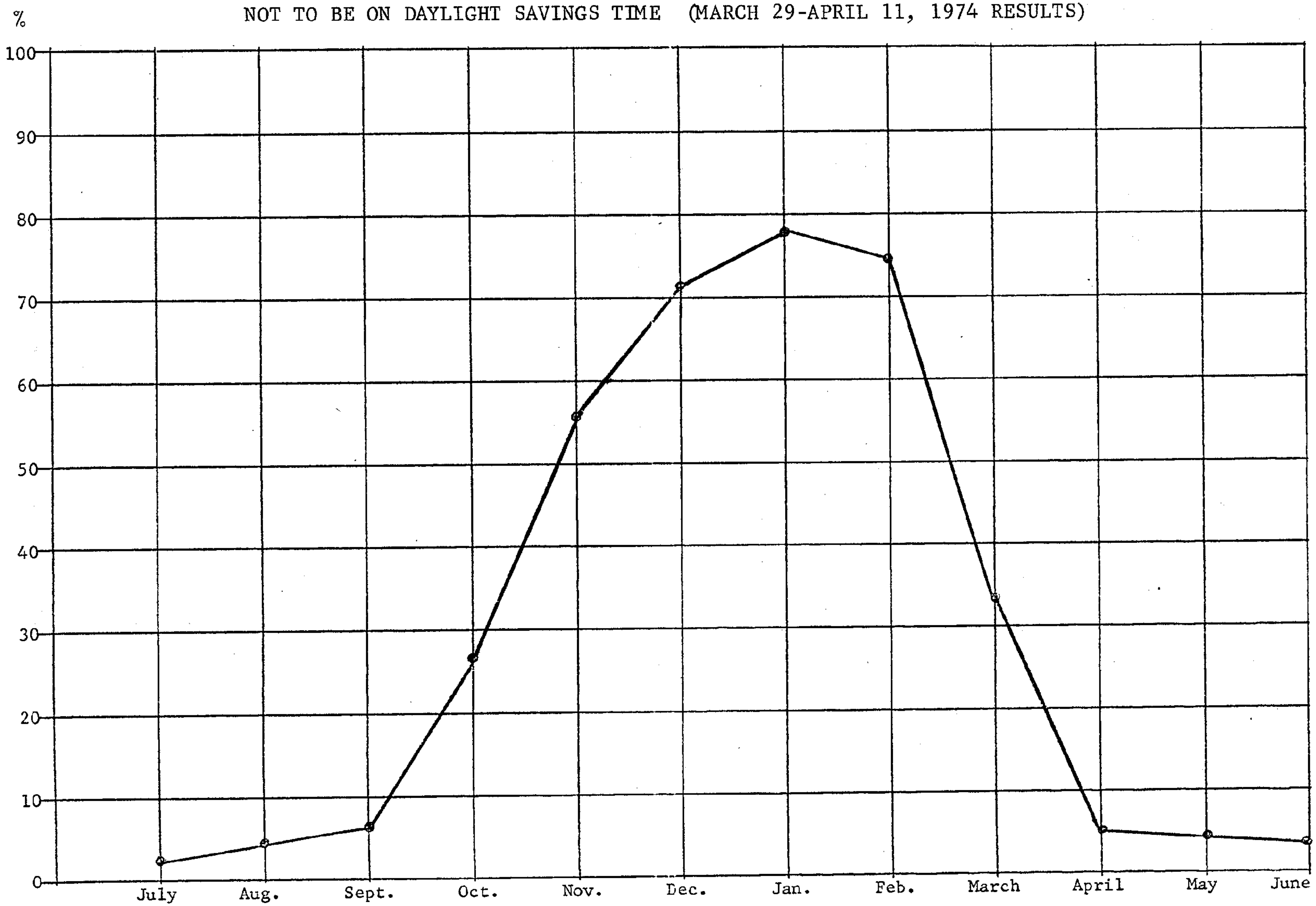
Before YRDST--"Last December--that is, December 1973--before we went back onto Daylight Savings Time--were you in favor of or against going back onto Daylight Savings Time for the remaining winter months?"

Favor YRDST, December 1973 vs. approve YRDST now--"As you know, the United States Congress put our country back onto Daylight Savings Time this winter as part of a two-year experiment to try to save energy. Some people think that we should continue to have Daylight Savings Time all year round, that is, not turn the clocks back at the end of next October. Would you approve or disapprove of remaining on Daylight Savings Time all year round next year, or don't you care one way or the other?"

trend toward increased approval of YRDST. Taken together, these findings suggest that the public would favor an increase in the traditional six-month period of summer DST but disapprove of twelve months of DST. To test this hypothesis, data was collected during the March/April interviewing period about specific months for which respondents disapprove of DST (Figure 3.7). The significance of these results is that a majority of the sample disapprove of DST only during the four-month period from November through February. On the basis of these data, then, the plan that would be most favorably accepted by the majority of the public is an eight-month period of DST extending from March through October.

Figure 3.7

IF DISAPPROVE OF YEAR ROUND DAYLIGHT SAVINGS TIME WHAT MONTHS WOULD YOU PREFER NOT TO BE ON DAYLIGHT SAVINGS TIME (MARCH 29-APRIL 11, 1974 RESULTS)



Reasons Given for Liking or Disliking YRDST And How YRDST Helps the Country

Table 3.6 presents the results of the ways in which respondents reported liking YRDST. The percentages from August through November are relatively stable, and interestingly, there is no single reason endorsed by more than 25 per cent of the sample. The primary reason cited for liking YRDST is that it permits extra social and recreational activity (23 per cent). The only other reasons given by at least 15 per cent of the sample are "I have light when I need it" (21 per cent), and "makes travel easier in the evening" (16 per cent).

The results for the March/April interview period show a significant increase (to 39 per cent) in the percentage of respondents who like YRDST because of the availability of light when needed. The second most frequent reason given was that YRDST changes the hours schools are open (21 per cent)--presumably, some parents prefer the later starting times of schools due to YRDST. "Permits extra social and recreational activity" was mentioned by 16 per cent of the March/April sample. This decrease in the percentage who reported the social-recreational reason when compared to the August - November data is probably due to the difference in weather and therefore in opportunities for such activities between these two periods.

The ways in which respondents reported disliking YRDST are presented in Table 3.7. During the three-month period of August - November, there were decreases in the reports of all reasons cited for disliking YRDST. Note particularly the significant increase in the percentage who stated that "There is nothing I do not like about it" (from 41 per cent to 58 per cent).

TABLE 3.6

WAYS RESPONDENTS REPORT LIKING YRDST[a]

(Per Cent)

Response	Cycles and Dates			
	5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	11:3/29 4/11
Before Legislation:				
Makes travel easier in the evening	19	14	15	--
Improves my ability to perform work activities	9	6	9	--
Helps my business	3	2	1	--
I have more useful free time with family .	17	11	13	--
Permits extra social and recreational activity	23	20	25	--
I/Family member(s) feel safer on streets in the evening	14	6	8	--
Prevents having to change clocks twice a year	18	15	12	--
Saves on (fuel/lighting/energy)	12	7	16	--
I have light when I need it	19	22	22	--
Increases the amount of time for outdoor play for children	--	--	--	--
Changes the hours schools are open	--	--	--	--
I would not like it in any way	16	14	11	--
Other	15	12	17	--
After Legislation:				
Makes travel easier in the evening	--	--	--	9
Improves my ability to perform work activities	--	--	--	7
Helps my business	--	--	--	1
I have more useful free time with family .	--	--	--	13
Permits extra social and recreational activity	--	--	--	16
I/Family member(s) feel safer on streets in the evening	--	--	--	5
Prevents having to change clocks twice a year	--	--	--	6
Saves on (fuel/lighting/energy)	--	--	--	7
I have light when I need it	--	--	--	39
Increases the amount of time for outdoor play for children	--	--	--	13
Changes the hours schools are open	--	--	--	21
I would not like it in any way	--	--	--	--
Other	--	--	--	9

[a]The questions were worded as follows:

Before Legislation: "If we had Daylight Savings Time all year round, in what ways would you like it?"

After Legislation: "Now that we have Daylight Savings Time all year round, in what ways do you like it?"

TABLE 3.7

WAYS RESPONDENTS REPORT DISLIKING YRDST[a]

(Per Cent)

Response	Cycles and Dates			
	5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	11:3/29 4/11
Before Legislation:				
Children have to go to school in the dark	17	13	10	--
I get up in the dark	22	17	12	--
I/Family member(s) feel less safe on the streets in the morning	5	3	0	--
Causes a delay in time when I could start work in the morning	4	2	1	--
Hurts my business	1	1	0	--
Makes travel harder in the morning . . .	6	4	3	--
Mixes up my schedule	6	4	4	--
Religious reasons	1	1	0	--
There is nothing I do not like about it.	41	41	58	--
Other	10	12	11	--
Hurts my performance on the job	--	--	--	--
Changes the hours schools are open . . .	--	--	--	--
After Legislation:				
Children have to go to school in the dark	--	--	--	38
I get up in the dark	--	--	--	22
I/Family member(s) feel less safe on the streets in the morning	--	--	--	5
Causes a delay in time when I could start work in the morning	--	--	--	5
Hurts my business	--	--	--	0
Makes travel harder in the morning . . .	--	--	--	7
Mixes up my schedule	--	--	--	5
Religious reasons	--	--	--	1
There is nothing I do not like about it.	--	--	--	2
Other	--	--	--	0
Hurts my performance on the job	--	--	--	12
Changes the hours schools are open . . .	--	--	--	39

[a]The questions were worded as follows:

Before Legislation: "If we had Daylight Savings Time all year round, in what ways would you not like it?"

After Legislation: "Now that we have Daylight Savings Time all year round, in what ways do you not like it?"

In dramatic contrast to the findings for this period, the results from March/April show that the public had some definite dislikes for YRDST--only 2 per cent reported "there is nothing I do not like about YRDST." Although the percentage reporting each reason for disliking YRDST increased in the March/April sample, the most significant change was the almost four-fold increase (10 per cent to 38 per cent) in the percentage who disliked YRDST because "children have to go to school in the dark." The other most frequently mentioned reason for disliking YRDST was that it "changes the hours schools are open" (39 per cent). The issues of increased public concern about the safety of school children will be discussed in the next section.

Table 3.8 displays the ways in which respondents thought that life in this country would be helped by having Year Round Daylight Savings Time. The most significant change in the levels of percentages in the August - November cycles is an increase (from 13 per cent to 40 per cent) during the October/November period in the number who think that YRDST saves electricity. This increase is undoubtedly due to the highly publicized statements from government officials during that time about the potential energy savings, particularly electricity, from YRDST.

The March/April results demonstrate three substantial changes in the distribution of percentages reporting reasons why YRDST helps the country. First, only 1 per cent thought that YRDST "does not help life in this country at all." Second, there is a considerable decrease (40 per cent to 5 per cent) in the percentage who thought that YRDST helps save electricity. Third, 46 per cent reported that YRDST helps the country because it "increases opportunities for social and recreational activities"--note that only 12 per cent mentioned this reason in October/November.

TABLE 3.8

REPORTS OF HOW YRDST HELPS THE COUNTRY[a]

(Per Cent)

Response	Cycles and Dates			
	5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	11:3/29-4/11
Before Legislation:				
Improves highway safety, less accidents	17	9	9	--
Saves electricity	19	13	40	--
Improves business	7	5	3	--
Makes trips from work faster and easier	9	3	2	--
Increases opportunities for social and recreational activities	21	17	12	--
I/We have lights when we need it	14	13	11	--
Other	18	19	19	--
Does not help life in this country at all	24	27	17	--
Saves gasoline	--	--	--	--
Saves heating fuel	--	--	--	--
Saves (energy/fuel) (unspecified as to type of energy or fuel)	--	--	--	--
Increases the amount of time for outdoor play for children	--	--	--	--
Changes the hours schools are open	--	--	--	--
Reduces crime	--	--	--	--
After Legislation:				
Improves highway safety, less accidents	--	--	--	16
Saves electricity	--	--	--	5
Improves business	--	--	--	7
Makes trips from work faster and easier	--	--	--	6
Increases opportunities for social and recreational activities	--	--	--	46
I/We have lights when we need it	--	--	--	15
Other	--	--	--	8
Does not help life in this country at all	--	--	--	1
Saves gasoline	--	--	--	0
Saves heating fuel	--	--	--	3
Saves (energy/fuel) (unspecified as to type of energy or fuel)	--	--	--	3
Increases the amount of time for outdoor play for children	--	--	--	1
Changes the hours schools are open	--	--	--	3
Reduces crime	--	--	--	14

[a]The questions were worded as follows:

Before Legislation: "What about the country as a whole? In what ways do you think life in this country might be helped if we had Daylight Savings Time all year round?"

After Legislation: "What about the country as a whole? In what ways do you think life in this country is helped by having Daylight Savings Time all year round?"

Table 3.9 presents the ways in which respondents thought that YRDST would not be good for life in this country. The results for August through November are very similar to the results for disliking YRDST in this same period (cf. Table 3.7); that is, there is a general linear decrease in reports of reasons why YRDST is bad for the country, and, by the October/November cycle, 52 per cent reported that YRDST "is not bad in any way for life in this country." There is also a parallel in the findings for March/April between personal dislikes for YRDST and the ways in which YRDST is bad for the country. By Cycle 11, only 6 per cent thought that YRDST "is not bad in any way for life in this country," and there is over a sevenfold increase (7 per cent to 50 per cent) in the percentage who thought that YRDST was bad for the country because "children have to go to school in the dark." It is interesting that any possible detrimental effects of YRDST upon farmers is of minimal concern to the majority of the American public.

In summary, the personal reasons cited for liking or disliking YRDST and the reports of ways in which YRDST is good or bad for the country are focused upon three issues: (1) opportunities for social-recreational activities, (2) energy savings, and (3) perhaps most important, the safety of school children. Increased opportunities for social-recreational activities were reported by a significant segment of the sample, before and after experimental YRDST began, as a personal and national benefit of YRDST. Savings of electricity were reported as a major advantage of YRDST for the country in August through November; after YRDST was instituted, however, very few respondents perceived actual electrical savings attributable to YRDST. The most significant dimension of change

TABLE 3.9

REPORTS OF HOW YRDST IS BAD FOR THE COUNTRY[a]

(Per Cent)

Response	Cycles and Dates 5:8/31-9/27	6:9/28-10/25	7:10/26-11/22	11:3/29-4/11
Before Legislation:				
Hurts farmers	10	7	8	--
Is bad for people who have to get up early	13	10	7	--
Children have to go to school in the dark	18	11	7	--
There are more accidents in the morning	6	4	2	--
Makes driving more dangerous in the morning	6	5	3	--
Hurts business	2	1	1	--
People have to change their way of living	7	4	3	--
Change is bad (unspecified)	3	2	1	--
Other	7	8	11	--
Is not bad in any way for life in this country	38	41	52	--
Changes the hours schools are open	--	--	--	--
After Legislation:				
Hurts farmers	--	--	--	10
Is bad for people who have to get up early	--	--	--	14
Children have to go to school in the dark	--	--	--	50
There are more accidents in the morning	--	--	--	9
Makes driving more dangerous in the morning	--	--	--	7
Hurts business	--	--	--	2
People have to change their way of living	--	--	--	5
Change is bad (unspecified)	--	--	--	13
Other	--	--	--	31
Is not bad in any way for life in this country	--	--	--	6
Changes the hours schools are open	--	--	--	0

[a]The questions were worded as follows:

Before Legislation: "In what ways do you think going onto Daylight Savings Time all year round might not be good for life in this country?"

After Legislation: "In what ways do you think going onto Daylight Savings Time all year round is not good for life in this country?"

in public opinion during these months was the concern for the safety of school children. Only a small percentage of the sample interviewed before YRDST reported this reason for disliking YRDST or suggested that this was a major negative effect of YRDST upon the country. By the March/April interviewing period, however, a substantial plurality reported that their major reason for disliking YRDST was its effect on the safety of school children.

Safety of School Children and YRDST

In January and February, 1974, the first two months during which the American public experienced the experimental two-year YRDST plan, there were some highly publicized reports in the media about accidents involving children on their way to school in the morning. Although statistics reported by the Federal Highway Administration suggest that there was an actual decrease in such accidents during winter of 1973-1974 when compared with the winter of 1972-1973, several prominent citizens, high level politicians, and local educators voiced opinions that these accidents were caused by the extra hour of darkness in the morning due to the commencement of YRDST. The results reviewed in the previous section point to the centrality of this issue in the public's evaluation of the advantages and disadvantages of YRDST. There are at least three important questions with respect to this issue: (1) How many persons were aware of such _actual_ YRDST-related problems in their community? (2) What percentage of the public thought that these accidents involving school children were caused by YRDST? (3) Did this concern for school children's safety determine the public's stance toward remaining on YRDST?

These three questions were asked during the March/April interviewing period; Table 3.10 presents the findings. Only 19 per cent of the respondents reported problems in their community for children getting to school safely in the morning. Ninety-eight per cent of this small segment of the sample thought that YRDST was the causal factor in the occurrence of these problems. It is noteworthy that although less than one-fifth of the March/April sample reported direct knowledge of YRDST-related problems with the safety of school children in their community, a large majority (71 per cent) of the sample felt that the early morning accidents involving school children were caused by the extra hour of darkness. Hence, the underlying dynamics of such attitudes seem to be based on diffuse impressions ("It's not happening here, but I know it must be happening elsewhere.") from such distant secondary sources as the national media.

The importance of this public concern for the safety of school children is also demonstrated by the finding that over half of the respondents (56 per cent) think that YRDST should be terminated because of its possible adverse effects upon school children's safety in the morning (Table 3.10). Moreover, this factor appears to be the major determinant in reports of dislike of YRDST (Table 3.11). It is also noteworthy that 51 per cent of those respondents who reported "liking YRDST somewhat" thought that the country should go off YRDST the following winter because of the safety of school children.

Reports of Behavioral Changes Due to YRDST

Reports of changes in behaviors due to YRDST are important from at least two perspectives: (1) the degree to which behaviors are associated with attitudes about YRDST (e.g., does the concern for the safety of

TABLE 3.10

ACCIDENTS INVOLVING SCHOOL CHILDREN AND YRDST

(Per Cent)

Question	3/29-4/11, 1974
As far as you know, have children in <u>your</u> community been having any extra problems this winter getting to school safely in the morning?	
Yes	19
No	70
Don't know	11
<u>IF YES</u>: Do you think these extra problems were because of the additional hours of darkness in the morning?	
Yes	98
No	2
There have been some accidents involving children on their way to school this winter. Some people think that such accidents were caused by the extra hour of darkness in the morning that winter Daylight Savings Time brought. Others think such accidents would have occurred even if we were not on Daylight Savings Time. Which view comes closest to your way of thinking?	
Such accidents were caused by the extra hour of darkness in the morning	71
Such accidents would have occurred even if we were not on Daylight Savings Time . .	29
Do you think that we should go off Daylight Savings Time next winter because some people have been concerned about the safety of children on their way to school in the morning?	
Yes	56
No	44

TABLE 3.11

PER CENT LIKE OR DISLIKE DST BY PER CENT FAVORING GOING OFF WINTER DST FOR SAFETY OF CHILDREN

Attitude Toward DST	Favor Going Off DST	N
Like it very much	23	156
Like it somewhat	51	107
Dislike it somewhat	81	85
Dislike it very much	95	80
Don't care	61	41

school children result in an increased number of chauffeured trips to school?), and (2) the systems analysis of energy savings (that is, how does YRDST affect energy-consuming behaviors?). Data on behaviors relevant to the first perspective are presented in Table 3.12. The percentage reporting the incidence of a child being driven to school increased significantly (39 per cent to 55 per cent) the winter of 1973-1974 when compared with retrospective reports of the winter of 1972-1973. Hence, there does appear to be a relationship between attitudes of concern about school children's safety and increased reports of driving children to school. It is noteworthy that although 67 per cent reported that it was dark outside when the child left for school during January and February 1974, only 27 per cent stated that they ever sent the child to school in a car because it was dark in the morning. Other factors, however, such as the adequacy of available public transportation, undoubtedly influenced these driving behaviors.

To elucidate the issue of energy savings, we asked about behavioral changes in the morning or evening due to YRDST (Table 3.13). Only 19 per cent of the March/April sample reported doing anything different in the

TABLE 3.12

DRIVING CHILDREN TO SCHOOL, WINTER 1973-1974 VS. Winter 1972-1973

(Per Cent)

Question	3/29-4/11, 1974		
	Yes	No	NA
IF THERE ARE ANY CHILDREN UNDER 18 IN THE HOUSEHOLD:			
During the past January and February, that is, January and February of 1974, (was/were) the (child/children) ever driven to school by car?	55	41	3
During January and February of last winter, that is, during January and February of 1973, (was/were) the (child/children) ever driven to school by car? . . .	39	53	7
During the months of January and February of this winter (1974), was it dark outside when the (child/children) left for school in the morning? . .	67	32	1
In January and February of this winter, did you ever send the (child/children) to school in a car because it was dark in the morning?	27	73	--

morning. The most frequently reported change for this group was "been getting up later in the morning/going to work later in the morning" (64 per cent). The respondents in this small segment of the sample were probably dependent upon sunlight for the start of their work; e.g., most outdoor construction work requires adequate sunlight. In addition, 13 per cent of this group reported using more electricity in the morning.

Twenty-six per cent of all respondents reported differences in behaviors in the evening due to YRDST (Table 3.14). Most of these changes were centered around outdoor activities--37 per cent reported "going out more for recreation in the late afternoon," and 24 per cent reported "doing

TABLE 3.13

REPORTS OF DOING ANYTHING DIFFERENT IN MORNING DUE TO YRDST

(Per Cent)

Question	3/15-4/11, 1974
Since we went back onto Daylight Savings Time, have you been doing anything different in the morning due to the extra hour of darkness?	
Yes	19
No	81
IF YES: What have you been doing different in the morning since we went back onto Daylight Savings Time?	
Been getting up later in the morning/ going to work later in the morning . .	64
Been using a car rather than public transportation more often	0
Been driving the children to school . . .	3
Been getting up earlier	11
Been using more light	13

more outdoor work around the house." The major issue here, of course, is the extent to which these extra outdoor activities involve fuel consumption. When asked about the amount of late afternoon driving, only 13 per cent reported driving more. At least in terms of gasoline usage, then, these outdoor activities did not appear to have had a major negative effect upon energy savings.

TABLE 3.14

REPORTS OF DOING ANYTHING DIFFERENT IN EVENING DUE TO YRDST

(Per Cent)

Question	3/15-4/11, 1974
Since we went back onto Daylight Savings Time, have you been doing anything different in the evening due to the extra hour of daylight?	
Yes	26
No	75
IF YES: What have you been doing different in the evening since we went back onto Daylight Savings Time?	
Been leaving work later	15
Been using public transportation more . .	0
Been walking more	8
Been doing more (errands/shopping) in the late afternoon	10
Been going out for more recreation in the late afternoon	32
Been doing more outdoor work around the house	24
Been doing more indoor work in the house.	10
Would you say that you are now driving more, less, or about the same amount in the late afternoon as you were before we went back onto Daylight Savings Time?	
More	13
Less	25
About the same	54
NA (Respondent does not [generally] drive)	8

In summary, there appear to be only minimal reports of behavioral changes attributable to YRDST. There was a significant increase in the percentage of partents driving children to school. Changes in behaviors in terms of energy savings, however, appear to have been inconsequential with respect to the total level of public fuel consumption.

STATISTICAL APPENDIX

The following one hundred eighty pages present many of the central findings of the data collected during the period of November 23, 1973 to May 30, 1974. The format of this appendix is similar to the basic structure of our weekly and monthly reports delivered to various governmental agencies. The purpose of these reports was at least twofold: first, describe and explain the public's experiences with energy shortages, and second, supply information to decision-makers which might provide beneficial feedback as input into the establishment of energy policy. The demands to monitor weekly trends; make comparisons over months; understand the interrelationships between the shortages and consequent reactions; and the need for lucidity and succinctness of presentation of the data, dictated the use of several types of graphs, tables, and figures. In the early stages of data collection and subsequent analyses, the delineation of conceptual areas and specification of important issues within these areas was often exploratory--the incidence and severity of shortages and the consequent public reactions were totally unpredictable. However, as the experience and awareness of shortages became a reality to a large segment of the American population, and we became more familiar with the nature and impact of the shortages, the major areas of concern became focused upon six topics: exposures, evaluations, personal reactions, policy preferences, expectations, and voluntary conservation behaviors. These issues provided the organizing guidelines for the development of this appendix.

The sample design for the CNS is described in Chapter 1.

APPENDIX A: DEMOGRAPHIC CHARACTERISTICS

TABLE A.1

DEMOGRAPHIC CHARACTERISTICS

(Weighted Per Cent)[a]

	Cycle 1	2	3	4	5	6	7	8	9	10	11	12	Total	1970[b] Census Est.
Sample Size: (Unweighted)	723	647	644	616	644	631	688	700	697	696	610	658	7,954	
Sample Size: (Weighted)	1,627	1,400	1,365	1,290	1,342	1,279	1,405	1,425	1,499	1,476	1,297	1,397	16,802	
Sex:														
Male	47.0	45.2	45.9	42.1	42.6	44.9	45.1	45.2	45.3	43.5	46.1	43.5	44.7	48.7
Female	53.0	54.8	54.1	57.9	57.4	55.1	54.9	54.8	54.7	56.5	53.9	56.5	55.3	51.3
Age:														
18-24	17.9	17.4	17.6	15.8	14.3	18.7	15.8	17.2	17.5	19.5	16.9	16.2	17.1	17.7
25-34	23.1	17.4	22.7	23.2	23.2	19.9	22.9	20.8	20.1	20.2	19.4	24.9	21.5	18.6
35-44	13.0	20.4	15.9	16.0	17.5	15.7	20.8	15.7	16.7	18.4	18.0	15.7	17.0	17.3
45-54	16.5	16.3	17.8	18.4	18.4	15.4	15.6	18.5	17.9	19.0	18.0	16.0	17.3	17.4
55-64	14.2	15.0	14.2	13.5	12.1	16.0	12.7	11.8	15.4	11.4	12.7	14.1	13.6	13.9
65-74	10.2	8.9	9.2	9.1	9.5	9.4	9.0	11.4	8.1	7.5	9.3	9.7	9.3	9.3
75-84	4.4	4.0	2.1	2.7	4.0	3.9	2.9	3.9	3.9	3.5	4.5	2.9	3.6	4.6
85 or over	0.6	0.6	0.5	1.3	1.0	1.0	0.3	0.7	0.4	0.5	1.2	0.5	0.7	1.1
Race:														
Black	7.3	10.5	8.3	9.0	8.3	9.6	6.4	9.8	9.4	9.8	8.5	11.0	9.0	11.1
Spanish	6.0	4.8	7.8	4.3	4.0	3.1	5.4	3.7	4.1	3.4	5.5	6.2	4.9	4.5
White + Other	86.7	84.7	83.9	86.7	87.6	87.3	88.2	86.5	86.5	86.9	86.0	82.8	86.1	84.3
Education:														
Less than HS	30.0	34.5	35.3	37.0	34.3	37.6	33.7	35.5	33.1	32.9	36.5	38.5	34.7	45.1
HS Grad	42.1	39.3	34.0	35.2	37.9	37.5	37.4	39.2	38.3	37.9	33.8	33.7	37.3	33.6
Some College	15.9	13.0	15.8	15.7	12.4	12.0	16.5	15.1	15.7	15.3	15.7	14.6	14.9	11.1
College Grad	12.1	13.2	14.9	12.1	15.4	13.0	12.4	10.3	12.9	13.9	14.0	13.2	13.1	10.2

TABLE A.1--Continued

(Weighted Per Cent)[a]

	Cycle												Total	1970[b] Census Est.
	1	2	3	4	5	6	7	8	9	10	11	12		
Religious Preference:														
Protestant	60.0	62.2	57.7	60.1	60.5	61.3	60.5	59.9	61.9	62.6	61.9	63.9	61.0	
Catholic	28.4	25.8	31.4	27.3	25.2	25.8	28.9	28.1	25.0	22.9	27.5	27.3	27.0	
Jewish	2.4	3.1	2.9	3.0	3.3	3.2	2.7	2.3	4.1	3.4	2.2	1.7	2.9	
None	5.0	5.0	4.0	5.5	6.4	5.5	4.9	5.4	4.8	6.5	5.1	4.9	5.2	
Other	4.2	3.9	4.0	4.0	4.6	4.2	3.0	4.3	4.2	4.7	3.3	2.1	3.9	
Relationship to Head of HH:														
Head	49.2	50.4	48.6	46.4	49.6	50.6	48.8	50.7	49.3	46.8	50.8	46.7	49.0	
Spouse	36.5	37.6	38.0	38.5	40.6	35.2	40.1	38.3	37.8	38.4	36.1	38.9	38.0	
Child	10.6	8.8	9.9	10.3	6.1	9.6	8.1	8.1	9.0	10.0	8.1	10.5	9.1	
Parent	0.7	0.4	1.0	1.6	0.8	1.5	0.8	0.4	1.1	0.6	1.8	1.3	1.0	
Sister, Brother	1.5	0.7	0.9	1.4	1.0	0.2	0.6	1.5	0.7	1.7	1.0	0.6	1.0	
Aunt/Uncle/Cousin	--	0.3	0.7	0.7	0.1	--	0.2	0.3	0.3	0.6	0.5	0.4	0.3	
Roommate	1.0	1.2	0.3	0.4	1.3	2.2	1.4	0.7	1.5	1.4	1.2	0.7	1.1	
Grandparent/grandchild	0.2	0.4	0.4	0.5	0.2	0.5	--	--	0.4	0.3	0.3	0.1	0.3	
Visitor	0.1	--	--	--	--	0.2	--	--	--	0.1	0.3	0.5	0.1	
Other	0.1	--	0.1	0.3	0.2	--	--	--	--	--	--	0.2	0.1	
Marital Status:														
Married	74.4	73.2	73.7	73.8	74.1	71.5	77.6	71.9	73.3	73.0	72.9	72.9	73.6	62.7
Widowed	6.3	9.1	6.4	6.9	8.1	8.7	6.6	7.4	8.1	7.1	7.1	8.4	7.5	7.7
Divorced	3.4	2.1	3.9	3.9	4.8	2.5	2.8	4.2	3.3	3.5	3.8	2.4	3.4	3.3
Separated	1.3	1.6	1.6	1.9	1.9	1.8	1.4	2.0	1.6	2.0	2.2	2.1	1.8	1.2
Never Married	14.6	13.9	14.3	13.6	11.1	15.6	11.5	14.5	13.6	14.5	14.0	14.2	13.8	25.1

TABLE A.1--Continued

(Weighted Per Cent)[a]

	Cycle												Total	1970[b] Census Est.
	1	2	3	4	5	6	7	8	9	10	11	12		
Interviewer's Perception of Type of Place:														
City	31.0	28.4	32.7	34.7	32.9	33.6	32.4	29.7	31.8	29.1	37.0	35.0	32.3	
Suburb	24.7	22.2	23.4	24.6	23.3	23.2	23.1	21.2	26.2	24.5	18.9	21.9	23.2	
Town	18.0	23.8	20.4	14.5	20.4	17.3	20.4	20.5	18.5	20.1	18.6	17.7	19.2	
Rural (Non-farm)	21.3	19.8	18.2	19.8	18.1	19.9	19.8	23.0	18.3	19.9	19.1	18.7	19.7	
Farm	5.0	5.8	5.3	6.4	5.3	5.9	4.2	5.5	5.2	6.4	6.4	6.7	5.7	
Population Size:[d]														
Less than 2,500	11.9	14.6	12.8	15.0	12.1	14.7	14.4	15.2	12.3	15.3	13.8	15.6	13.9	
2,500-9,999	28.0	27.0	28.5	27.1	25.6	27.1	28.3	27.6	27.6	28.7	27.8	26.3	27.5	
10,000-24,999	13.9	15.1	13.8	15.8	14.9	12.3	13.3	11.9	13.9	13.5	14.3	12.6	13.8	
25,000-49,999	14.4	15.5	11.6	11.3	14.1	13.4	12.7	12.5	13.5	13.1	12.5	13.2	13.2	
50,000-99,999	9.8	7.4	10.1	8.4	9.6	11.0	9.9	10.0	11.2	9.1	9.8	9.7	9.7	
100,000-249,999	6.3	5.8	6.5	6.0	5.4	5.1	6.0	5.5	5.6	5.7	5.9	6.0	5.8	
250,000 or more	15.9	14.5	16.6	16.3	18.3	16.4	15.4	17.3	16.0	14.5	16.0	16.6	16.1	
Census Region:														
New England	4.1	5.1	5.9	1.9	5.1	4.8	5.2	5.7	4.5	4.9	4.5	4.3	4.7	5.8
Mid Atlantic	18.7	17.2	17.9	19.7	19.9	18.2	17.4	18.6	17.9	16.6	17.1	17.3	18.0	18.3
East North Central	21.9	23.4	22.1	23.1	20.3	23.7	21.4	22.9	22.5	20.1	22.1	24.5	22.3	19.8
West North Central	6.0	8.1	5.3	8.0	7.3	7.3	8.0	7.5	7.4	8.2	8.4	7.0	7.4	8.0
South Atlantic	20.2	20.1	20.1	19.8	18.3	17.0	17.9	16.7	19.6	21.7	21.1	18.3	19.2	15.1
East South Central	5.1	5.7	5.6	5.7	5.1	5.9	7.5	5.8	6.5	6.6	4.2	5.2	5.8	6.3
West South Central	7.8	6.7	7.3	7.9	8.0	8.7	7.8	7.6	6.8	7.5	7.3	7.4	7.5	9.5
Mountain	4.2	3.8	4.3	4.3	3.4	3.7	4.0	3.6	3.9	4.3	4.8	4.1	4.0	4.1
Pacific	12.0	9.9	11.4	9.7	12.7	10.8	11.0	11.5	10.7	10.1	10.4	12.1	11.0	13.1

TABLE A.1--Continued

(Weighted Per Cent)[a]

	Cycle												Total	1970[b] Census Est.
	1	2	3	4	5	6	7	8	9	10	11	12		
Household Income:[c]														
Under $1,000	1.1	1.5	1.9	3.3	2.0	2.5	1.6	2.5	1.7	2.6	1.8	1.1	1.9	2.5
$1,000-1,999	2.9	2.6	3.2	3.0	4.1	3.7	3.3	3.1	2.7	4.0	2.2	2.1	3.1	3.4
$2,000-2,999	3.6	3.3	3.5	4.4	5.0	5.1	4.9	4.4	3.4	3.9	3.5	4.1	4.1	4.4
$3,000-3,999	4.7	5.1	5.3	5.4	5.1	3.9	3.1	4.8	4.2	4.2	5.4	5.2	4.7	4.9
$4,000-4,999	5.1	6.4	6.6	3.4	3.9	4.8	5.4	4.5	4.2	5.4	4.4	5.4	5.0	5.1
$5,000-5,999	4.4	6.0	4.9	5.2	4.9	5.8	5.2	4.7	6.9	3.9	4.3	3.9	5.0	5.7
$6,000-6,999	4.1	4.6	4.7	3.3	5.4	3.7	5.1	6.2	5.2	4.8	5.1	4.8	4.7	6.1
$7,000-7,999	5.2	6.0	4.7	6.9	4.4	4.7	4.5	5.1	6.0	6.3	3.6	4.4	5.2	6.7
$8,000-9,999	10.9	12.5	10.7	9.8	8.3	11.6	9.7	10.4	7.4	7.1	11.4	10.2	9.9	13.9
$10,000-14,999	27.9	23.7	24.6	23.0	27.4	25.5	24.0	25.0	22.9	19.2	24.6	23.5	24.2	26.6
$15,000-19,999	14.0	12.7	12.7	15.3	12.6	14.1	16.3	16.0	15.7	17.7	14.0	14.7	14.6	16.0
$20,000-24,999	8.2	7.1	5.7	8.4	8.4	8.4	7.0	6.5	7.7	10.0	6.2	8.7	7.7	
$25,000 or over	7.6	8.6	11.5	8.7	8.7	6.0	10.1	6.6	12.3	10.9	13.6	12.1	9.7	4.7
Total Number of People in Household														
1	7.8	9.4	7.5	8.4	7.9	8.6	8.6	8.8	8.3	7.3	7.6	7.6	8.1	
2	29.7	29.4	27.0	26.1	32.0	33.8	27.0	31.4	30.6	29.5	30.3	28.3	29.6	
3	22.6	20.5	21.5	20.7	19.2	19.9	18.6	19.4	19.4	20.5	21.0	17.5	20.1	
4	17.6	19.4	18.6	19.0	19.2	15.4	19.4	17.2	23.1	17.8	18.9	18.9	18.7	
5	10.8	9.0	11.1	13.6	10.4	11.5	12.9	11.4	9.5	13.1	12.0	13.4	11.5	
6	5.0	4.6	7.1	5.3	6.4	3.4	7.8	7.0	5.0	4.3	5.9	7.5	5.8	
7	3.1	3.6	4.6	2.9	2.5	3.5	2.6	2.4	2.2	3.9	2.0	3.2	3.0	
8	1.5	1.4	1.1	1.9	1.7	1.6	1.2	1.2	1.2	2.0	0.8	2.1	1.5	
9	1.0	0.6	1.0	0.7	0.3	2.0	0.8	0.4	--	0.8	0.5	1.1	0.7	
10	0.7	1.3	0.4	0.8	0.4	--	0.9	0.8	0.1	0.7	0.5	0.3	0.5	
11	0.1	0.6	--	0.4	--	0.2	0.3	--	--	0.1	--	--	0.1	
12	--	0.4	--	0.2	--	--	--	--	0.5	--	0.5	--	0.1	

FOOTNOTES

[a]The "weighted per cents" and "weighted sample size" refer to figures based on results using a weighted sample (16,802 cases) as opposed to the unweighted sample (7,954 cases).

Weighting is done for two reasons:

1) To account for undersampling. In areas where the population was undersampled, cases were weighted by replicating (i.e., counting again) those respondents who did reply to make up for the missing cases and to make some estimate of the population attributes in the sampling area. Although this gives a few respondents relatively more "weight" in the sample, since they were counted more than once, not to do the weighting would result in effectively having all other sample areas relatively more weighted than the area in question.

2) To do analysis at the individual rather than household level. Technically, the CNS sample is an equal probability sample of U.S. <u>households</u>, while the probability of selection for <u>individuals within households</u> depends on the total number of eligible individuals within that household. Therefore, since we want to compare individuals in the sample with individuals in the Census (not households with Census figures), we must weight the case by the number of persons in the household to yield unbiased estimators for individuals.

[b]The differences between the Census and the CNS percentages arise from three factors: (1) sampling error; (2) comparison of 1970 Census information to survey data from 1973 and 1974; and (3) discrepancies in category definitions.

The third factor applies to variables where it was not possible to group the CNS data into categories utilized by the Census. Two instances of this occurred: (1) Race. The Census uses the categories of White, Negro, and Spanish Heritage, whereas the CNS uses Black, Spanish, and White and Other non-Spanish. (2) Marital Status. The Census and CNS both use Married, Widowed, Divorced, and Separated, but the Census has a Single category, while the CNS used the more specific Never Married. In addition, the Census used data on persons 14 and over, while the CNS sampled only persons 18 and over.

Slight differences also occur in that the CNS sample is representative of the continental United States, while the Census estimates include data from persons in all fifty states.

FOOTNOTES--Continued

[c]Note that in the case of income, the two CNS groups of \$15,000 and 19,999 and \$20,000 to 24,999 must be combined to compare with the Census group of \$15,000 to 24,999.

[d]The CNS population size categories are not strictly comparable to the Census in that the definitions for coding the Size of Place are not necessarily the same as those used by the Census. To create the Size of Place variable, the NORC sampling department used the population of the smallest civil division listed by the Census (city, town, other incorporated area over 1,000 in population, township division, etc.) which encompasses the sampling location. If the location is in more than one locality, the area was assigned the population of the place where most of the listings occurred. If, however, the listings were equally divided, then: (1) If the places were all cities or towns or villages, the population of the larger city or town was coded. The same held true if the places were all rural townships or divisions. (2) If the locality included a town or village and a rural township or division, the population of the town or village was coded.

The coding for sampling locations in rural townships or divisions excludes portions of townships or divisions within incorporated or unincorporated areas listed elsewhere by the Census.

For all cases, the population in SMSAs should be correct by region within three groups (1,000,000 or more, 200,000 to 999,999, and less than 200,000) since these two stratifications (SMSA vs non-SMSA and the three population groups) were utilized in designing the sample. In non-SMSAs, the stratification was more complex, but ordered places primarily by size. Approximately 70 per cent of the sample fell into the SMSA category.

APPENDIX B: EXPOSURES

Dates on Figures of Weekly Results are End-Dates of Interviewing Week

Figure B.1

PER CENT OF CAR-OWNING HOUSEHOLDS HAVING TROUBLE GETTING GASOLINE IN THE PAST MONTH

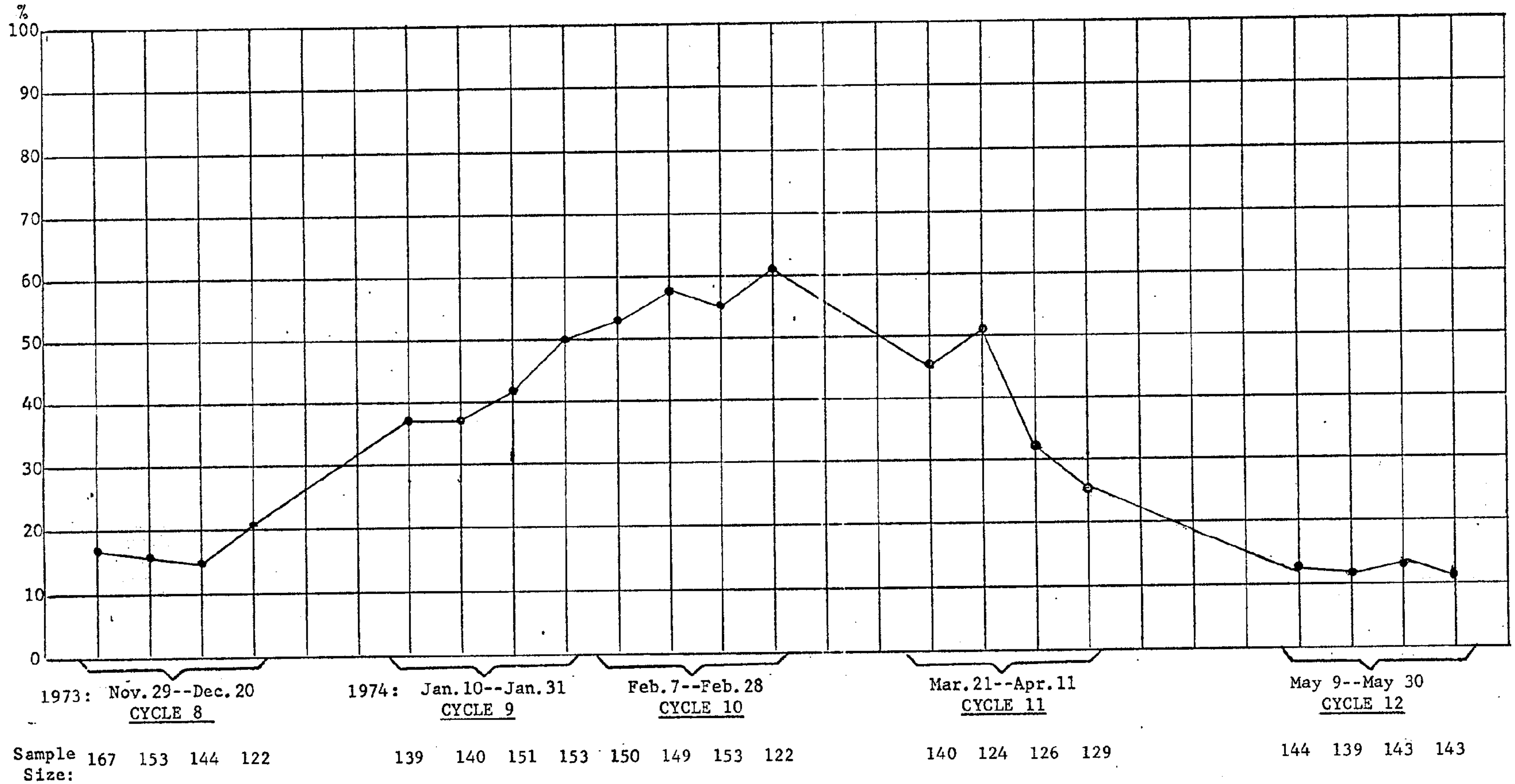


Figure B.2

PROBLEMS ENCOUNTERED IN TRYING TO GET GASOLINE

(Includes only those respondents reporting trouble getting gasoline)

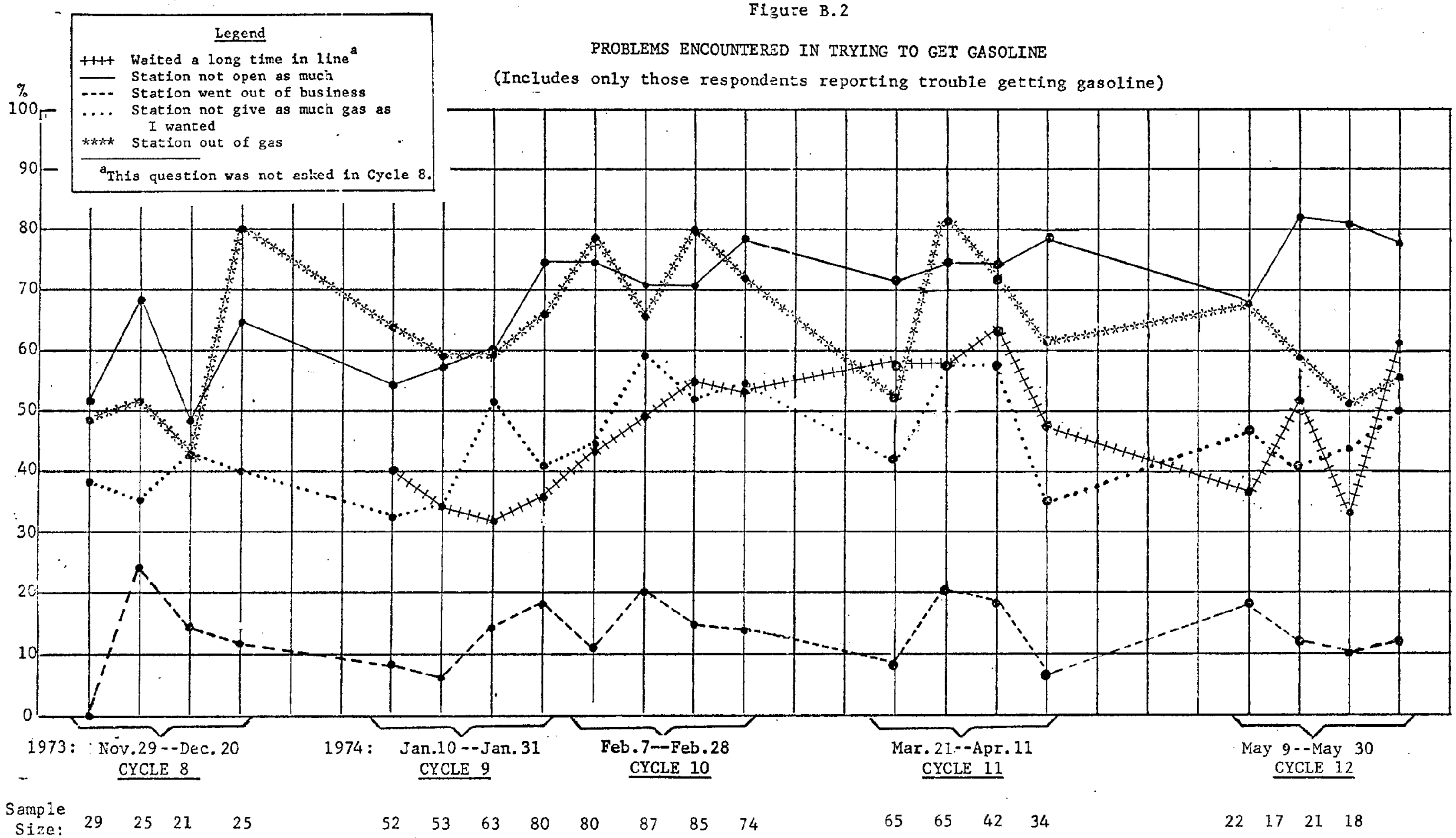


Figure B.3

PERIOD OF WEEK IN WHICH HOUSEHOLDS HAD TROUBLE GETTING GAS

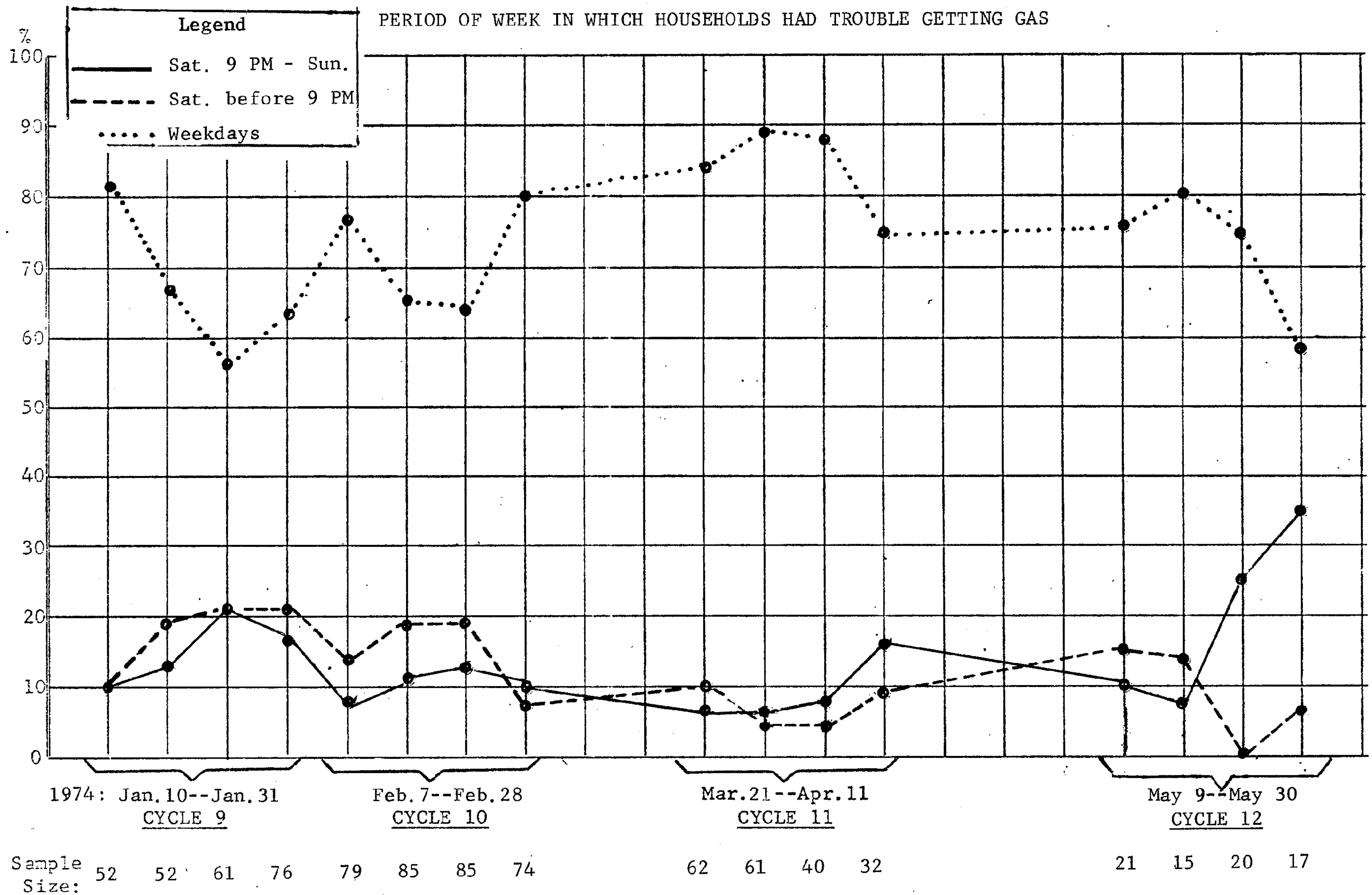


Table B.1

PER CENT REPORTING TROUBLE OBTAINING GASOLINE IN THE PAST MONTH, BY NUMBER OF CARS AND NUMBER OF LICENSED DRIVERS IN HOUSEHOLD

	Cycle 8 (11/23-12/20, 1973)	Cycle 9 (1/1-1/31, 1974)	Cycle 10 (2/1-2/28, 1974)	Cycle 11 (3/15-4/11, 1974)	Cycle 12 (5/3-5/30, 1974)
Number of Cars in Household:					
1	13	36	57	35	10
2	22	46	59	44	16
3	14	51	53	36	19
4 or more	39	50	61	56	23
Number of Licensed Drivers in Household:					
1	--	36	55	34	--
2	--	43	58	42	--
3	--	52	49	45	--
4	--	50	83	27	--
5 or more	--	67	100	33	--
N	584	585	597	527	569

Table B.2

RESPONSES TO QUESTIONS ABOUT WAITING IN LINE FOR GASOLINE

(Cycle 11)

Question	Response Category	Per Cent Answering	N
The last time you bought gasoline, did you have to wait in line?	Yes	10	521
	No	90	
If yes, how long did you have to wait in line that time?	Less than 10 min.	21	53
	10-19 minutes	56	
	20-29 minutes	12	
	30 or more	12	
Would you be willing to pay more for gasoline if you didn't have to wait?	Yes	32	53
	No	68	
If yes, what is the most you would be willing to pay per gallon if you didn't have to wait?	$.48 - .50	25	16
	$.51 - .60	31	
	Over $.60	44	

Figure B.4

CENSUS REGIONS

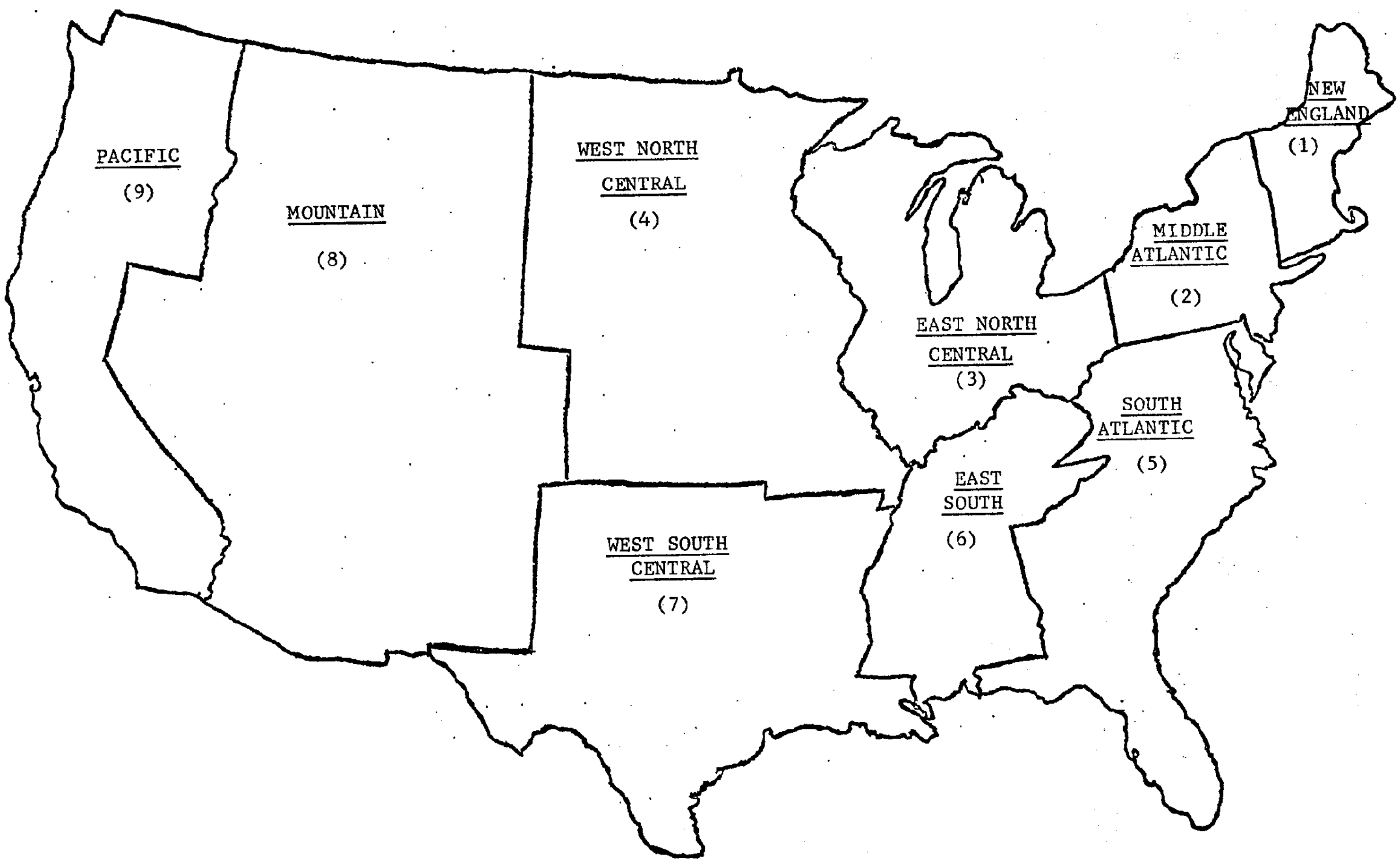
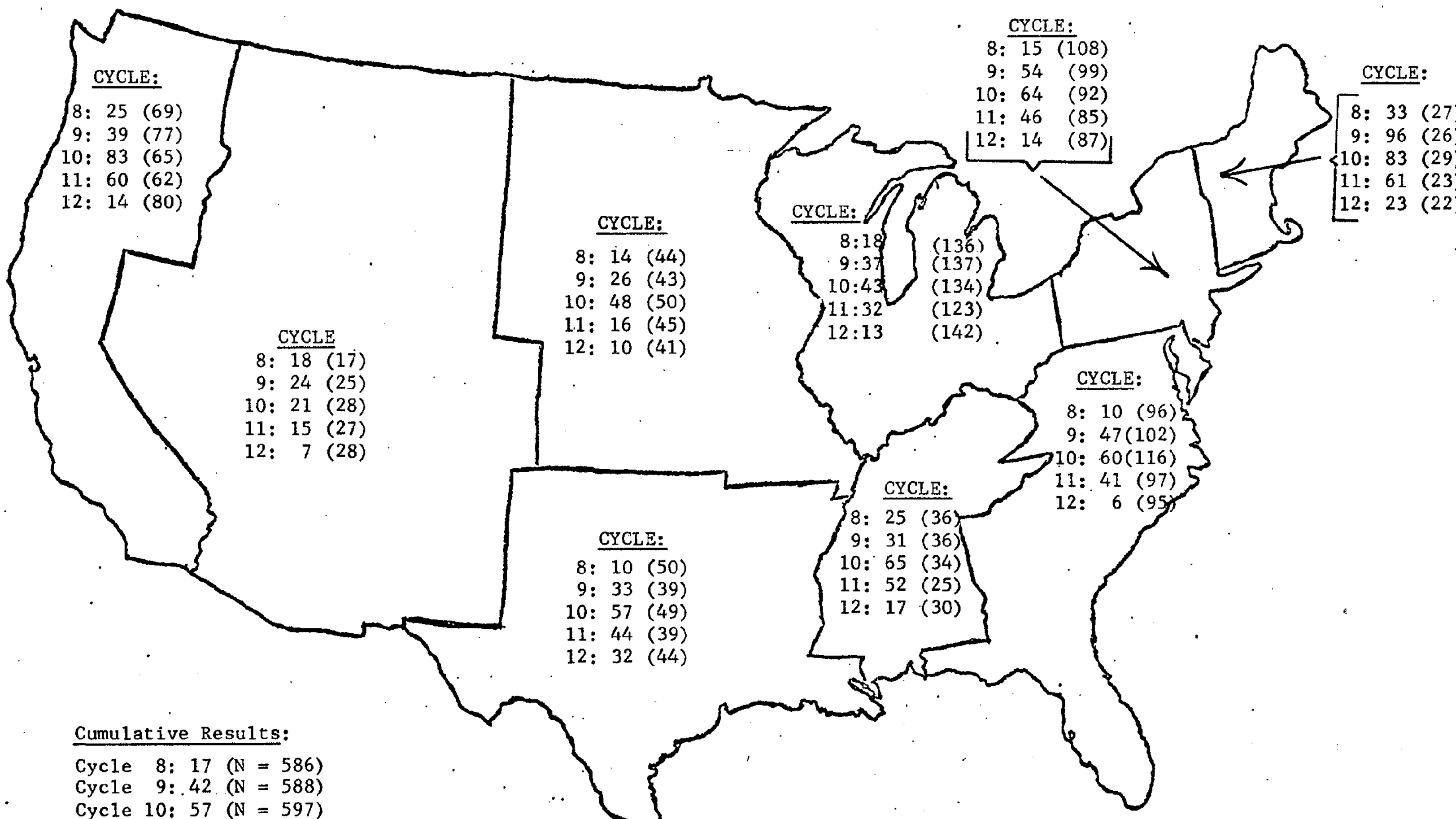


Figure B.5

PER CENT OF HOUSEHOLDS HAVING TROUBLE GETTING GAS IN THE PAST MONTH BY CENSUS REGION
(Sample Size is Given in Parentheses)



Cumulative Results:

Cycle 8: 17 (N = 586)
Cycle 9: 42 (N = 588)
Cycle 10: 57 (N = 597)
Cycle 11: 40 (N = 526)
Cycle 12: 14 (N = 569)

Figure B.6

PER CENT OF HOUSEHOLDS HAVING TROUBLE GETTING FUEL OIL DURING THEIR LAST PURCHASE BY CENSUS REGION
(Sample Size Given in Parentheses)

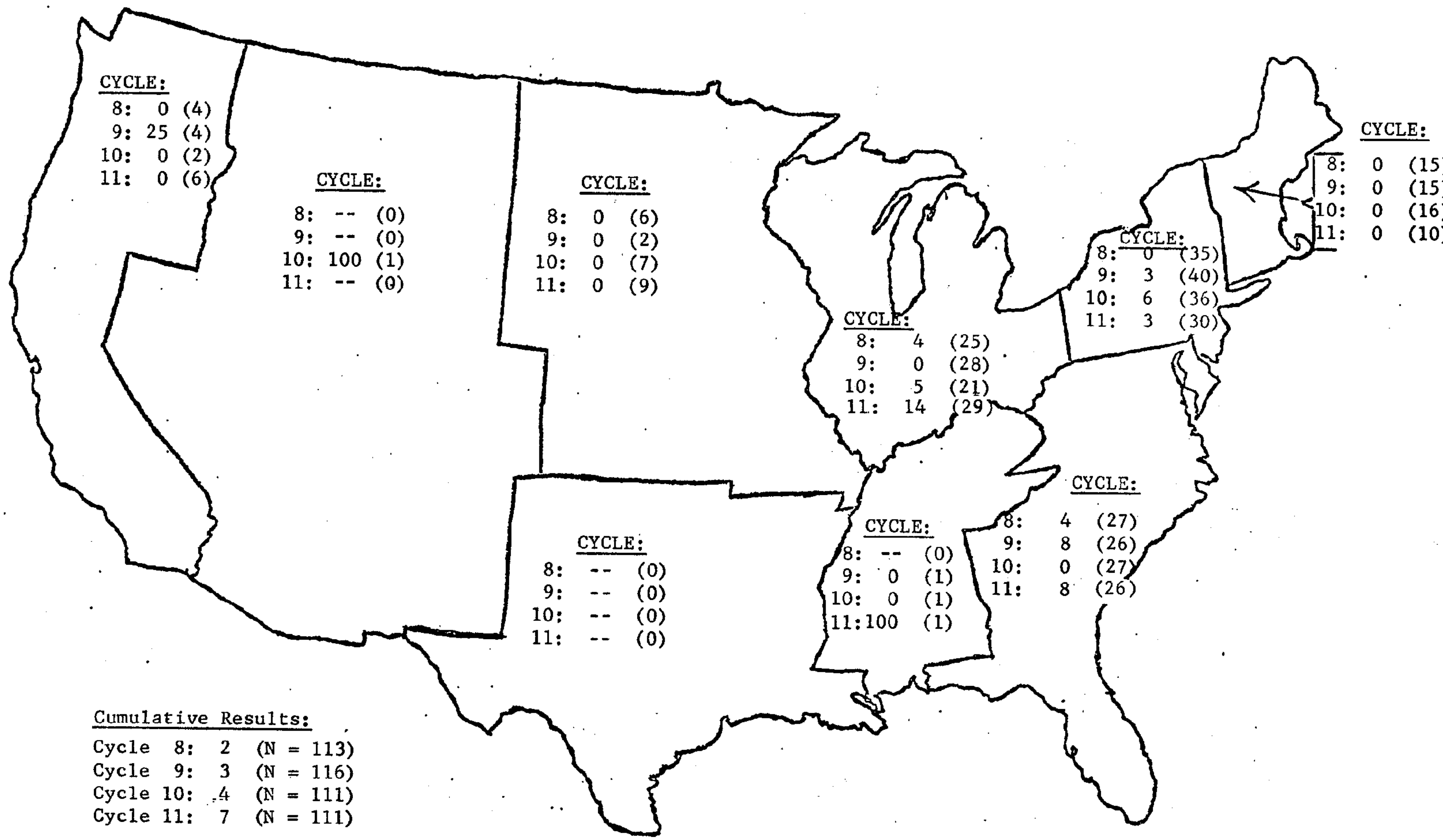
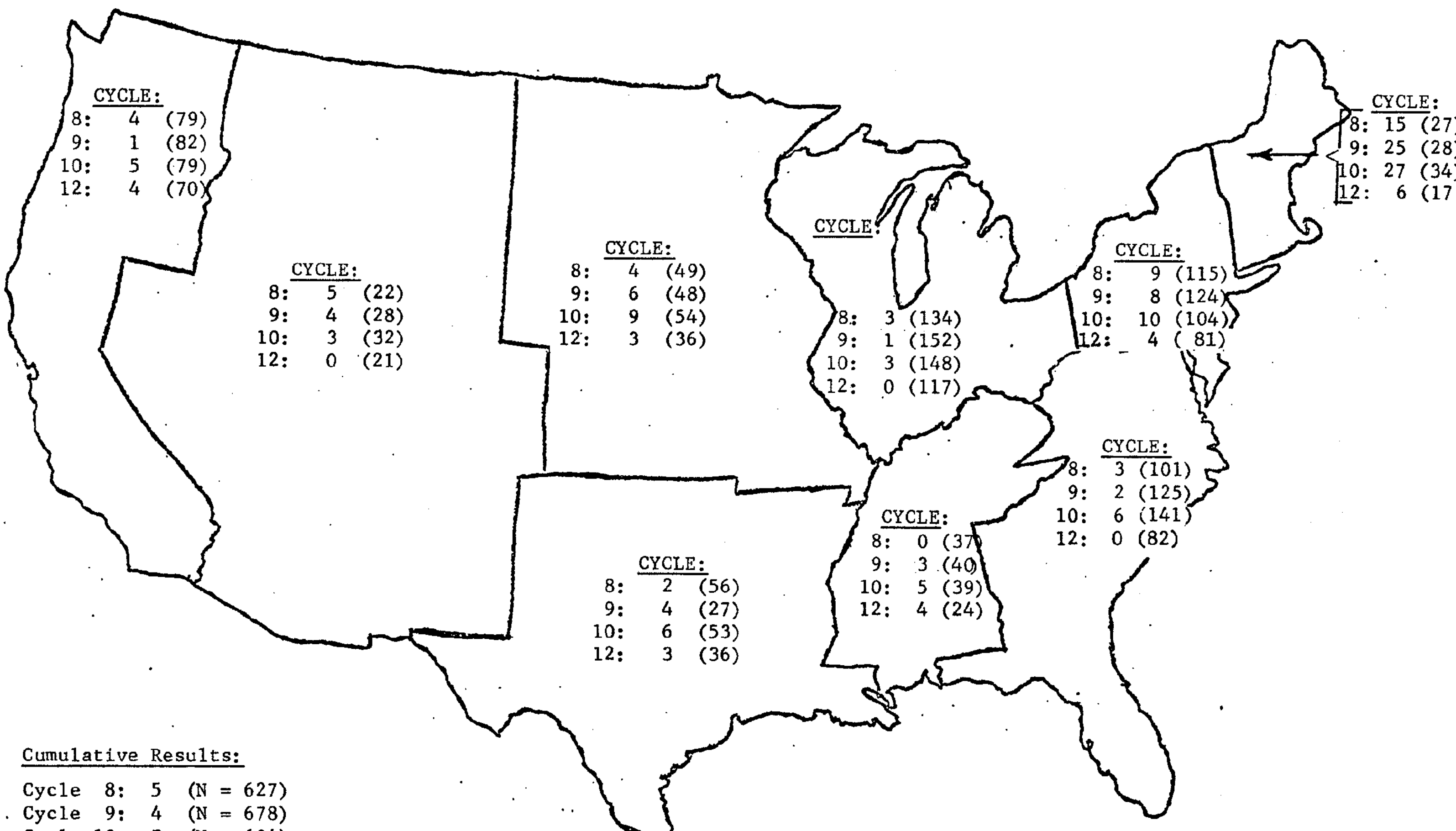


Figure B.7

PER CENT OF HOUSEHOLDS HAVING TROUBLE GETTING ELECTRICITY IN THE LAST YEAR BY CENSUS REGION
(Sample Size is Given in Parentheses)



Cumulative Results:

Cycle 8: 5 (N = 627)
Cycle 9: 4 (N = 678)
Cycle 10: 7 (N = 694)
Cycle 12: 2 (N = 484)

NOTE: This question was not asked in Cycle 11.

APPENDIX C: EVALUATIONS

Figure C.1

WHICH GROUP IS MOST RESPONSIBLE FOR THE CURRENT ENERGY SHORTAGE?

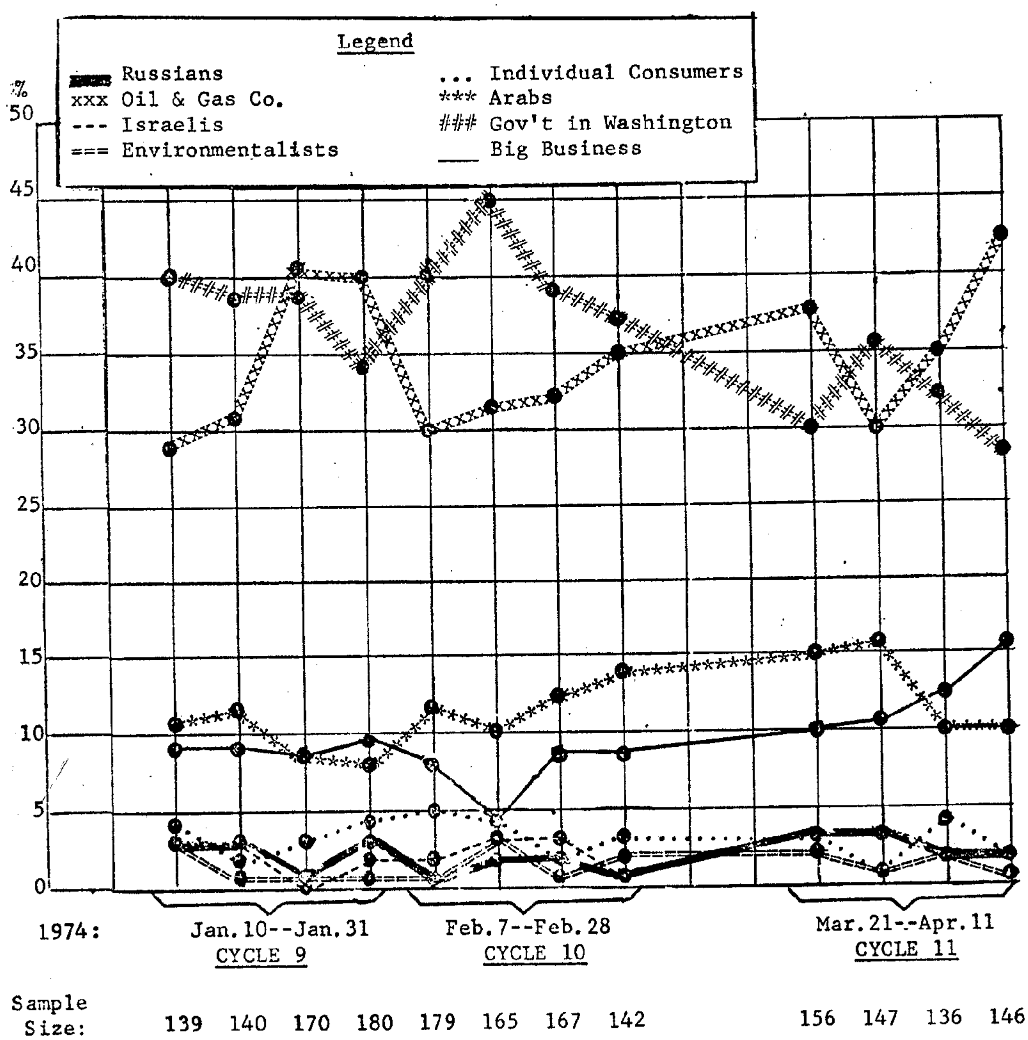


Figure C.2

HOW MUCH RESPONSIBILITY DO YOU FEEL EACH GROUP HAS FOR THE CURRENT ENERGY SHORTAGE?
(The results presented are the per cent of respondents attributing "a great deal of responsibility" to the respective groups.)

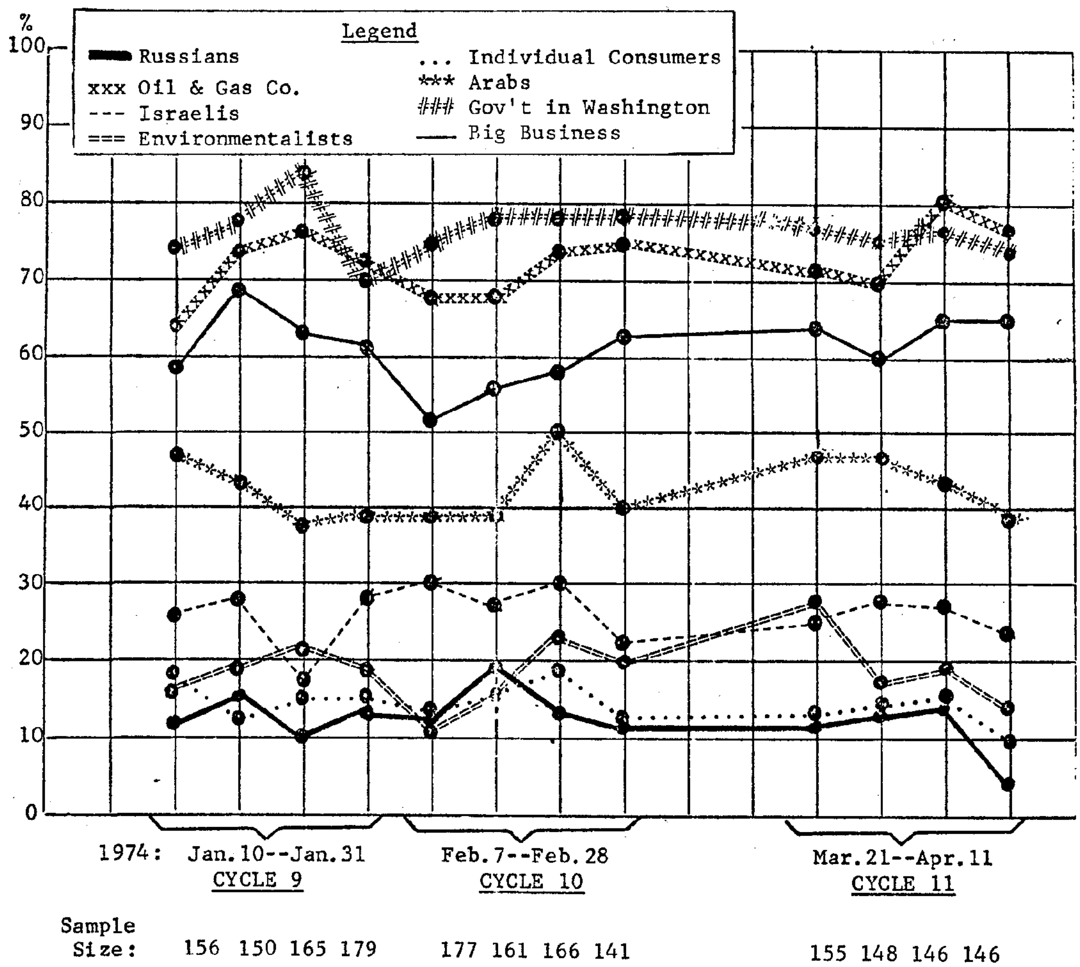


Figure C.3

HOW IMPORTANT A PROBLEM IS THE ENERGY SHORTAGE TO THIS COUNTRY?

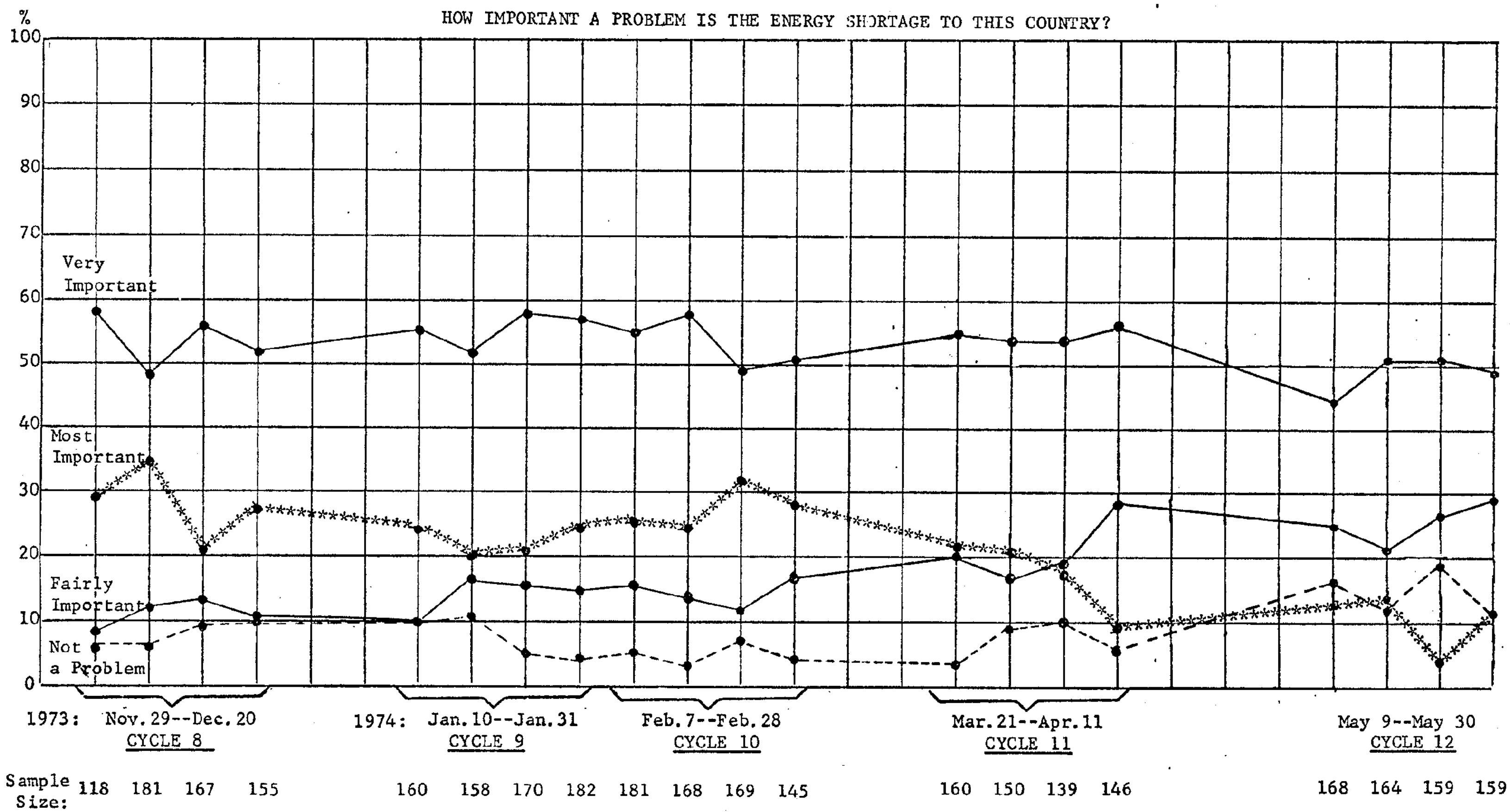
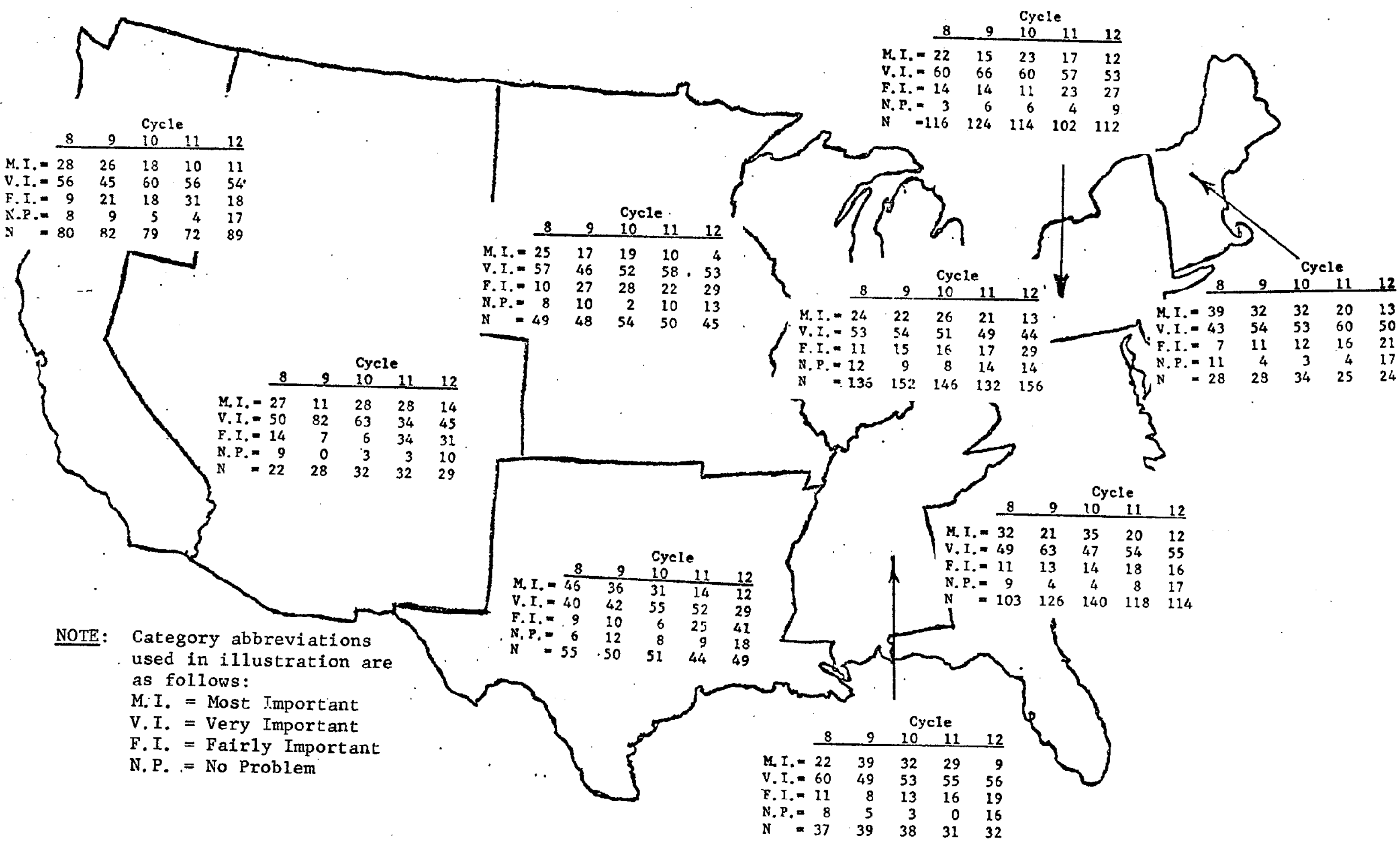


Figure C.4

HOW IMPORTANT A PROBLEM DO YOU FEEL THE ENERGY SHORTAGE IS FOR THIS COUNTRY
BY CENSUS REGION
(Per Cent)



NOTE: Category abbreviations used in illustration are as follows:
M.I. = Most Important
V.I. = Very Important
F.I. = Fairly Important
N.P. = No Problem

Figure C.5

HOW WOULD YOU RATE THE JOB BEING DONE BY YOUR STATE GOVERNMENT IN HANDLING THE FUEL SHORTAGE?
(Poor = Very poor plus poor; Good = Pretty good plus very good; the rating "fair" is omitted.)

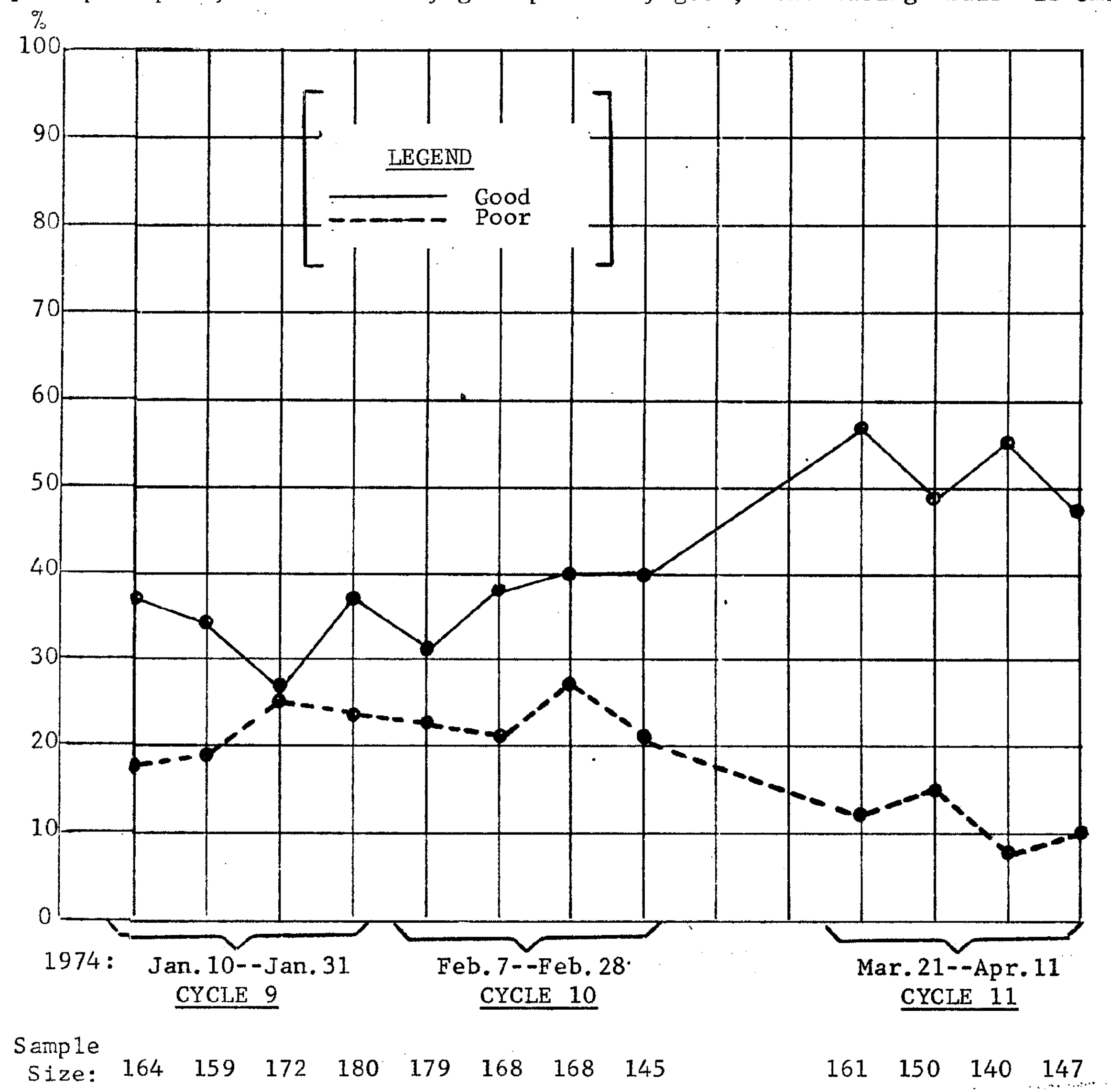


Figure C.6

HOW WOULD YOU RATE THE JOB BEING DONE BY THE GOVERNMENT IN WASHINGTON IN HANDLING THE FUEL SHORTAGE?
(Poor = Very poor plus poor; Good = Pretty good plus very good; the rating "fair" is omitted.)

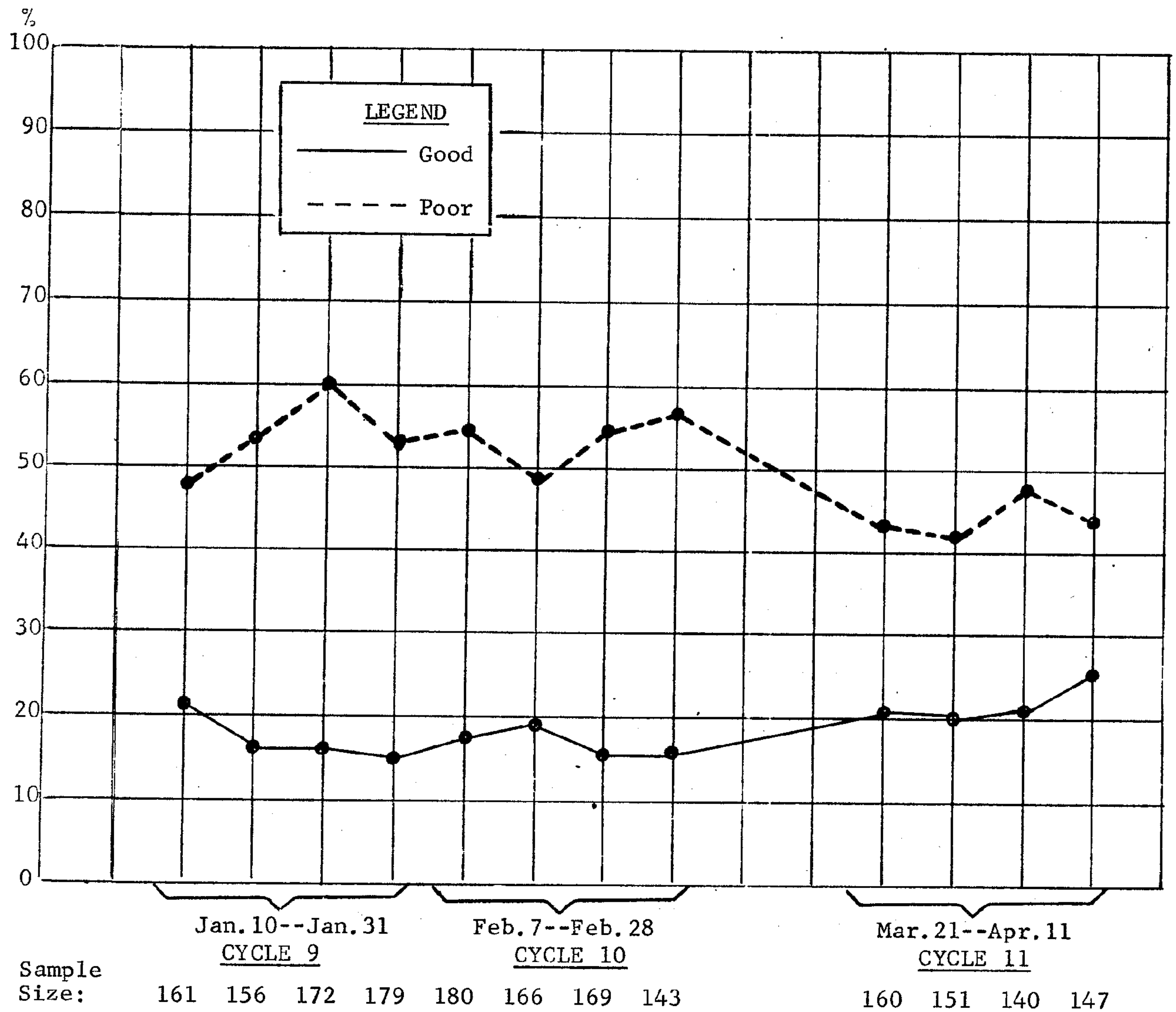


Table C.1

RESPONSES TO QUESTIONS CONCERNING RESPONSIBILITY FOR FUEL CRISIS

(Cycle 11)

Question	Response Category	Per Cent Answering	N
If respondent rates the job being done by the government in Washington in handling the fuel shortage as "poor" or "very poor" (see Fig. C.6), he is asked why.	Gov't is letting the fuel companies raise prices too high	30	268
	Gov't is not doing anything to solve the shortage .	47	
	Gov't is lying--there is no shortage	25	
	Gov't knew beforehand that we would soon be having a shortage but did nothing	24	
	Gov't is in conspiracy with oil companies	18	
How would you rate the job being done by the oil companies in handling the fuel shortage?	Very good	3	607
	Pretty good	10	
	Fair	24	
	Very poor	26	
	Don't know	4	
If "poor or "very poor," why?	Oil companies are holding back supplies to create shortage	70	355
	Oil companies are making "windfall" profits	45	
	Oil companies have not invested enough in finding new sources of (oil/energy)	18	
	Oil companies are not distributing supplies in a fair way	21	

Table C.2

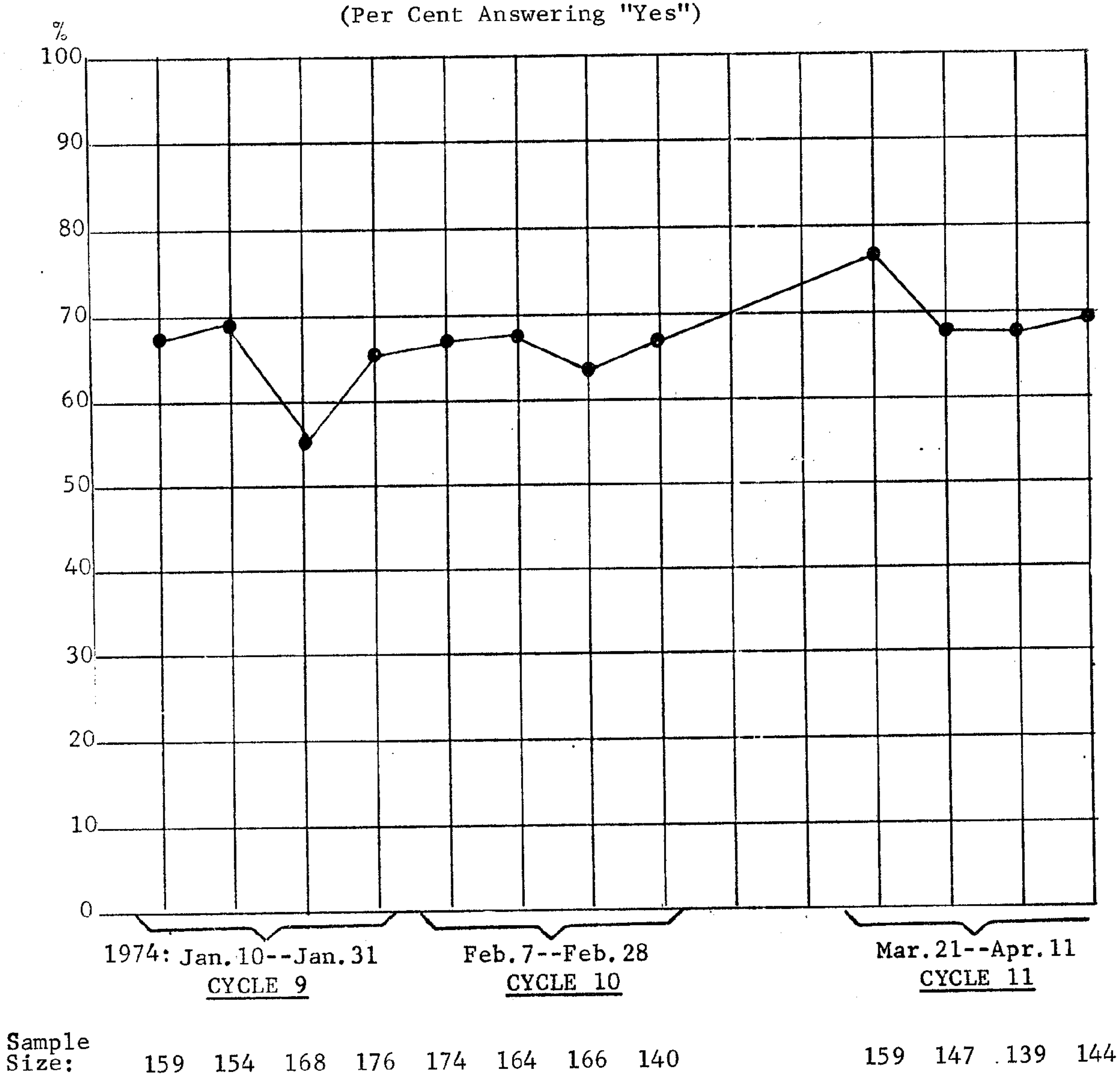
RESPONSES TO QUESTIONS CONCERNING ARAB EMBARGO AND ENERGY CONSERVATION MEASURES

Question	Response Categories	Per Cent Answering	N
It is quite possible that the Arab nations will soon lift their embargo on sales of oil to the United States. If they do so, what effect do you think this would have on our energy shortage?		March 15-28	368
	Completely solve our energy shortage . . .	3	
	Go a long way toward solving it	23	
	Go a short way toward solving it	55	
	No help at all	19	
Most of the Arab nations have lifted their embargo on sales of oil to the United States. What effect do you think this will have on our energy shortage?		March 29-April 11	228
	Completely solve our energy shortage . . .	2	
	Go a long way toward solving it	20	
	Go a short way toward solving it	58	
	No help at all	20	
Which one way do you feel would conserve the greatest amount of energy?		Cycle 11	590
	Shut off a color TV for an hour	34*	
	Shut off a black-and-white TV for 2 hours.	7*	
	Shut off five 100-watt light bulbs for 1 hour	30*	
	Not run a dishwasher one time	29*	
Which one way do you feel would conserve the least amount of energy?	Shut off a color TV for an hour	15	584
	Shut off a black-and-white TV for 2 hours.	25	
	Shut off five 100-watt light bulbs for 1 hour	38	
	Not run a dishwasher one time	22	

*Estimates from Commonwealth Edison for these categories are, respectively; 200 watts, 110 watts, 500 watts, 500 watts.

Figure C.7

DO YOU FEEL MOST PEOPLE ARE OBSERVING THE 55 MPH SPEED LIMIT ON THE NATION'S HIGHWAY?
(Per Cent Answering "Yes")



APPENDIX D: PERSONAL REACTIONS

Figure D.1

PER CENT OF HOUSEHOLDS WHO FEEL THEY ARE GETTING THEIR
FAIR SHARE OF FUEL FOR HOME AND TRANSPORTATION

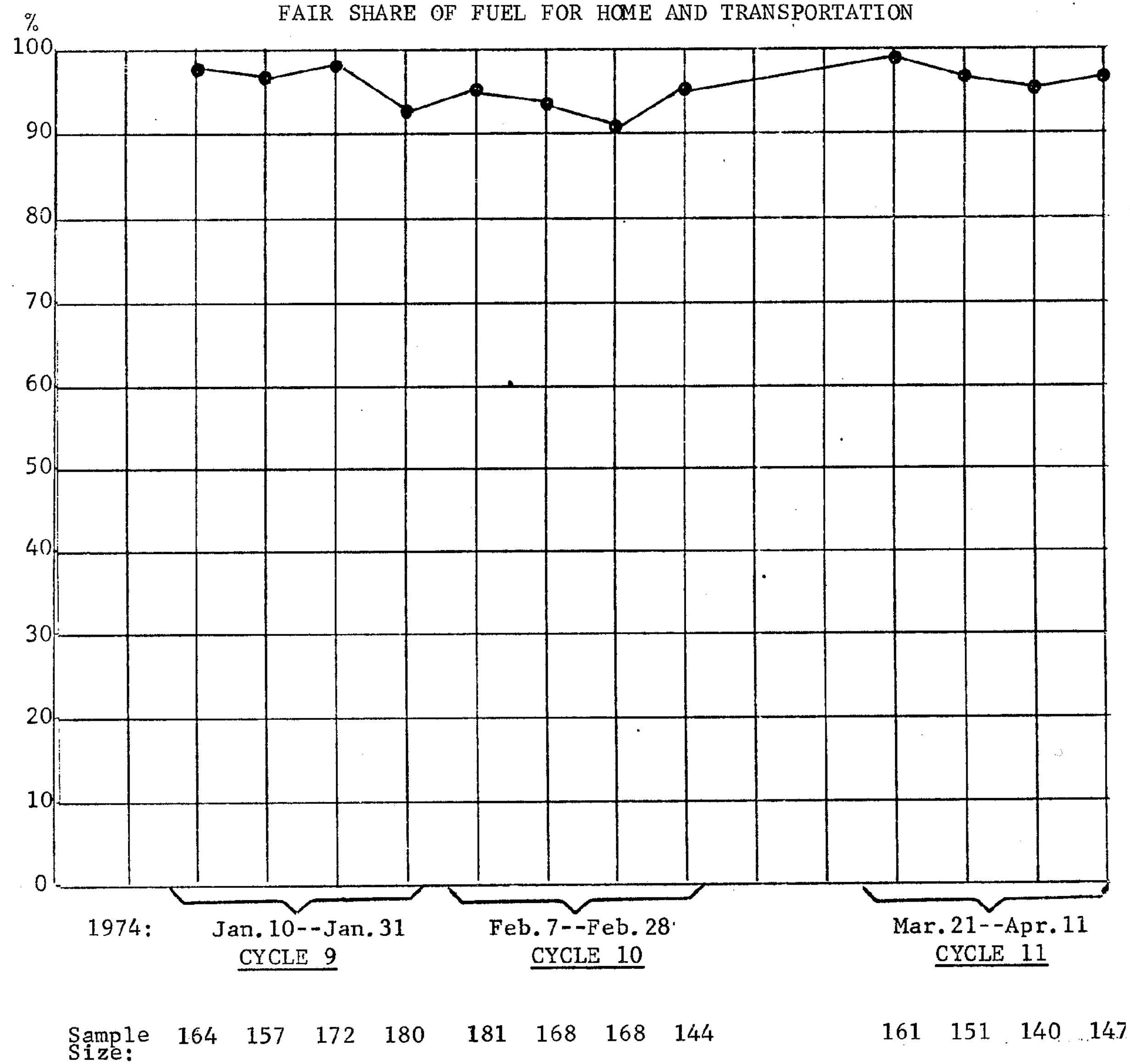


Figure D.2

PER CENT OF HOUSEHOLDS WHO FEEL THEY ARE SUFFERING MORE THAN PEOPLE OF OTHER INCOME LEVELS

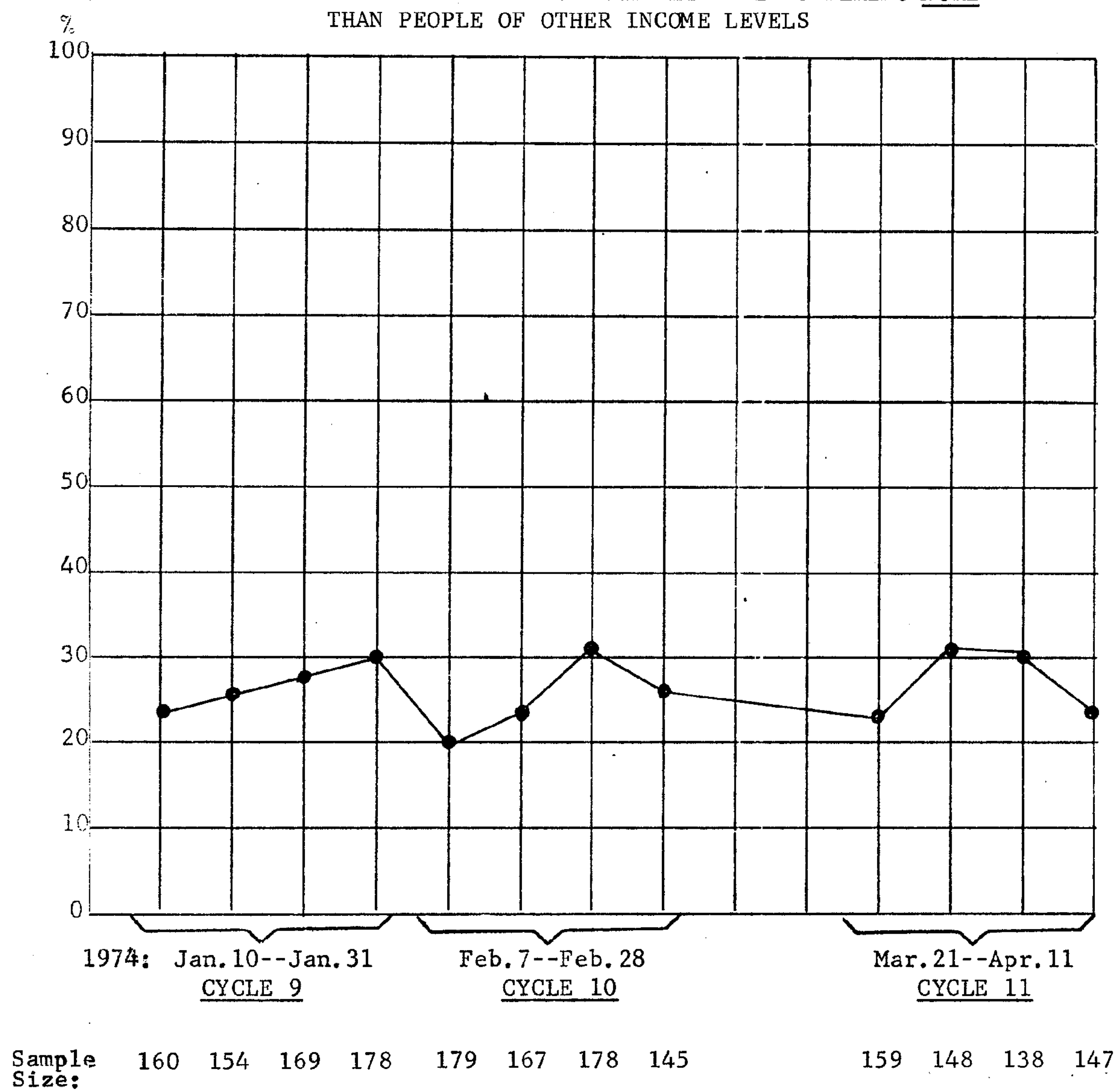


Figure D.3

PER CENT OF HOUSEHOLDS WHO FEEL THEY ARE SUFFERING MORE THAN PEOPLE OF OTHER INCOME LEVELS BY INCOME CLASS

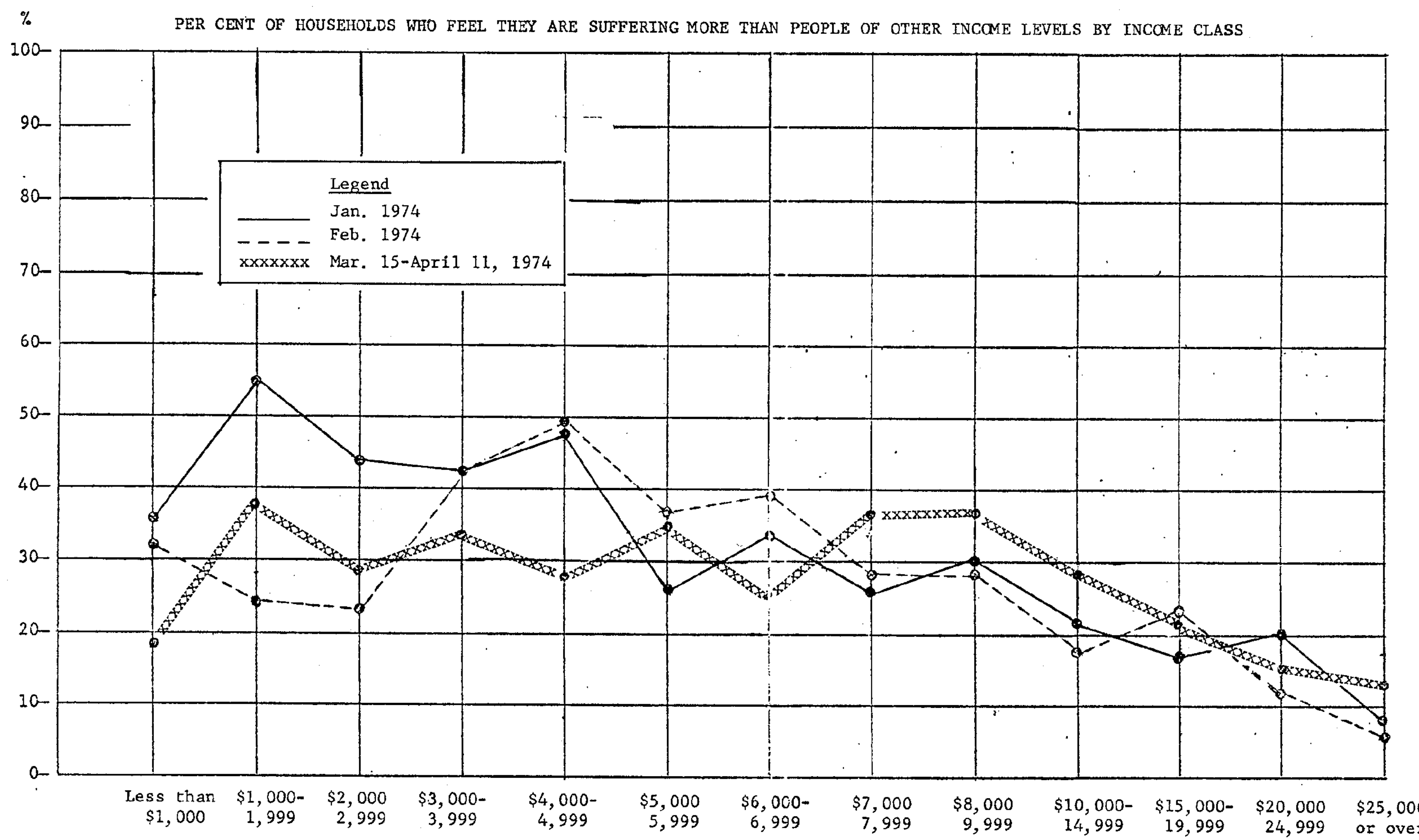


Figure D.4

PER CENT OF RESPONDENTS WHO FEEL THE ENERGY SHORTAGE HAS CHANGED THEIR WAYS OF LIVING

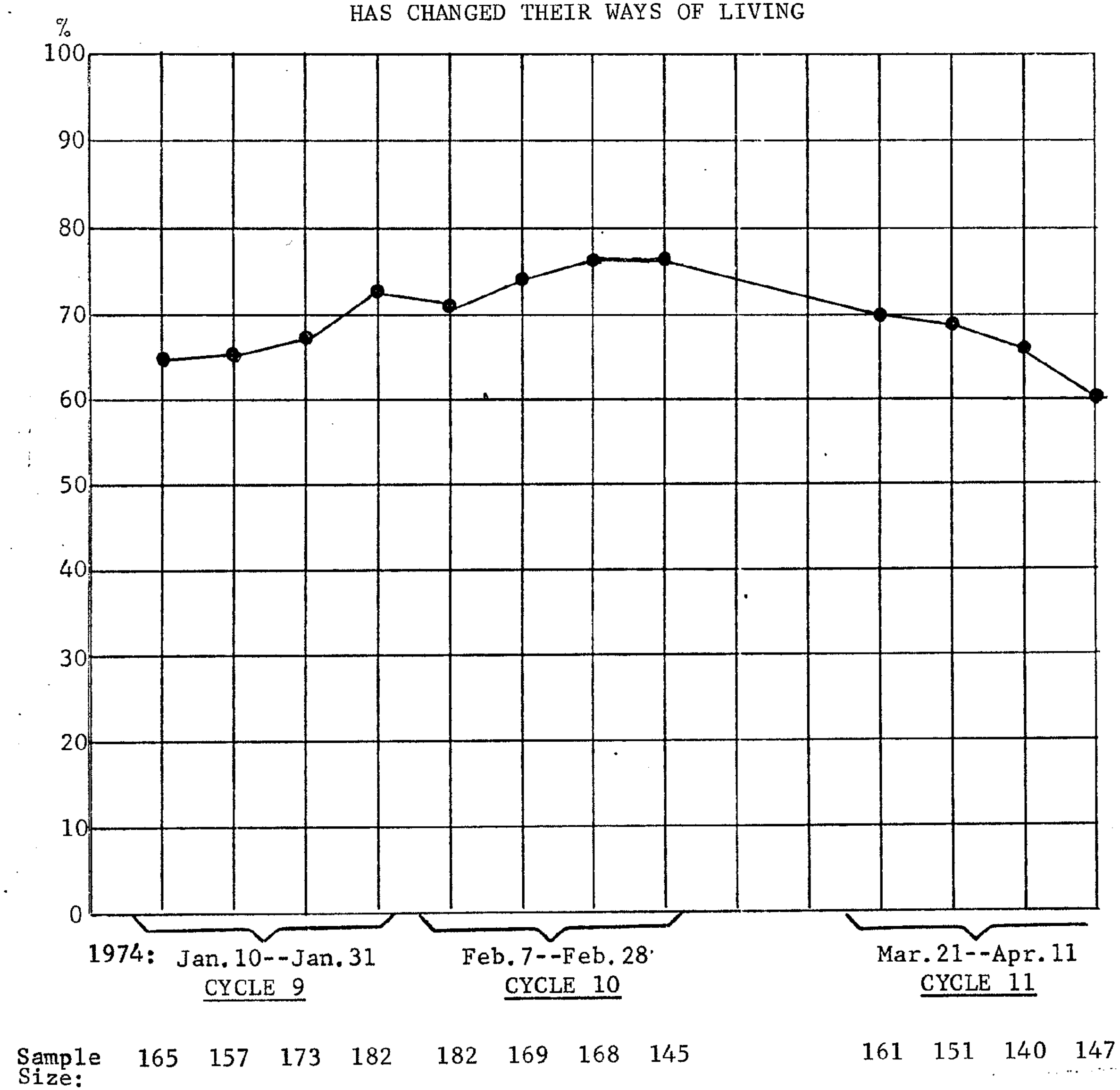
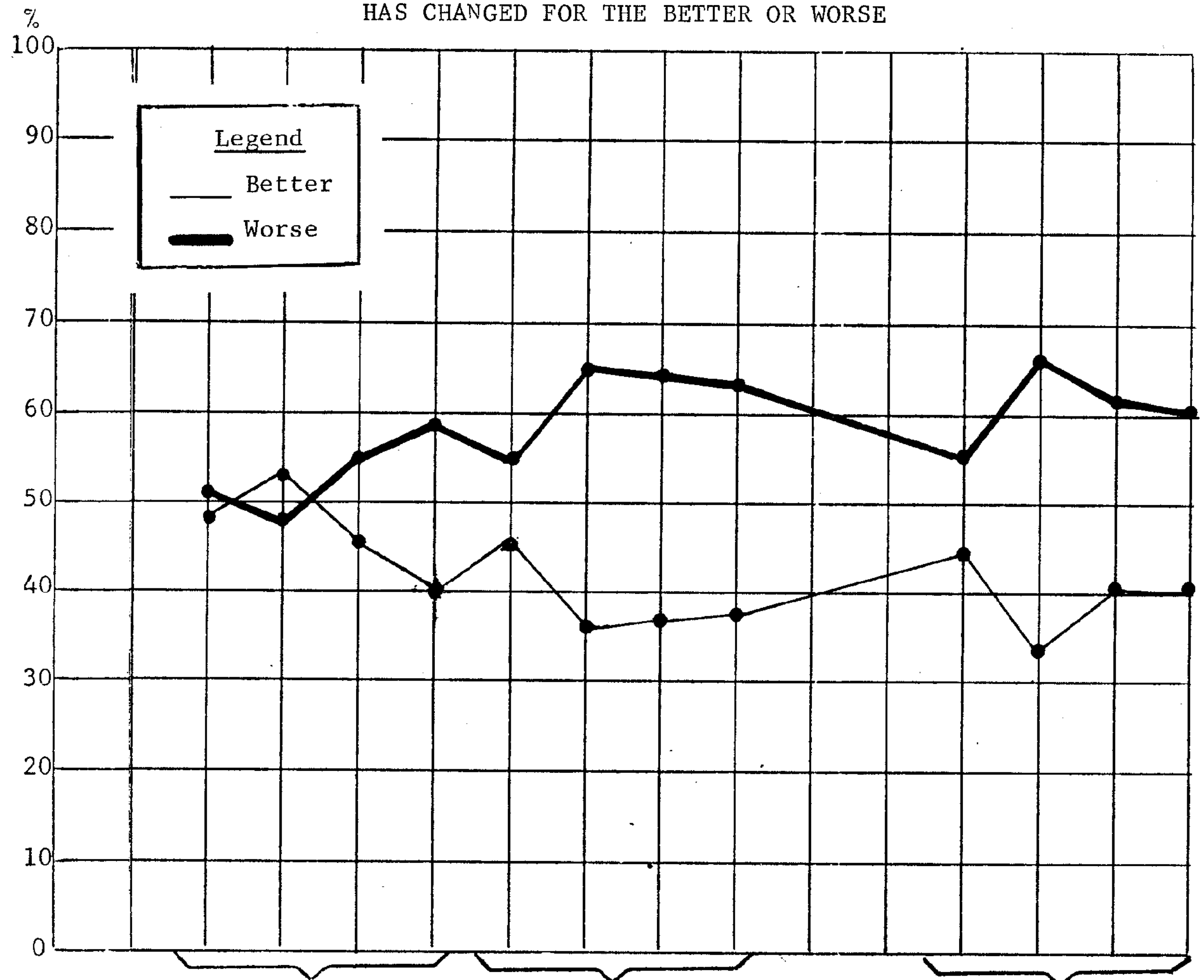


Figure D.5

PER CENT OF RESPONDENTS WHO FEEL THEIR LIFE
HAS CHANGED FOR THE BETTER OR WORSE



1974: Jan. 10--Jan. 31
CYCLE 9

Feb. 7--Feb. 28
CYCLE 10

Mar. 21--Apr. 11
CYCLE 11

Sample Size: 105 100 111 126 127 124 125 112 113 103 91 88

Figure D.6

THOSE RESPONDENTS WHO ARE ANGRY, ANNOYED OR RESIGNED
BECAUSE THEIR LIFE HAS CHANGED FOR THE WORSE

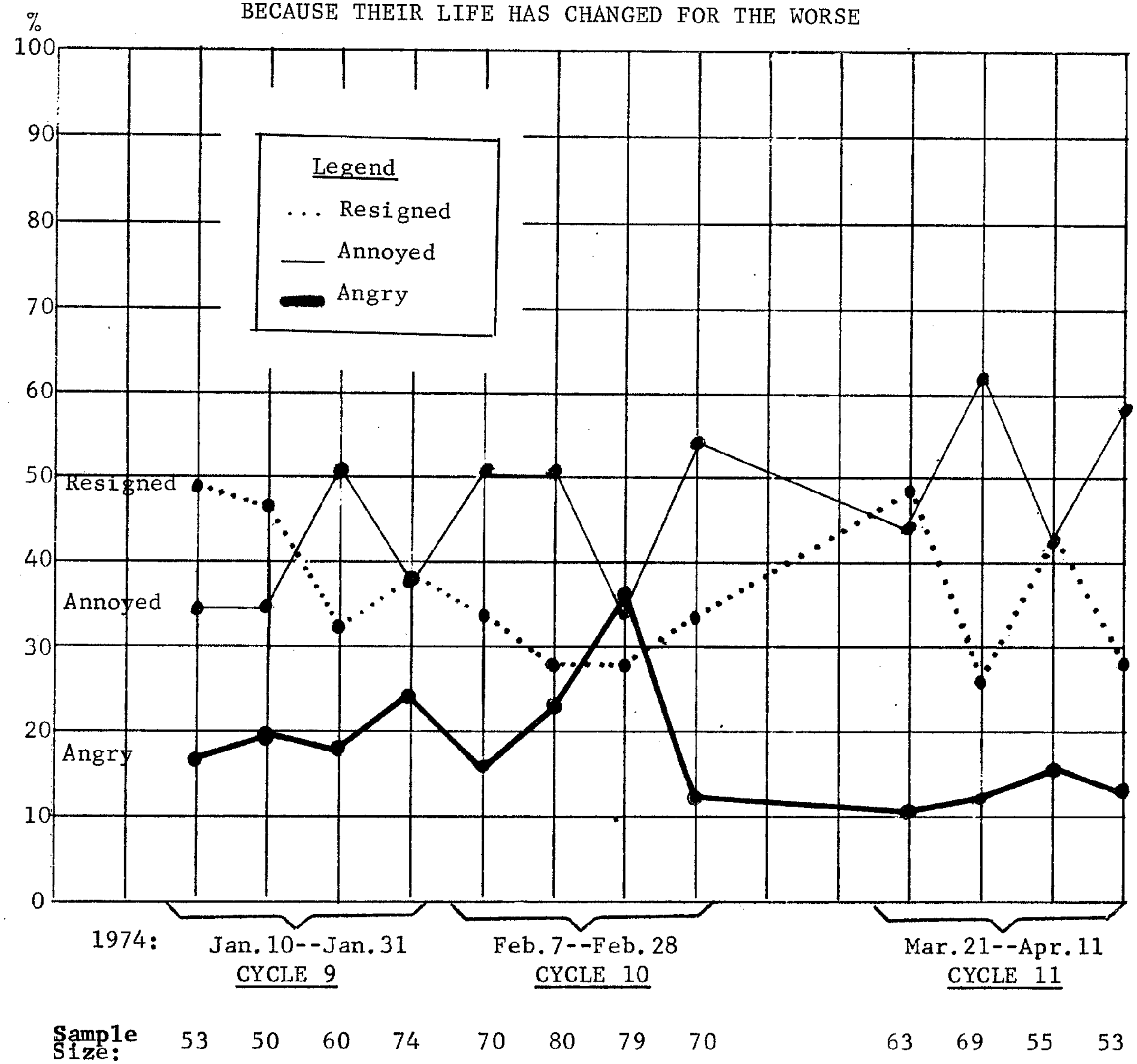
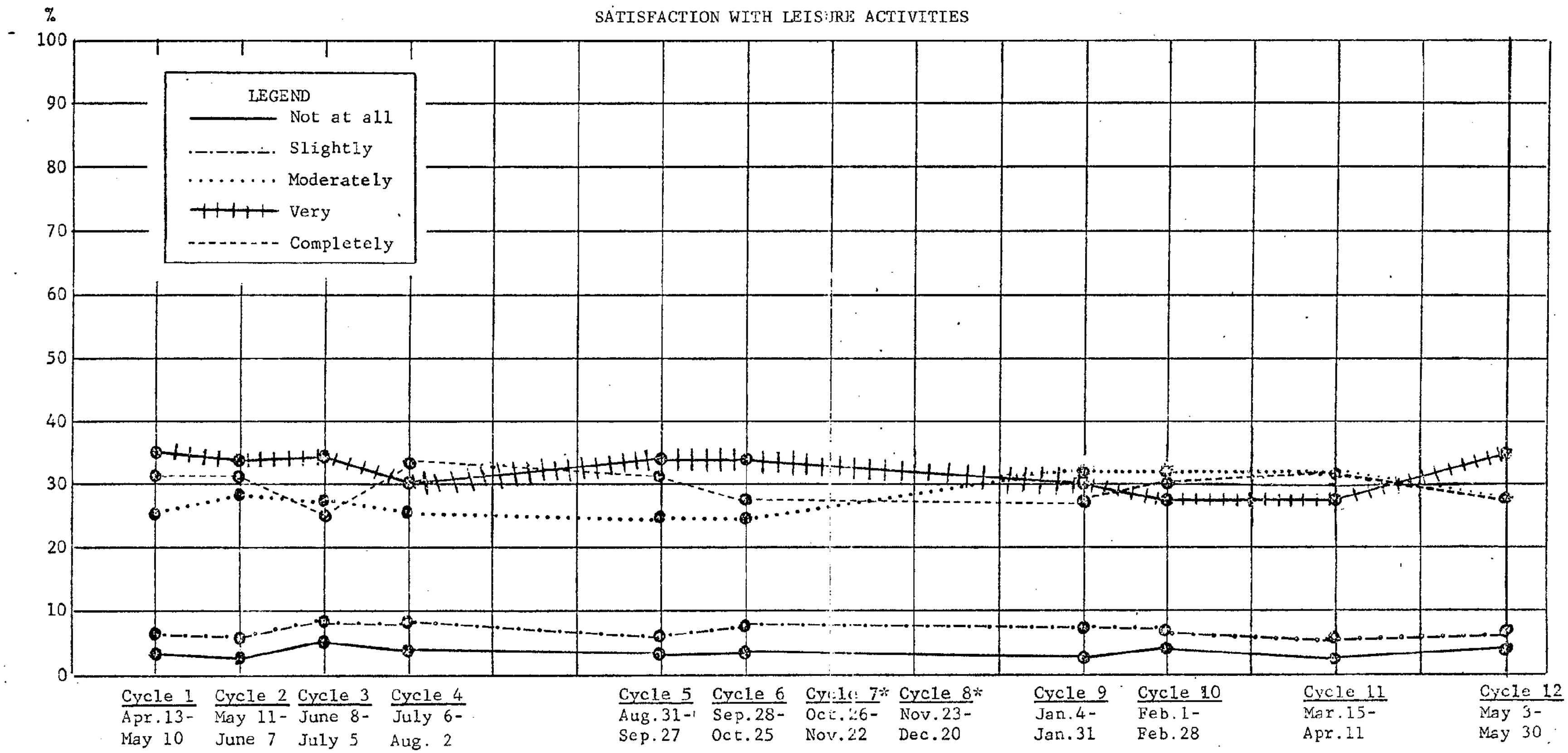


Figure D.7

SATISFACTION WITH LEISURE ACTIVITIES



*NOTE: Data not collected for this question during these months

Figure D.8

SATISFACTION WITH LEISURE ACTIVITIES

(Weekly Results)

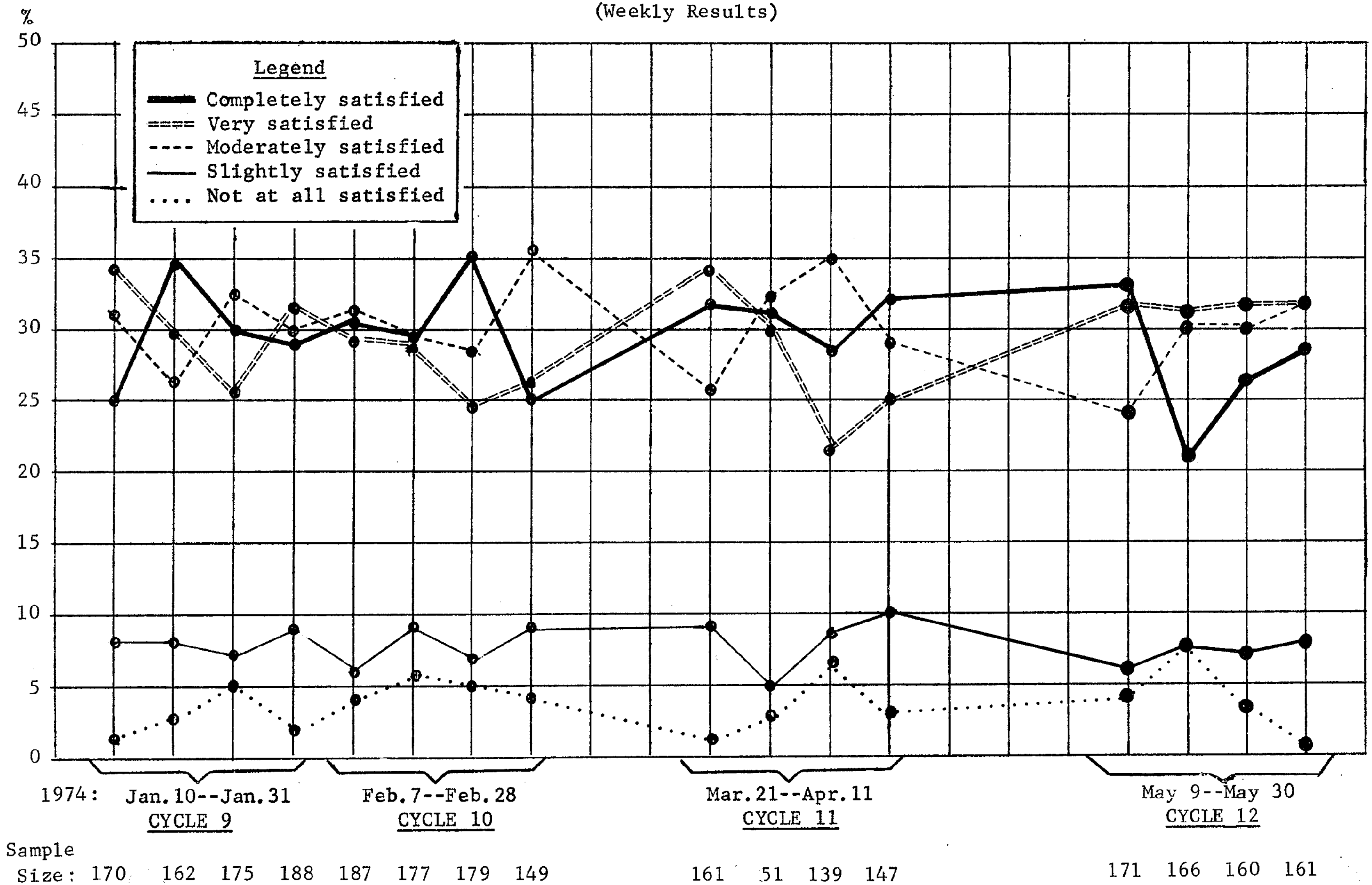


Figure D.9

PER CENT OF CAR-OWNING HOUSEHOLDS WHO FEEL THEY ARE ABLE TO USE THEIR CAR AS MUCH AS THEY WANT

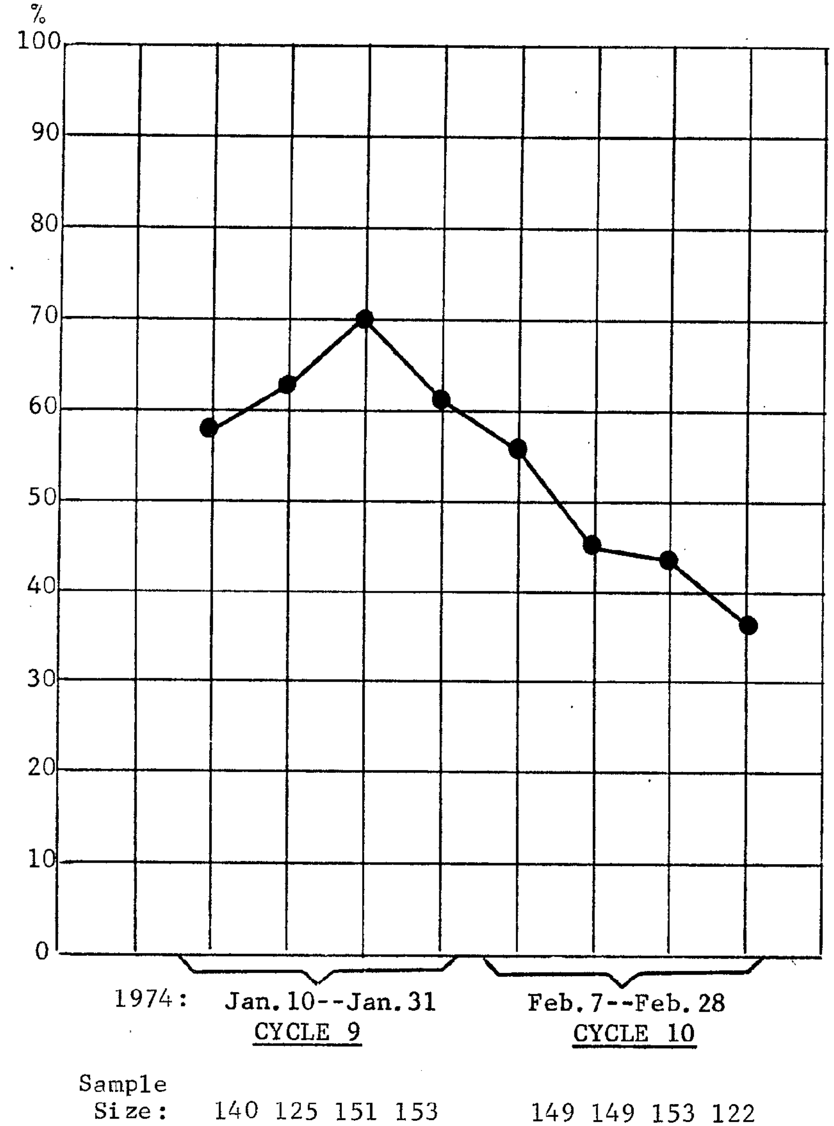


Figure D.10

PER CENT OF HOUSEHOLDS WHO ARE SATISFIED WITH
HOW MUCH THEY ARE ABLE TO USE THEIR CARS

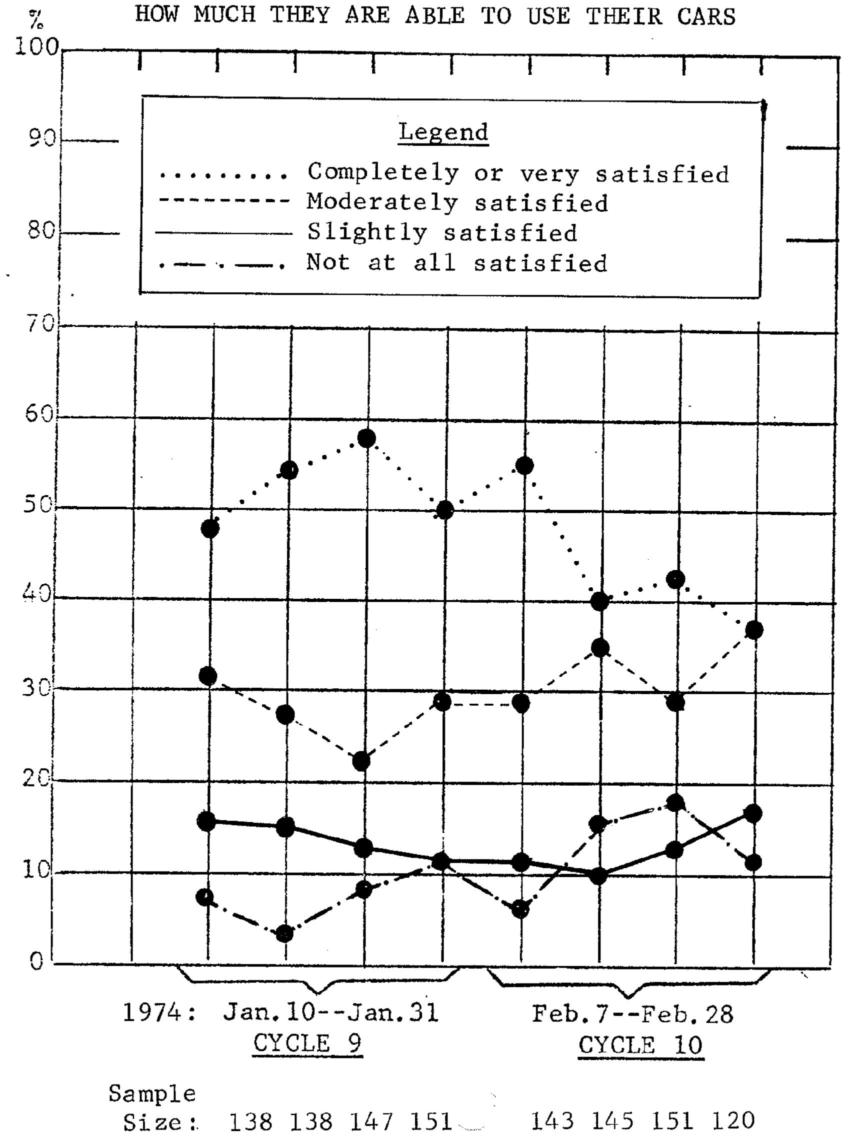


Table D.1

RESPONSES TO QUESTIONS CONCERNING PERSONAL REACTIONS TO THE ENERGY SHORTAGE

Question	Response Category	Per Cent Answering		N	
		Cycle 10	Cycle 11	Cycle 10	Cycle 11
Respondents were asked to state their belief regarding the degree which individual consumers can help solve the gasoline shortage through cutting down their driving.	The gasoline shortage can be solved if individual consumers cut down gasoline consumption	67	58	684	600
	It makes little difference what individual consumers do.	33	42		
		Cycle 9	Cycle 10	Cycle 9	Cycle 10
How comfortable are you with the daytime temperature of your house or apartment this winter?	Much too warm	1	1		
	A little too warm	2	3		
	Just right	72	63	650	684
	A little too cold	24	30		
	Much too cold	2	3		
How comfortable are you with the daytime temperature of the place that you work this winter?	Much too warm	3	3		
	A little too warm	7	8		
	Just right	50	62	360	349
	A little too cold	27	22		
	Much too cold	13	5		

Table D.2

RESPONSES TO QUESTIONS CONCERNING TRUCKERS' ACTIONS AND GASOLINE PRICES

(Cycle 11)

Question	Response Category	Per Cent Answering	N
As you know, many truckers have been doing such things as striking and blocking highways in order to bring attention to such problems as getting fuel and increases in costs of doing business. Do you . . . of what the truckers have been doing.	Strongly approve	15	600
	Somewhat approve	35	
	Somewhat disapprove . . .	27	
	Strongly disapprove . . .	24	
Let's say you had a choice between two filling stations when you wanted to buy gasoline. Both stations sold 10 gallons to each customer. One station charged 50¢ a gallon but you'd have to wait in line for 45 minutes to an hour. The other station charged $1.00 a gallon but there would be no line. At which filling station would you choose to buy your gasoline?	At the station charging 50¢ a gallon in spite of the wait	82	518
	At the station charging $1.00 a gallon with no wait	18	

APPENDIX E: POLICY PREFERENCES

APPENDIX E: POLICY PREFERENCES--Continued

APPENDIX E: POLICY PREFERENCES--Continued

Table E.1

RESPONSES TO THE QUESTION "WHAT THREE ACTIONS WOULD YOU MOST LIKE FEDERAL, STATE OR LOCAL GOVERNMENT TO DO IN ORDER TO CUT FUEL CONSUMPTION?"

(Per Cent)

Response Categories	1st Choice				2nd Choice				3rd Choice			
	Cycle 10 (N=685)	Cycle 9 (N=676)	Cycle 8 (N=663)	Cycle 4 (N=588)	Cycle 10 (N=681)	Cycle 9 (N=669)	Cycle 8 (N=662)	Cycle 4 (N=583)	Cycle 10 (N=673)	Cycle 9 (N=667)	Cycle 8 (N=659)	Cycle 4 (N=578)
Limit of 50 mph .	31	33	34	22	11	10	17	11	6	11	8	9
Ration gasoline .	9	6	9	8	9	8	12	6	10	6	10	8
Increase gas tax .	1	1	2	2	1	1	1	2	1	2	2	1
Improve public transit	18	18	18	23	23	24	18	18	18	17	16	14
Relax anti-pollution standards .	5	6	5	10	7	8	7	11	14	13	11	15
Limit of 60 mph .	15	15	11	14	6	5	8	7	6	6	4	10

Table E.2

RESPONSES TO THE QUESTION "IF THERE IS NOT ENOUGH FUEL FOR EVERYONE, WHICH USES DO YOU THINK ARE MOST IMPORTANT?"

(Per Cent)

Response Categories	Absolutely Essential				Important				Not At All Important			
	Cycle 10	Cycle 9	Cycle 8	Cycle 4	Cycle 10	Cycle 9	Cycle 8	Cycle 4	Cycle 10	Cycle 9	Cycle 8	Cycle 4
Heating homes	57	60	60	61	43	40	40	38	0	0	0	1
Commercial freight transportation	38	35	30	30	62	64	69	68	0	01	01	2
Pleasure driving	1	01	01	1	66	66	57	58	33	34	48	41
Farming operations	59	59	56	55	41	41	44	44	0	0	01	0
Mass transit	34	31	28	27	66	69	72	69	0	01	01	4
Factory operations	50	46	43	42	50	54	57	58	0	0	0	1
Business driving by private citizens	22	24	20	17	75	74	76	76	3	02	04	8
National defense	51	50	X	X	47	49	X	X	2	02	X	X

Note: Sample Size = Cycle 10: 693
Cycle 9: 679
Cycle 8: 670
Cycle 4: 585

Table E.3

RESPONSES TO THE QUESTION "IF THE GOVERNMENT MUST RATION MOTOR FUEL, WHICH TYPE OF VEHICLES SHOULD GET IT FIRST, SECOND, AND THIRD?"

(Per Cent)

Response Category	1st Choice				2nd Choice				3rd Choice			
	Cycle 10 (N=686)	Cycle 9 (N=675)	Cycle 8 (N=664)	Cycle 4 (N=596)	Cycle 10 (N=688)	Cycle 9 (N=676)	Cycle 8 (N=660)	Cycle 4 (N=593)	Cycle 10 (N=683)	Cycle 9 (N=673)	Cycle 8 (N=660)	Cycle 4 (N=593)
Private cars . .	12	17	16	11	8	11	8	8	16	17	11	12
Taxis.	1	0	1	2	2	1	2	1	2	1	1	2
Urban mass transit	13	14	15	19	14	15	14	16	15	13	17	13
Buses for between-city trips. . .	3	2	4	3	5	6	6	7	4	7	6	6
Passenger trains for between-city trips. . .	2	1	2	1	3	4	4	3	3	5	5	4
Railroad freight trains	10	6	8	7	18	16	18	17	16	13	16	16
Trucks	17	11	9	6	25	19	21	14	15	18	16	18
Commercial air-lines	1	2	2	2	2	3	3	6	4	4	7	5
Private air-planes	0	1	0	1	1	1	0	0	0	1	1	1
Farm work vehicles. . . .	40	44	39	47	20	19	20	21	17	14	16	14
Construction vehicles. . . .	1	0	1	1	4	5	4	7	6	6	5	9

Figure E.1

WHO SHOULD GET FUEL (1st CHOICE)

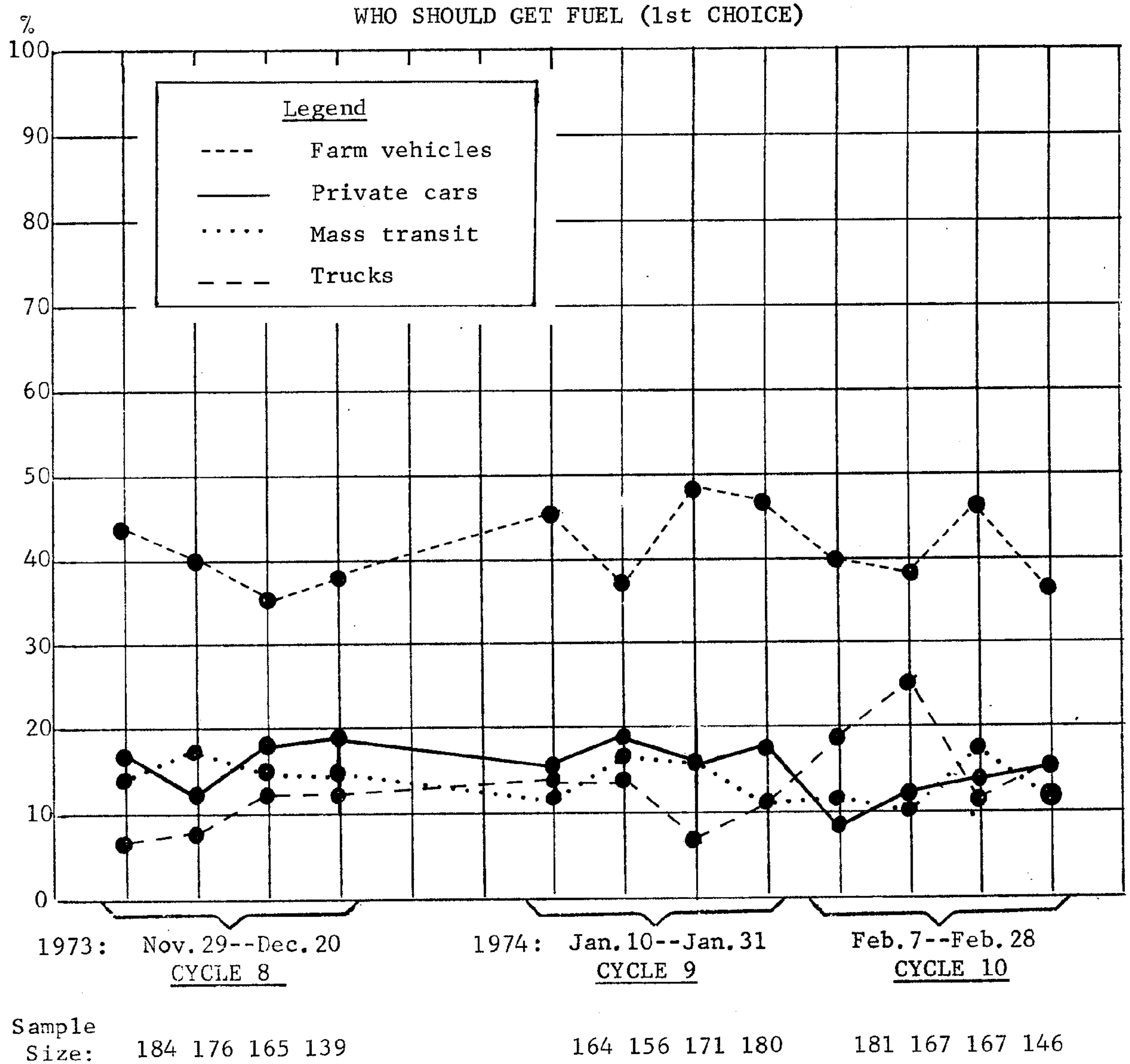


Figure E.2

IS GAS RATIONING NECESSARY?

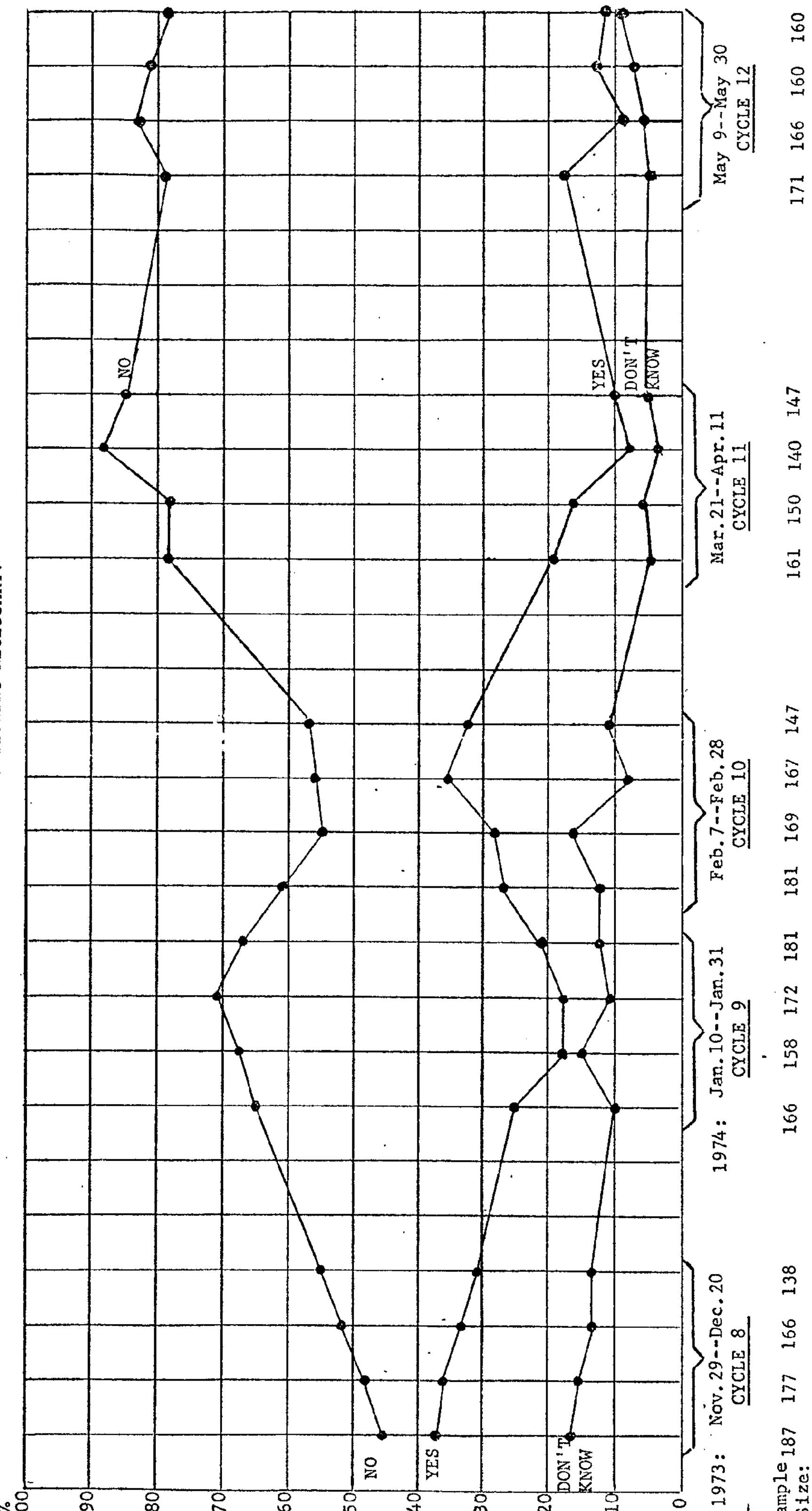


Table E.4

RESPONSES TO QUESTIONS CONCERNING THE NECESSITY OF GASOLINE RATIONING

(Cycle 11)

Question	Response Category	Per Cent Answering	N
Those respondents who think gasoline rationing is necessary were asked: Why do you think gasoline rationing throughout the nation is necessary?	Rationing is the fairest way to sell gasoline when it's scarce	67	78
	Rationing would force people to conserve	37	
	Rationing would eliminate panic buying/ long lines	9	
	Rationing would keep the price of gasoline low	15	
Those respondents who think gasoline rationing is <u>not</u> necessary were asked: Why do you think gasoline rationing throughout the nation is <u>not</u> necessary?	There is no real shortage	64	493
	Against government regulation	9	
	Rationing would only create a "Black Market"	14	
	People can cut back voluntarily if necessary	21	
	I want to be able to buy all I need . . .	12	
	Rationing creates too much (red tape/bureaucracy)	9	
	Not necessary when gas prices increase .	15	

Table E.5

PER CENT CHOOSING VARIOUS ALTERNATIVES TO REDUCE THE AMOUNT OF GASOLINE BEING USED

(Per Cent)

Question: Because of the fuel shortage, the government may have to take some steps to reduce the amount of gasoline being used. Here are some things the government might do. I'll read them to you two at a time. Considering each pair by itself, please tell me which one of the two you would rather have the government do.

Alternative	Cycle 8 (N=599)	Cycle 9 (N=669)	Cycle 10 (N=661)
A. Make gasoline cost $1.00 a gallon	21	15	17
or			
Allow only 10 gallons of gasoline per week for each car at 50¢ a gallon	79	85	83
B. Allow 7 gallons of gasoline per week for each car at 50¢ a gallon, but let people buy more at $1.30 a gallon	63	61	62
or			
Let people find gasoline wherever they can and at whatever price they are willing to pay	37	39	38
C. Allow 7 gallons of gasoline per week for each car at 50¢ a gallon, but let people buy more at $1.30 a gallon	73	74	76
or			
Make gasoline cost $1.00 a gallon	27	26	24
D. Let people find gasoline wherever they can and at whatever price they are willing to pay	27	24	28
or			
Allow only 10 gallons of gasoline per week for each car at 50¢ a gallon	73	76	72
E. Allow only 10 gallons of gasoline per week for each car at 50¢ a gallon	56	61	59
or			
Allow 7 gallons per week for each car at 50¢ a gallon, but let people buy more at $1.30 a gallon	44	39	41
F. Make gasoline cost $1.00 a gallon	50	49	45
or			
Let people find gasoline wherever they can and at whatever price they are willing to pay	50	51	55

Table E. 6

SUMMARY RANK ORDER RESULTS FOR PAIRED SETS OF OPTIONS ON GAS ALLOCATIONS

(Per Cent)

Option	Cycle 8	Cycle 9	Cycle 10
First:			
Ration 10 gallons/week at $.50 gal. chosen over all other alternatives with an average	69	74	71
Second:			
Ration 7 gallons/week at $.50 gal. and buy over that at $1.30/gallon ... chosen over remaining options with an average	68	67	69
Third & Fourth:			
$1.00/gallon chosen over a free market . . .	50	49	45

NOTE: Clearly, the respondents prefer rationing at a stable price when forced to choose among these unpleasant alternatives, but will avoid rationing if given other non-price increasing options.

Figure E.3

PER CENT OF HOUSEHOLDS WHO FEEL THAT PEOPLE IN SOME AREAS OF THE COUNTRY SHOULD GET AN EXTRA AMOUNT OF GAS RATIONS

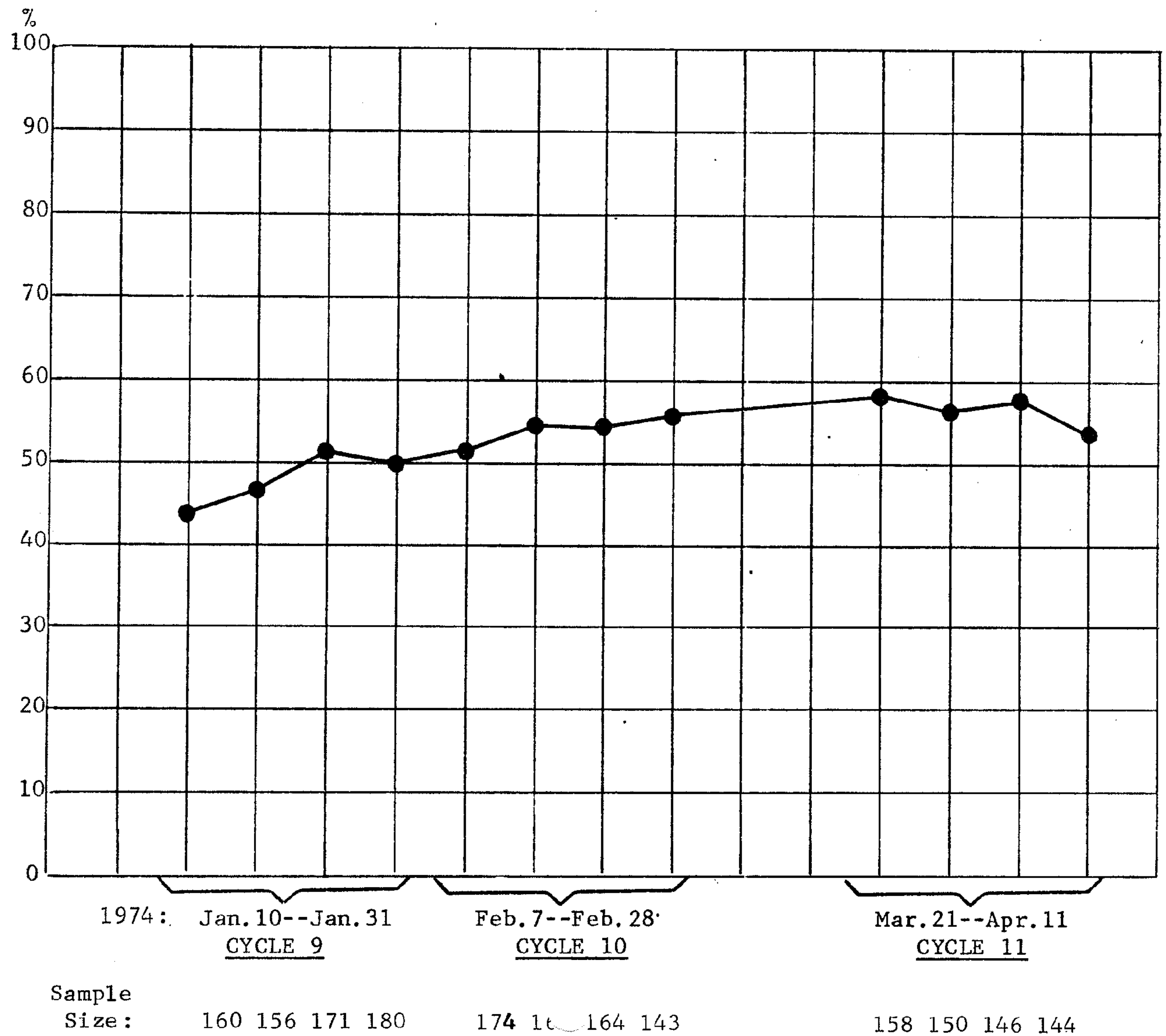


Figure E.4

PER CENT OF HOUSEHOLDS WHO FEEL PEOPLE LIVING IN AREAS WITH LITTLE OR NO PUBLIC TRANSPORTATION <u>SHOULD GET EXTRA RATION COUPONS</u>

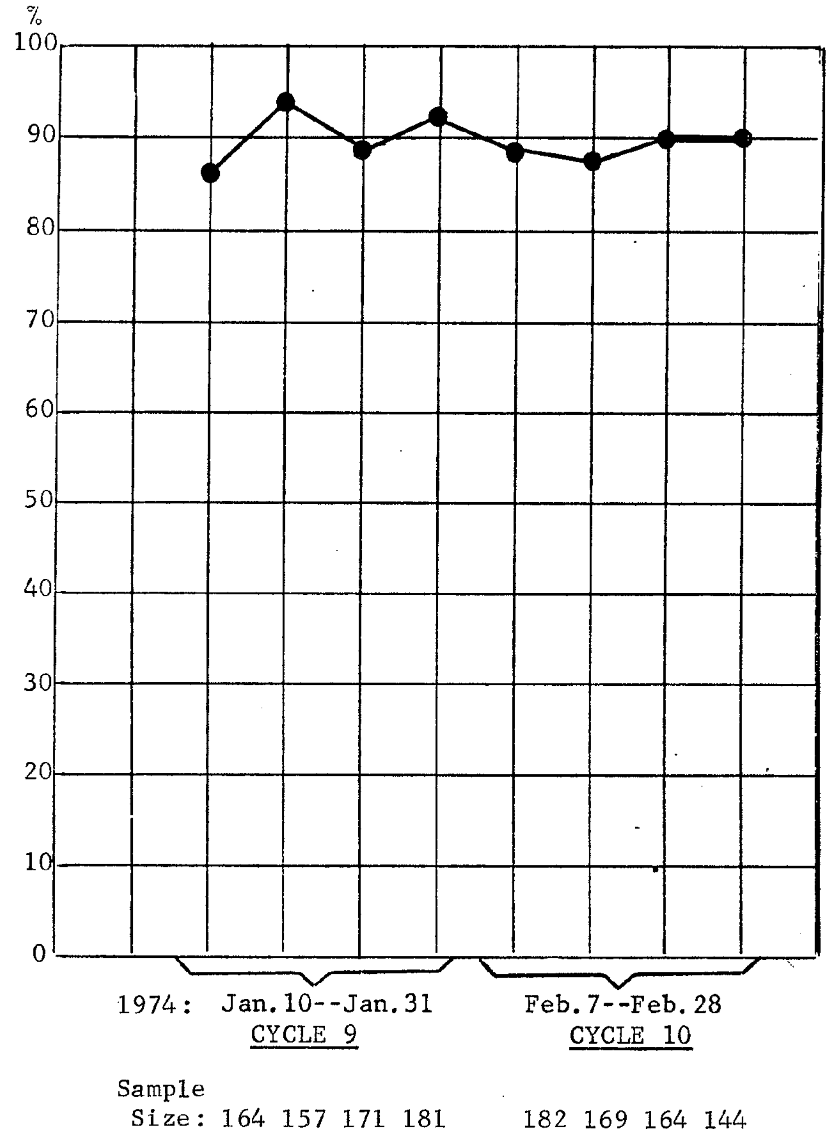
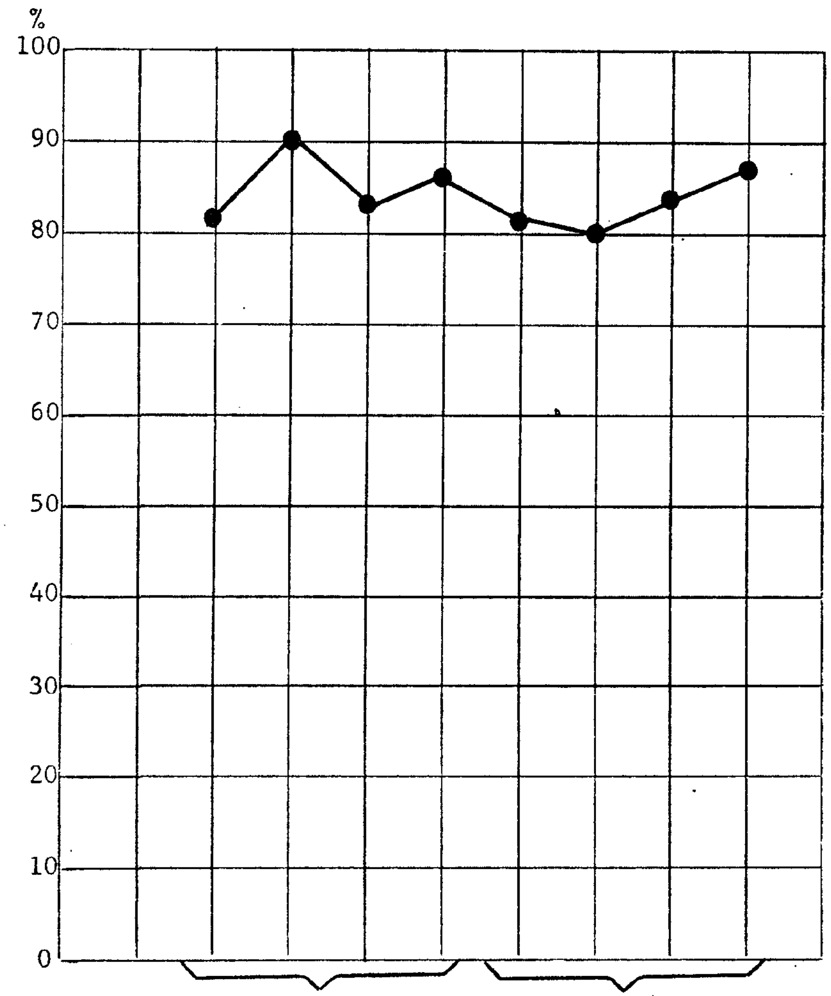


Figure E.5

PER CENT OF HOUSEHOLDS WHO FEEL PEOPLE WHO USE THEIR CARS FOR BUSINESS PURPOSES SHOULD GET EXTRA RATION COUPONS



1974: Jan. 10--Jan. 31 CYCLE 9 | Feb. 7--Feb. 28 CYCLE 10

Sample Size: 165 155 170 [illegible] 180 168 165 145

Figure E.6

PER CENT OF HOUSEHOLDS WHO FEEL RATION COUPONS SHOULD EXPIRE AT THE END OF:

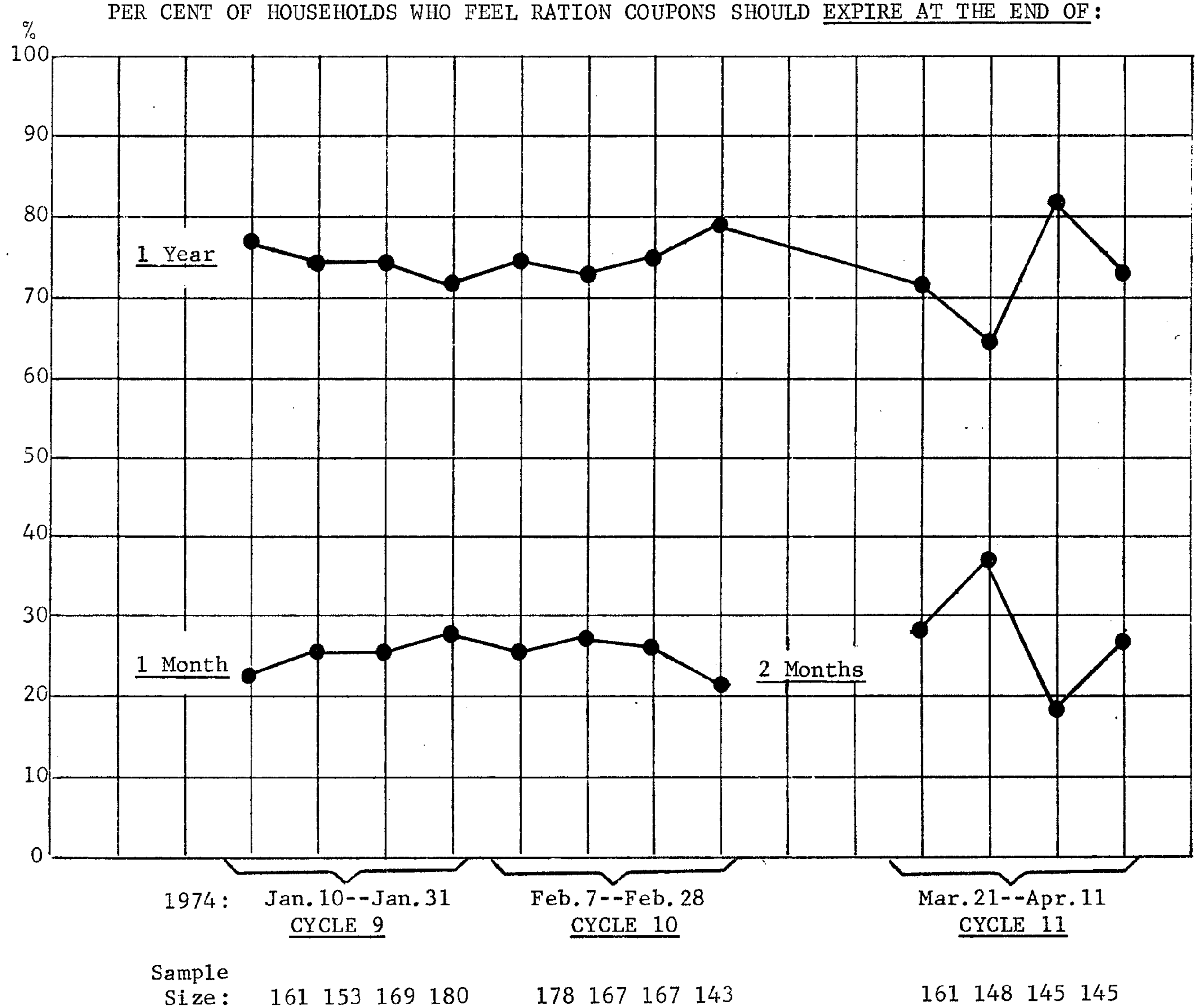


Table E. 7

PREFERENCES FOR ONE PLACE TO BUY OR SELL GASOLINE RATION COUPONS

(Per Cent)

Response Category	1st Choice		2nd Choice		3rd Choice	
	Cycle 10 (N=673)	Cycle 9 (N=671)	Cycle 10 (N=665)	Cycle 9 (N=669)	Cycle 10 (N=658)	Cycle 9 (N=670)
Special offices in supermarkets	11	13	27	25	25	26
Special windows in banks . . .	27	27	31	28	28	30
Gas stations . .	45	43	12	15	16	15
Special windows at post offices	16	14	29	29	25	22
Local draft boards	1	2	2	3	6	7

Table E.8

RESPONSES TO QUESTIONS CONCERNING GOVERNMENT ACTION IN RELATION TO THE ENERGY SHORTAGE

(Cycle 11)

Question	Response Category	Per Cent Answering	N
Some people believe that the government should not interfere with how the companies that supply such energy as fuel oil and gasoline run their business. Others believe that the government should closely regulate these companies. Which view comes closest to your way of thinking?	The gov't should not interfere with how the companies that supply energy run their business	24	597
	The gov't should closely regulate these companies	76	
Some people believe that, because of the energy shortage, the government should place limits on how much heating fuel can be used per household. Others believe that the government should stay out of the matter. Which view comes closest to your way of thinking?	The gov't should place limits on how much heating fuel can be used per household .	28	601
	The gov't should stay out of the matter .	72	
Some people think that the government should organize its own oil producing company to produce oil from reserves on government-owned land. The idea would be that if the government's company succeeded in producing oil more efficiently, the government's company could teach the private oil companies by example how to produce oil better. Others believe that the government should stay out of the oil producing business altogether, and that the private oil companies can figure out for themselves better ways to produce oil. Which view comes closest to your way of thinking?	The government should set up its own company to produce oil from gov't owned land	39	592
	The gov't should stay out of the oil producing business altogether	61	

Table E.9

LIKE VERSUS DISLIKE OF DAYLIGHT SAVINGS TIME

(Per Cent)

Question: As you know, we recently switched from Standard Time to Daylight Savings Time. That means that it now gets light an hour later in the morning than before we switched over. It also means that it now gets dark an hour later in the evening than before we switched over. How do you feel about being on Daylight Savings Time now? Would you say that you like it very much, like it somewhat, dislike it somewhat, or dislike it very much?

Response Category	Cycles and Dates			
	8: 11/23-12/20	10: 2/1-2/28	11: 3/15-4/11	12: 5/3-5/30
Like it very much	--	23	31	39
Like it somewhat	--	18	21	23
Dislike it somewhat	--	19	17	15
Dislike it very much	--	31	22	14
Don't care	--	10	10	10
N	--	(679)	(595)	(644)

Question: Same question as Cycle 10, except question read as follows: "Would you prefer to be on Daylight Savings Time all year around instead of just being on it for part of the year?"

Yes	76	--	--	--
No	24	--	--	--
N	(637)	---	---	---

Table E.10

APPROVE VERSUS DISAPPROVE OF YRDST

(Per Cent)

Response Category	Cycles and Dates					
	5: 8/31-9/27	6: 9/28 10/25	7: 10/26-11/22	10:[a] 2/1-2/28	11: 3/29-4/11	12: 5/3-5/30
Approve	49	48	58	37	45	42
Don't care	22	24	22	16	18	19
Disapprove	25	24	17	47	35	37
Don't know	2	3	3	1	2	2
N . . .	(613)	(593)	(648)	---	(285)	(645)

[a]This question was not asked in Cycle 10. These percentages represent estimates.

Table E.11

APPROVE VERSUS DISAPPROVE OF YRDST, RELATIVE TO ENERGY SAVINGS AND MONTHS OF YEAR

(Per Cent)

Question	Response Category	Cycles and Dates	
		11: 3/29-4/11	12: 5/3-5/30
(If Approved of YRDST--See Table E.10--this Question was Asked): Suppose it turned out that the country saved very little energy as a result of being on Daylight Savings Time most of this winter. Would you approve or disapprove of remaining on Daylight Savings Time all year round next year, or wouldn't you care one way or the other?	Approve	--	73
	Disapprove . . .	--	13
	Don't care . . .	--	14
	Don't know . . .	--	1
	N	---	(273)
(If Disapprove): What months would you prefer not to be on Daylight Savings Time?	January	73	75
	February	71	68
	March	36	41
	April	8	17
	May	6	6
	June	5	6
	July	3	5
	August	4	4
	September . . .	8	10
	October	28	28
	November	52	59
	December	70	74
	N	(102)	(204)

Table E.12

PREFERENCES FOR SUNLIGHT

(Per Cent)

Question	Period	Morning	Evening	N
Which is more important to you, to have it get light in the morning when you want, or to have it get dark in the evening when you want?	8/31-9/27, 1973	38	62	(511)
	9/28-10/25, 1973	35	62	(465)
	10/26-11/22, 1973	32	67	(505)
	3/29-4/11, 1974	44	56	(269)
	5/3-5/30, 1974	51	49	(600)

Table E.13

WAYS RESPONDENTS REPORT LIKING YRDST

Question: If we had Daylight Savings Time all year round, in what ways would you like it? (Cycles 5, 6, and 7)

Now that we have Daylight Savings Time all year round, in what ways do you like it? (Cycles 11 and 12)

Response Category	Cycles and Dates				
	5: 8/31-9/27	6: 9/28-10-25	7: 10/26-11/22	11: 3/29-4/11	12: 5/3-5/30
Makes travel easier in the evening	19	14	15	9	8
Improves my ability to perform work activities . . .	9	6	9	7	7
Helps my business	3	2	1	1	2
I have more useful free time with family	17	11	13	13	10
Permits extra social and recreational activity . .	23	20	25	16	21
[I/Family member(s)] feel safer on streets in the evening	14	6	8	5	4
Prevents having to change clocks twice a year . . .	18	15	12	6	5
Saves on (fuel/lighting/energy)	12	7	16	7	6
I have light when I need it.	19	22	22	39	31
Increases the amount of time for outdoor play for children	--	--	--	13	8
Changes the hours schools are open	--	--	--	21	1
I would not like it in any way	16	14	11	--	16
Other	15	12	17	9	13
Permits more outdoor work in the evening	--	--	--	--	29

Table E.14

WAYS RESPONDENTS REPORT DISLIKING YRDST

(Per Cent)

Question: If we had Daylight Savings Time all year round, in what ways would you not like it? (Cycles 5, 6, and 7)

Now that we have Daylight Savings Time all year round, in what ways do you not like it? (Cycles 11 and 12)

Response Category	Cycles and Dates				
	5: 8/31-9/27	6: 9/28-10/25	7: 10/26-11/22	11: 3/29-4/11	12: 5/3-5/30
Children have to go to school in the dark	17	13	10	38	33
I get up in the dark	22	17	12	22	25
[I/Family member(s)] feel less safe on the streets in the morning	5	3	0	5	3
Causes a delay in time when I could start work in the morning	4	2	1	5	2
Hurts my business	1	1	0	0	1
Makes travel harder in the morning	6	4	3	7	8
Mixes up my schedule	6	4	4	5	10
Religious reasons	1	1	0	1	0
There is nothing I do not like about it	41	41	58	2	38
Other	10	12	11	0	9
Hurts my performance on the job	--	--	--	12	1
Changes the hours schools are open	--	--	--	39	1
Use more energy	--	--	--	--	5

Table E.15

WAYS RESPONDENTS FEEL YRDST HELPS THE COUNTRY

(Per Cent)

Question: What about the country as a whole? In what ways do you think life in this country might be helped if we had Daylight Savings Time all year round? (Cycles 5, 6, and 7)

What about the country as a whole? In what ways do you think life in this country is helped by having Daylight Savings Time all year round? (Cycles 11 and 12)

Response Category	Cycles and Dates				
	5: 8/31-9/27	6: 9/28-10/25	7: 10/26-11/22	11: 3/29-4/11	12: 5/3-5/30
Improves highway safety, less accidents	17	9	9	16	6
Saves electricity	19	13	40	5	11
Improves business	7	5	3	7	3
Makes trips from work faster and easier	9	3	2	6	2
Increases opportunities for social and recreational activities	21	17	12	46	18
I/We have light when we need it	14	13	11	15	8
Other	18	19	19	8	13
Does not help life in this country at all	24	27	17	1	35
Saves gasoline	--	--	--	0	1
Saves heating fuel	--	--	--	3	2
Saves (energy/fuel) (unspecified as to type of energy or fuel) . . .	--	--	--	3	13
Increases the amount of time for outdoor play for children	--	--	--	1	6
Changes the hours schools are open	--	--	--	3	0
Reduces crime	--	--	--	14	3
Permits more outdoor work on the house or yard in the late afternoon	--	--	--	--	11

Table E.16

WAYS RESPONDENTS FEEL YRDST IS BAD FOR THE COUNTRY

(Per Cent)

Question: In what ways do you think going onto Daylight Savings Time all year round might not be good for life in this country? (Cycles 5, 6, and 7)

In what ways do you think going onto Daylight Savings Time all year round is not good for life in this country? (Cycles 11 and 12)

Response Category	Cycles and Dates				
	5: 8/31-9/27	6: 9/28-10/25	7: 10/26-11/22	11: 3/29-4/11	12: 5/3-5/30
Hurts farmers	10	7	8	10	7
Is bad for people who have to get up early	13	10	7	14	13
Children have to go to school in the dark	18	11	7	50	43
There are more accidents in the morning	6	4	2	9	8
Makes driving more dangerous in the morning	6	5	3	7	8
Hurts business	2	1	1	2	1
People have to change their way of living	7	4	3	5	6
Change is bad (unspecified).	3	2	1	13	2
Other	7	8	11	31	6
Is not bad in any way for life in this country . . .	38	41	52	6	30
Changes the hours schools are open	--	--	--	0	1
Use more energy	--	--	--	--	14

Table E.17

CHANGES IN BEHAVIORS DUE TO EXPERIMENTAL YRDST

(Per Cent)

Question	Response Category	Cycles and Dates: 11: 3/29-4/11	Cycles and Dates: 12: 5/3-5/30
Have you been doing anything different in the evening due to the extra hour of daylight?			
	Yes	24	38
	No	76	62
	N	(595)	(645)
IF YES: What?	Been leaving work later	15	8
	Been using public transportation more	0	0
	Been walking more	10	7
	Been doing more errands/shopping in the late afternoon	12	11
	Been going out more for recreation in the late afternoon	36	51
	Been doing more outdoor work around the house	32	3
	Been doing more indoor recreational activities in the late afternoon	--	15
	Been doing more housework indoors in the late afternoon	--	59
	Other	--	8
	N	(146)	(245)
Would you say that you are now driving (more/less/about the same) in the late afternoon as you were before we went back onto DST?			
	More	14	15
	Less	21	12
	About the same	55	59
	Not applicable	10	14
	N	(145)	(245)

Table E.18

SAFETY OF SCHOOL CHILDREN

(Per Cent)

Question	Response Category	Cycle and Dates: 11: 3/29-4/11	12: 5/3-5/30
There have been some accidents involving children on their way to school this winter. Some people think that such accidents were caused by the extra hour of darkness in the morning that winter Daylight Savings Time brought. Others think such accidents would have occurred even if we were not on Daylight Savings Time. Which view comes closest to your way of thinking?			
	Such accidents were caused by the extra hour of darkness in the morning	70	65
	Such accidents would have occurred even if we were not on Daylight Savings Time . .	31	35
	N	(282)	(630)
Do you think that we should go off Daylight Savings Time next winter because some people have been concerned about the safety of children on their way to school in the morning?			
	Yes	58	58
	No	42	42
	N	(279)	(634)
As far as you know, have children in <u>your</u> community been having any extra problems this winter getting to school safely in the morning?			
	Yes	20	18
	No	66	69
	Don't know	14	13
	N	(285)	(644)
<u>IF YES</u>: Do you think these extra problems were because of the additional hours of darkness in the morning?			
	Yes	96	99
	No	4	1
	N	(56)	(112)

(Table E.18 continued)

Table E.18--Continued

Question	Response Category	Cycles and Dates 11: 3/29-4/11	12: 5/3-5/30
IF THERE ARE ANY CHILDREN UNDER 18 IN THE HOUSEHOLD			
During the past January and February, that is, January and February of 1974, (was/were) the (child/children) ever driven to school by car?	Yes	56	53
	No	44	46
	N	(91)	(245)
IF YES: About how many times a week did the (child/children) go to school by car during the months of January and February?	Less than once a week .	18	21
	Once a week	10	10
	Twice a week	12	3
	Three times a week . .	6	3
	Four times a week . . .	2	5
	Five times a week . . .	53	58
	N	(51)	(126)
During January and February of last winter--that is, during January and February of 1973, (was/were) the (child/children) ever driven to school by car?	Yes	39	37
	No	57	59
	N.A.	4	3
	N	(91)	(243)
IF YES: About how many times a week did the (child/children) go to school by car during the months of January and February last winter (1973)?	Less than once a week .	11	20
	Once a week	14	12
	Twice a week	11	8
	Three times a week . .	3	7
	Four times a week . . .	0	2
	Five times a week . . .	60	52
	N	(35)	(91)
During the months of January and February of this winter (1974), was it dark outside when the (child/children) left for school in the morning?	Yes	71	68
	No	29	30
	N	(91)	(243)
IF YES: In January and February of this winter, did you ever send the (child/children) to school in a car because it was dark in the morning?	Yes	31	21
	No	69	79
	N	(35)	(81)

(Table E.18 continued)

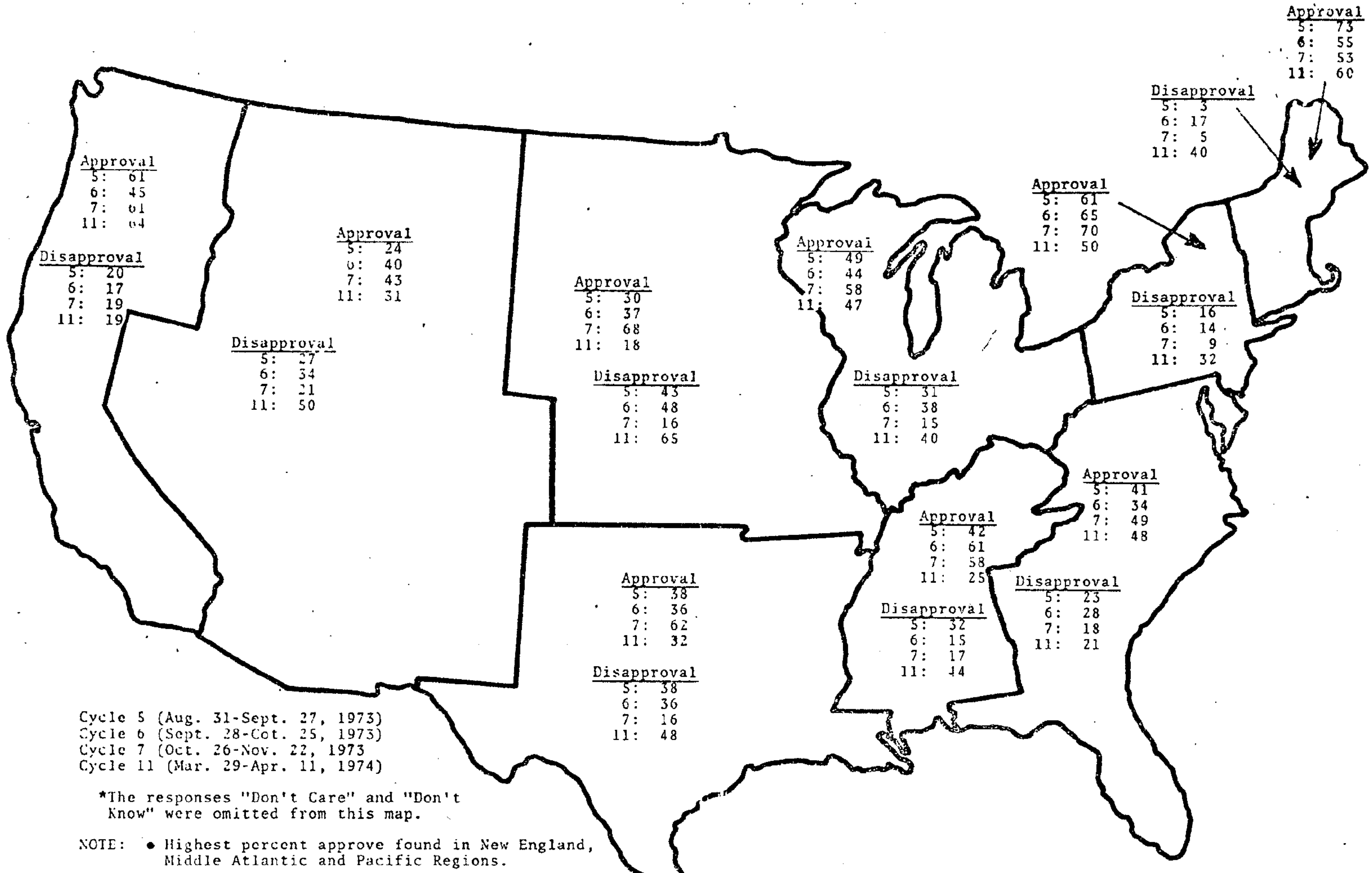
Table E.18--Continued

Question	Response Category	Cycles and Dates: 11: 3/29-4/11	12: 5/3-5/30
During January, February or March of this year, did the public schools - elementary or high schools - start classes later in the morning than usual?	Yes	--	32
	No	--	50
	Don't know	--	18
	N	---	(641)
IF YES: A. During those months, did the schools start classes later in the morning than usual because of the extra hour of darkness in the morning that winter Daylight Savings Time brought?	Yes	--	95
	No	--	2
	Don't know	--	4
	N	---	(202)
B. About how much later in the morning than usual did classes start?	Less than 15 minutes	--	1
	15 min. to less than ½ hour	--	17
	½ hr. to less than 45 minutes	--	29
	45 min. to less than 1 hour	--	22
	1 hour or more	--	31
	N	---	(197)
C. Now that it is Spring, have the public schools moved the starting time for classes back to the time usual before January 1, 1974?	Yes	--	78
	No	--	22
	N	---	(184)
D. IF YES: When did the public schools move the starting time for classes back to the usual time? During February, March, April, or May?	February	--	14
	March	--	56
	April	--	28
	May	--	2
	N	---	(128)

Figure E.7

APPROVAL OR DISAPPROVAL OF YEAR ROUND DAYLIGHT SAVINGS TIME BY CENSUS REGION

(weighted per cents)



Cycle 5 (Aug. 31-Sept. 27, 1973)
Cycle 6 (Sept. 28-Oct. 25, 1973)
Cycle 7 (Oct. 26-Nov. 22, 1973
Cycle 11 (Mar. 29-Apr. 11, 1974)

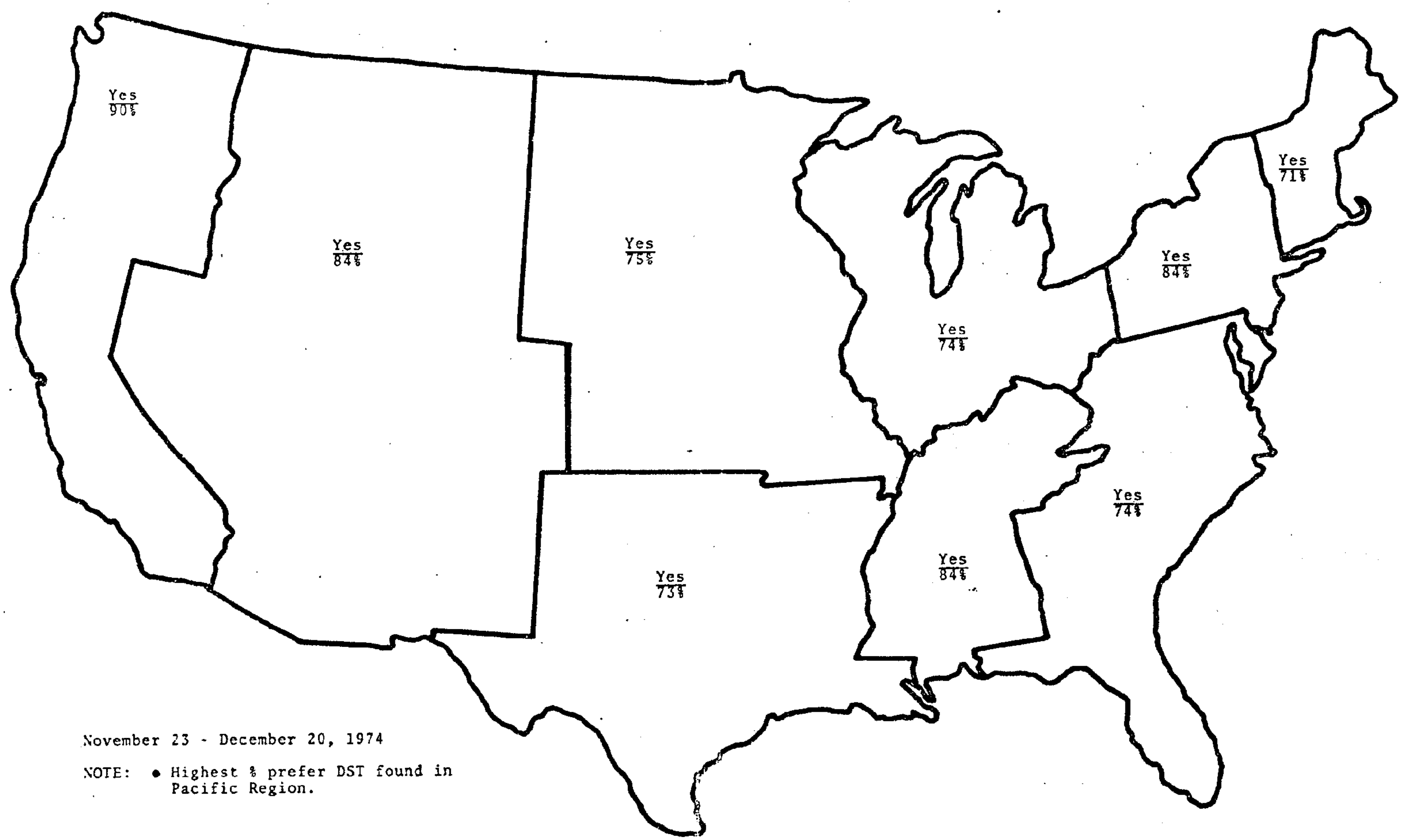
*The responses "Don't Care" and "Don't Know" were omitted from this map.

NOTE:
- Highest percent approve found in New England, Middle Atlantic and Pacific Regions.
- Highest percent disapprove in Midwest and South Central Regions.

Figure E.8

WOULD YOU PREFER TO BE ON DAYLIGHT SAVINGS TIME ALL YEAR ROUND (PER CENT YES) BY CENSUS REGION

(weighted per cents)



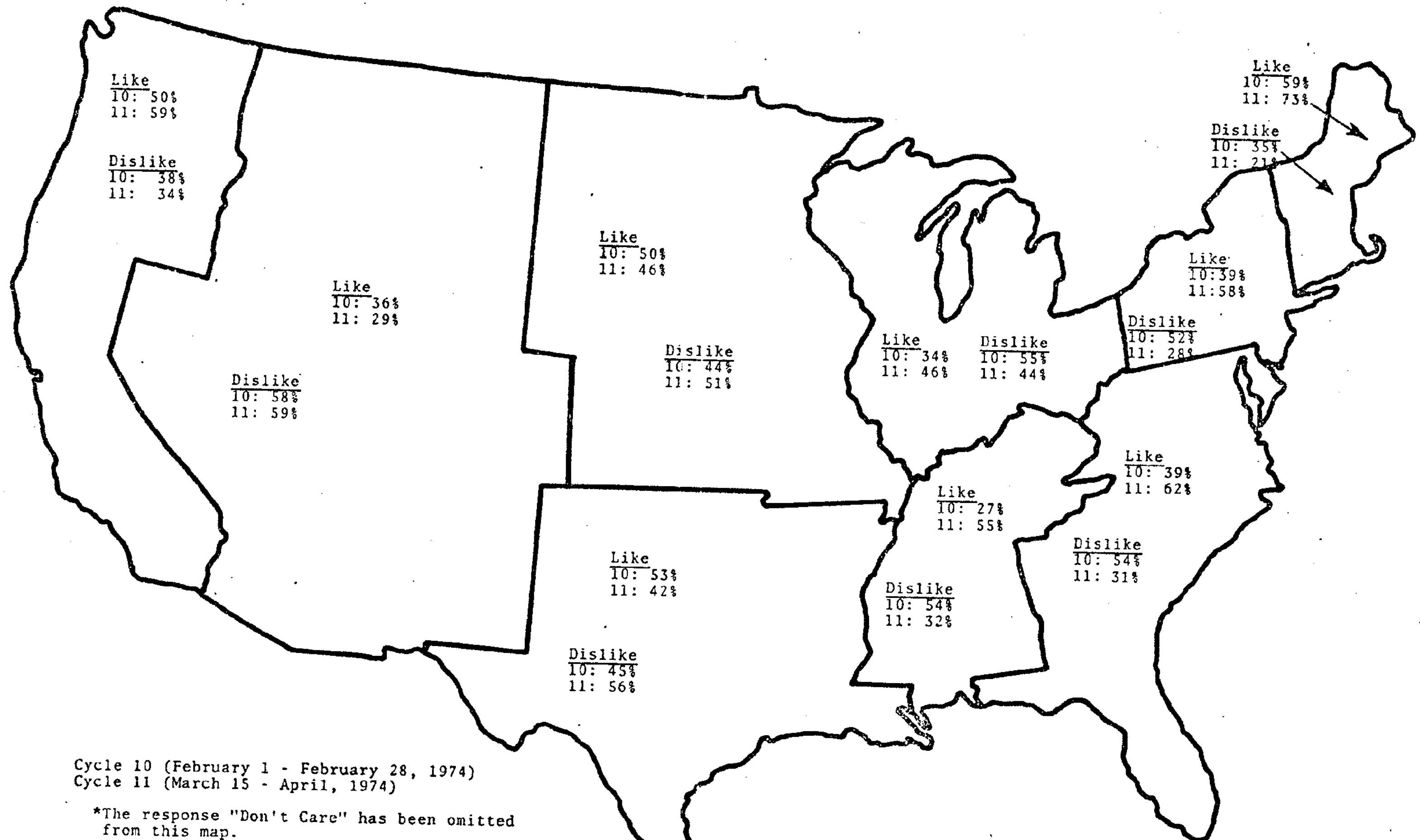
November 23 - December 20, 1974

NOTE: • Highest % prefer DST found in Pacific Region.

Figure E. 9

HOW DO YOU FEEL* ABOUT BEING ON DAYLIGHT SAVINGS TIME BY CENSUS REGION

(weighted per cents)



Cycle 10 (February 1 - February 28, 1974)
Cycle 11 (March 15 - April, 1974)

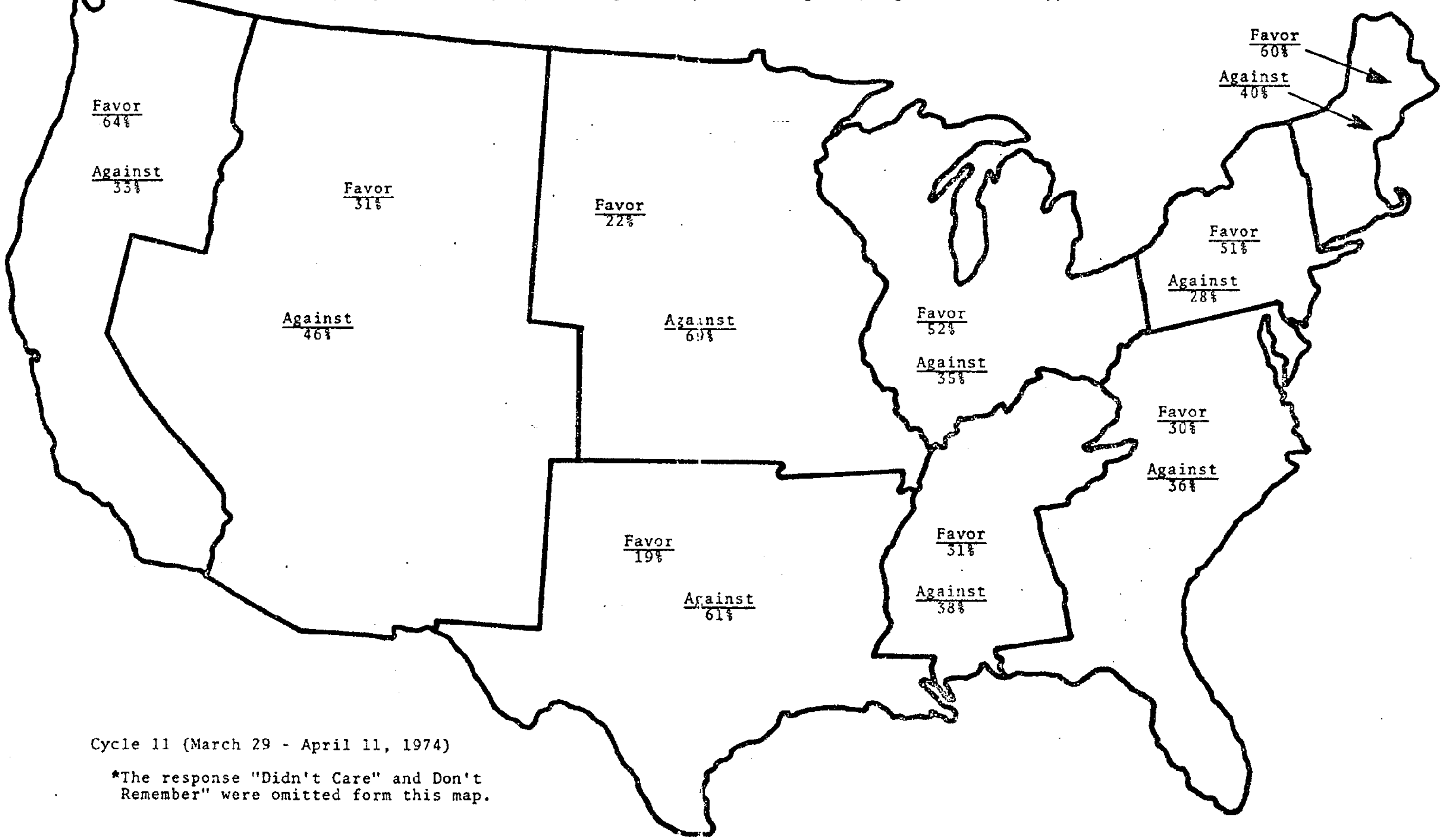
*The response "Don't Care" has been omitted from this map.

NOTE: • Highest % of "like" is on the east and west coasts.

Figure E.10

RETROSPECTIVE FEELINGS BY CENSUS REGION

(In December, 1973, before year round Daylight Saving Time, were you in favor or against* going back on Daylight Saving Time by Census Region (Weighted Per Cents))



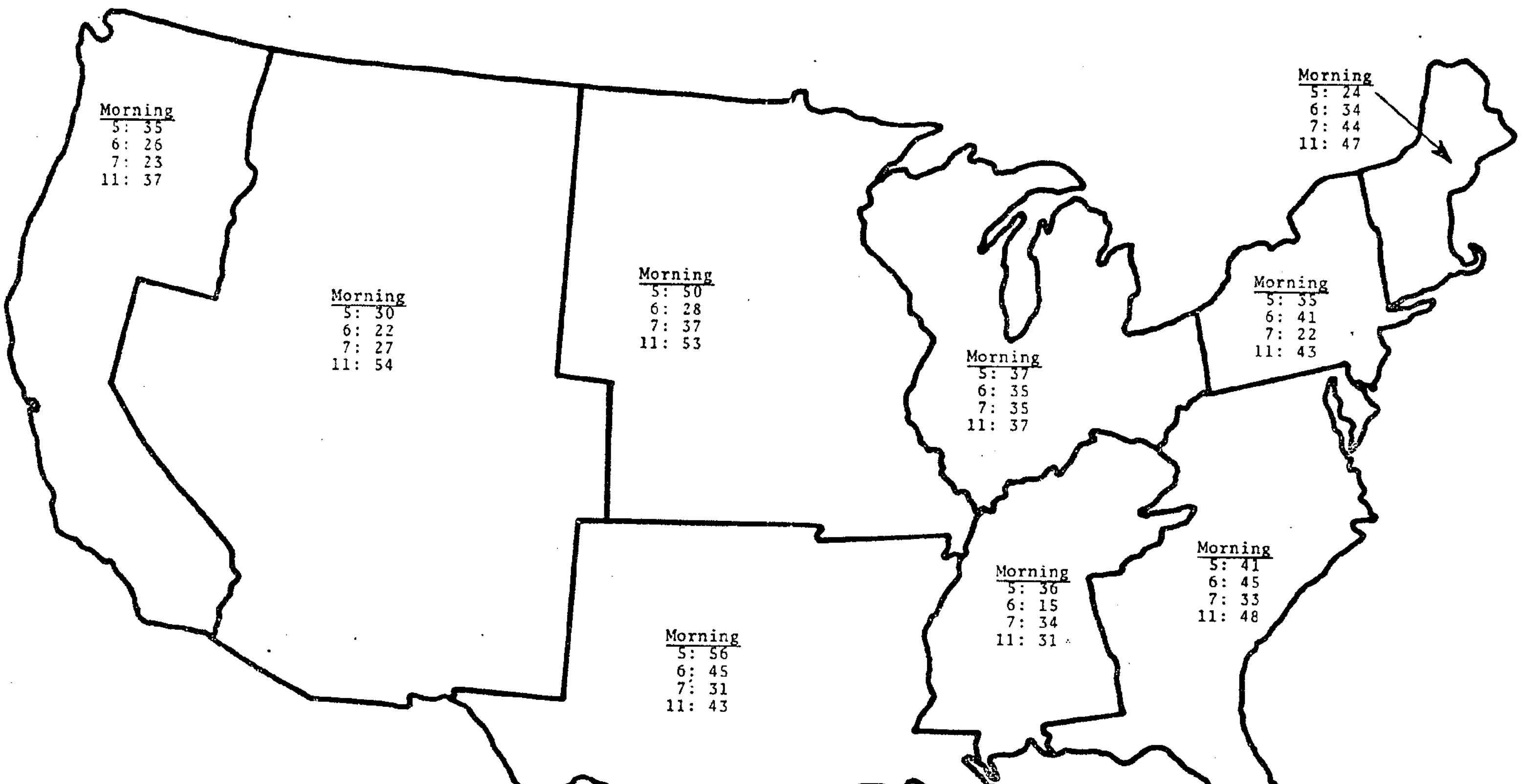
Cycle 11 (March 29 - April 11, 1974)

*The response "Didn't Care" and Don't Remember" were omitted form this map.

Figure E. 11

WHICH IS MORE IMPORTANT - LIGHT IN THE MORNING OR DARK IN THE EVENING BY CENSUS REGION

(weighted per cents)



Cycle 5 (August 31 - September 27, 1973)
Cycle 6 (September 28 - October 25, 1973)
Cycle 7 (October 26 - November 22, 1973)
Cycle 11 (March 29 - April 11, 1974)

NOTE: • Highest % wanting light in a.m. are in midwest regions.

Fi[illegible]re E.12

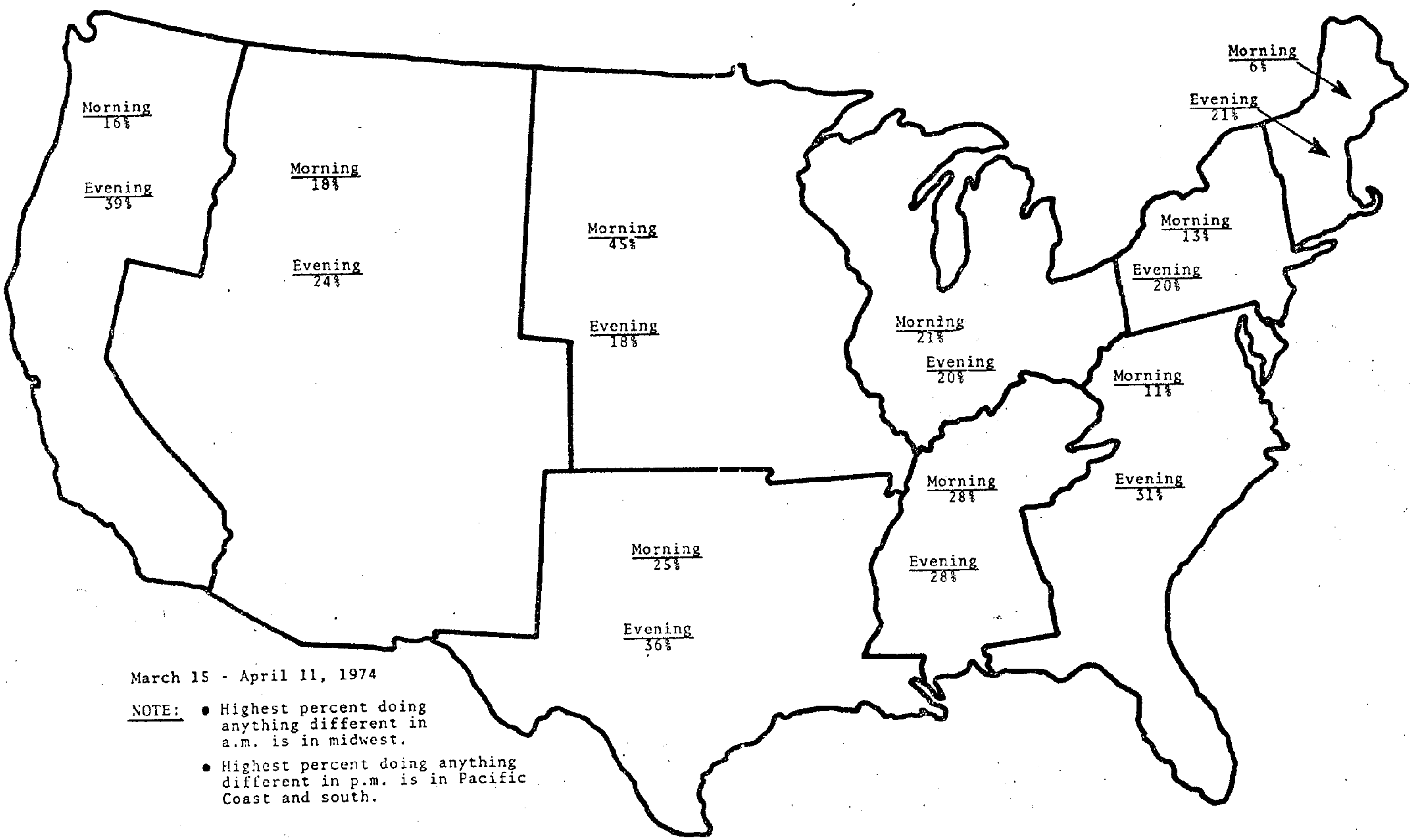
SINCE WE WENT BACK ONTO DAYLIGHT SAVINGS TIME

(1) HAVE YOU BEEN DOING ANYTHING DIFFERENT IN THE MORNING (PER CENT YES)

(2) HAVE YOU BEEN DOING ANYTHING DIFFERENT IN THE EVENING (PER CENT YES)

BY CENSUS REGION

(weighted per cents)

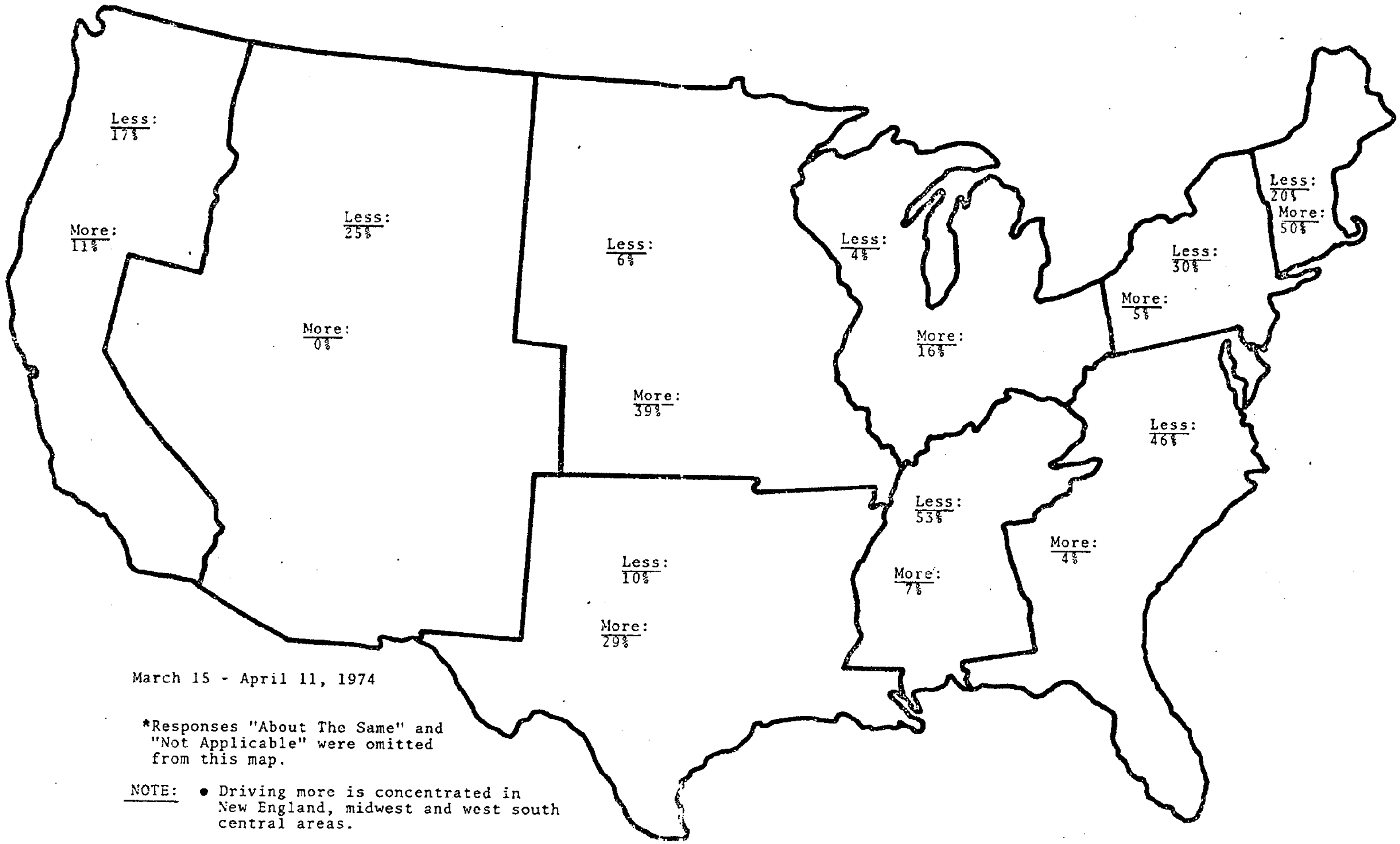


March 15 - April 11, 1974

NOTE:
- Highest percent doing anything different in a.m. is in midwest.
- Highest percent doing anything different in p.m. is in Pacific Coast and south.

Figure E.13

NOW DRIVING MORE OR LESS* IN THE LATE AFTERNOON BEFORE WE WENT BACK ONTO DAYLIGHT SAVINGS TIME BY CENSUS REGION
(weighted per cents)



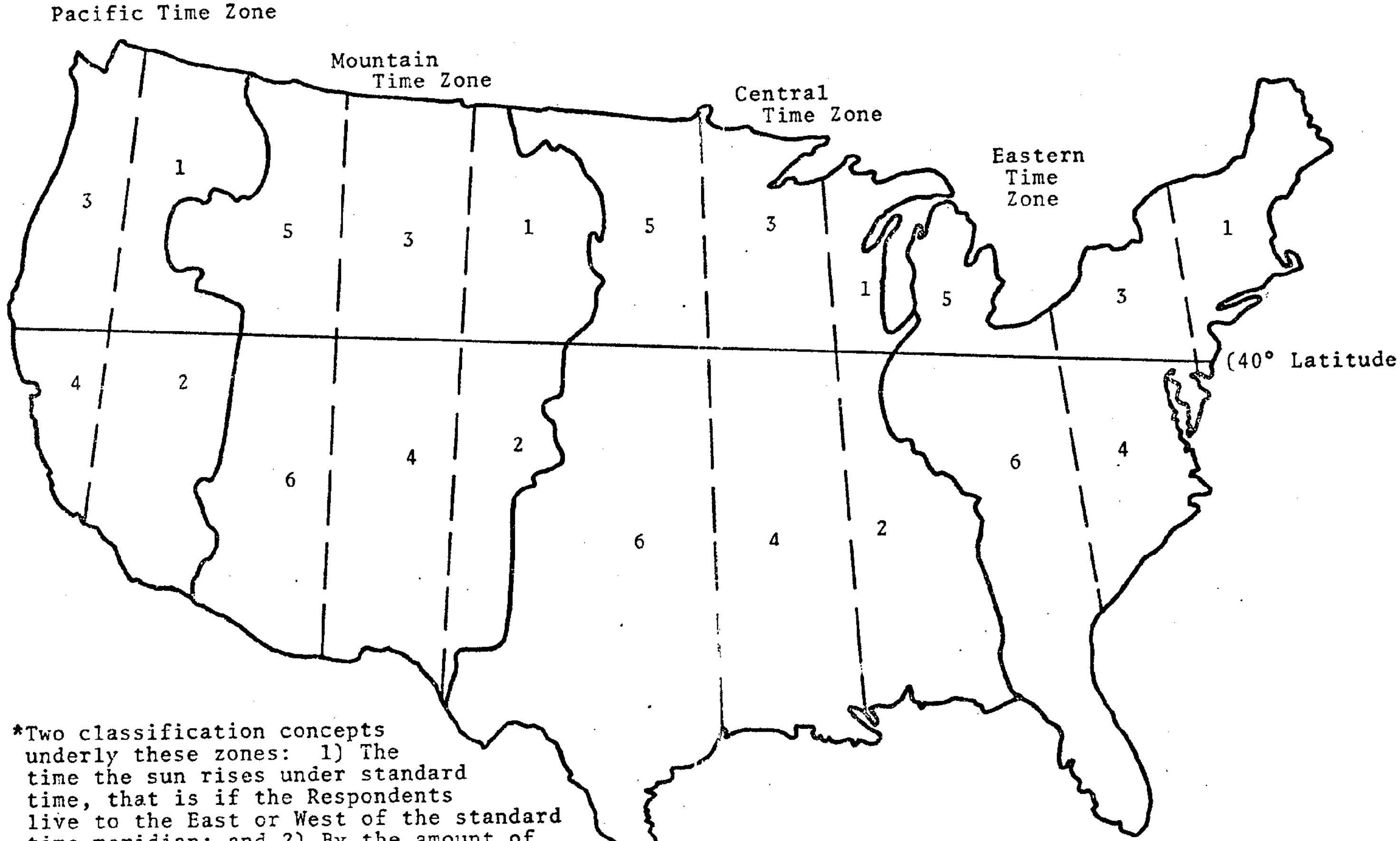
March 15 - April 11, 1974

*Responses "About The Same" and "Not Applicable" were omitted from this map.

NOTE: • Driving more is concentrated in New England, midwest and west south central areas.

Figure E. 14

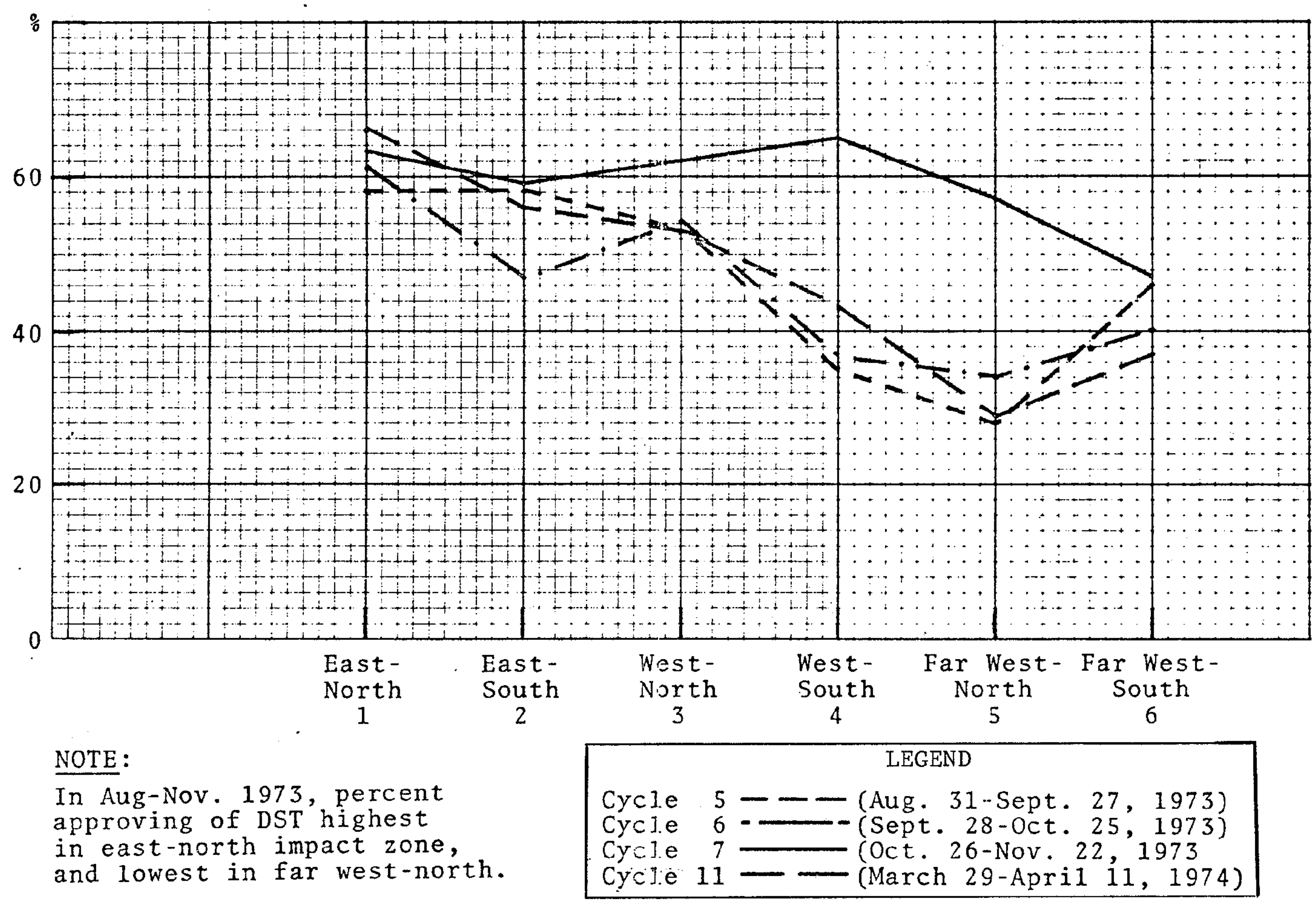
DAYLIGHT SAVINGS TIME IMPACT ZONES*



*Two classification concepts underly these zones: 1) The time the sun rises under standard time, that is if the Respondents live to the East or West of the standard time meridian; and 2) By the amount of daylight they experience during the winter; that is on what latitude they live.

Figure E.15

APPROVAL OF YRDST BY DST IMPACT ZONE



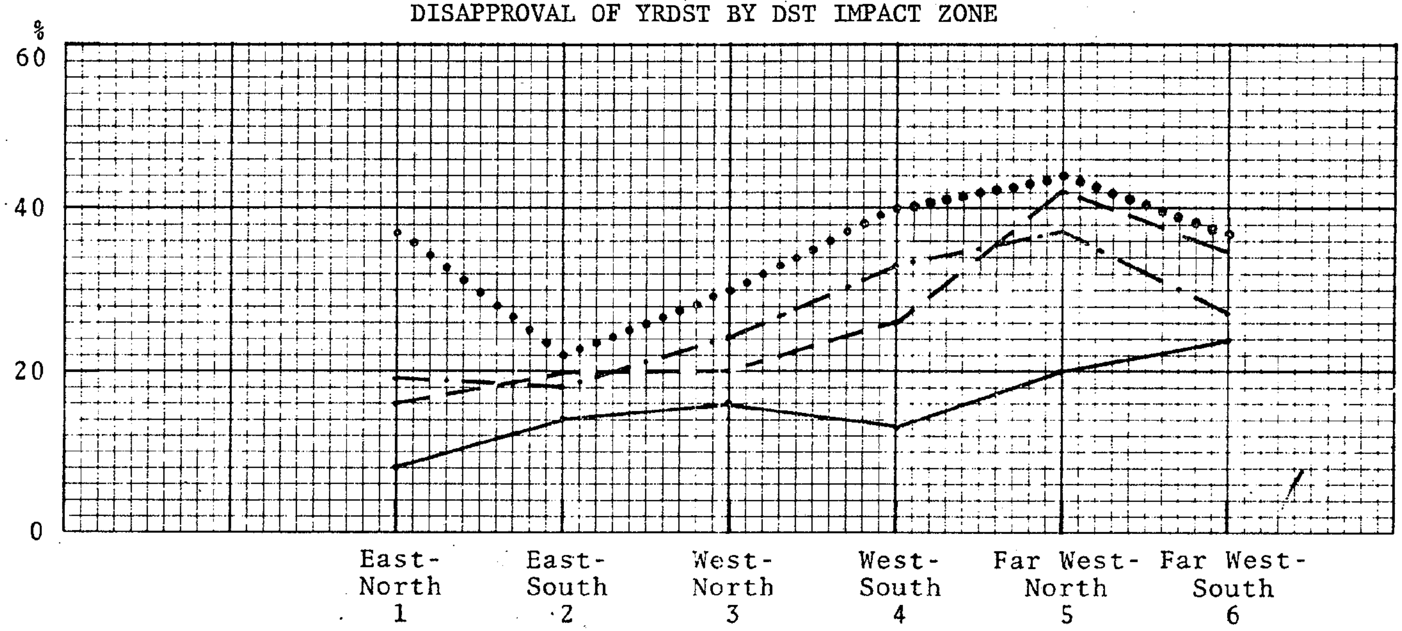
NOTE:

In Aug-Nov. 1973, percent approving of DST highest in east-north impact zone, and lowest in far west-north.

March-April, percent approving of DST highest in west-south, lowest in far west-south.

Figure E.16

DISAPPROVAL OF YRDST BY DST IMPACT ZONE



NOTE:

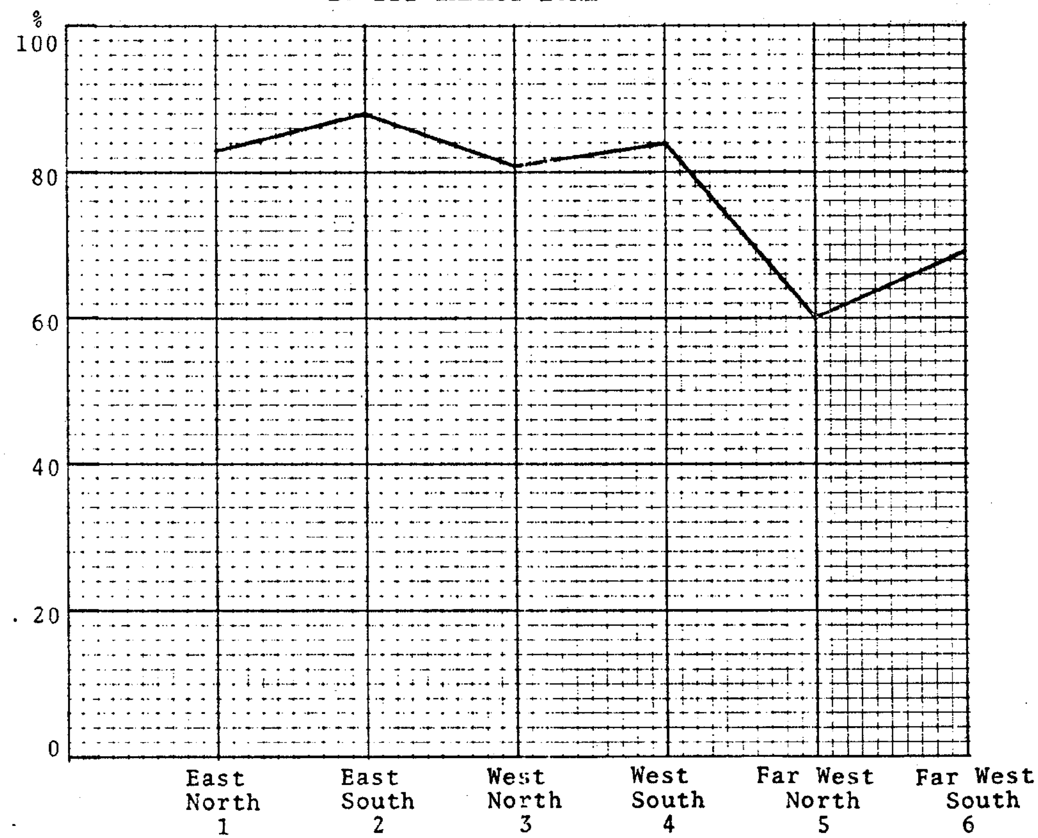
General trend: the farther west, the higher percentage disapprove of DST.

LEGEND

Cycle 5 — — — (Aug. 31-Sep. 27, 1973)
Cycle 6 - ——— - (Sept. 28-Oct. 25, 1973)
Cycle 7 ——— (Oct. 26-Nov. 22, 1973)
Cycle 11 ••••••• (March 29-April 11, 1974)

Figure E.17

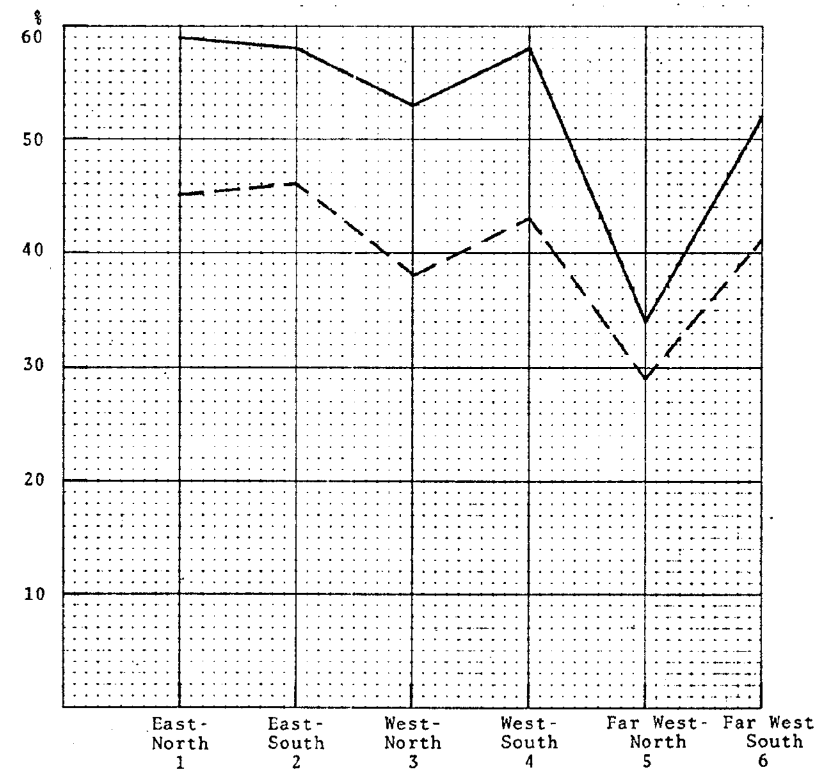
PREFER DST YEAR ROUND (NOV. 23 - DEC. 20,1973)
BY DST IMPACT ZONE



NOTE:
Zones in south have higher percentage preferring DST.
The farther west, the lower percentage preferring DST.

Figure E.18

LIKE DST NOW BY DST IMPACT ZONE



LEGEND

Cycle 10 - like — — — (Feb. 1 - Feb. 26. 1974)
Cycle 11 - like ———— (Mar. 15 - Apr. 11, 1974)

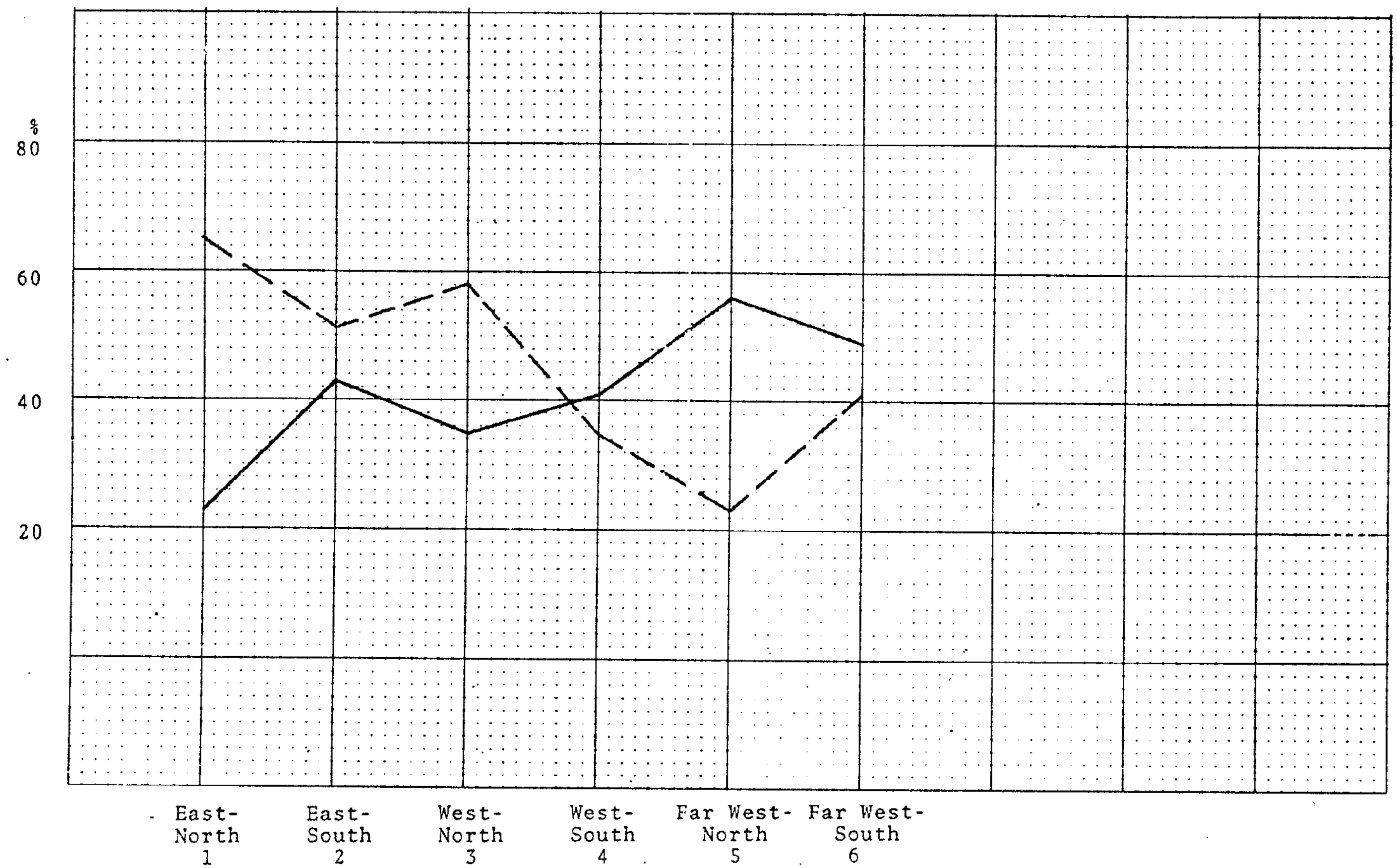
NOTE:
Increase in percentage liking DST in Cycle 11 for all zones.

Lowest percentage liking DST in far west-north zone.

In west and far west zones dramatic differences exist between north and south percentages (south percentage is greater).

Figure E.19

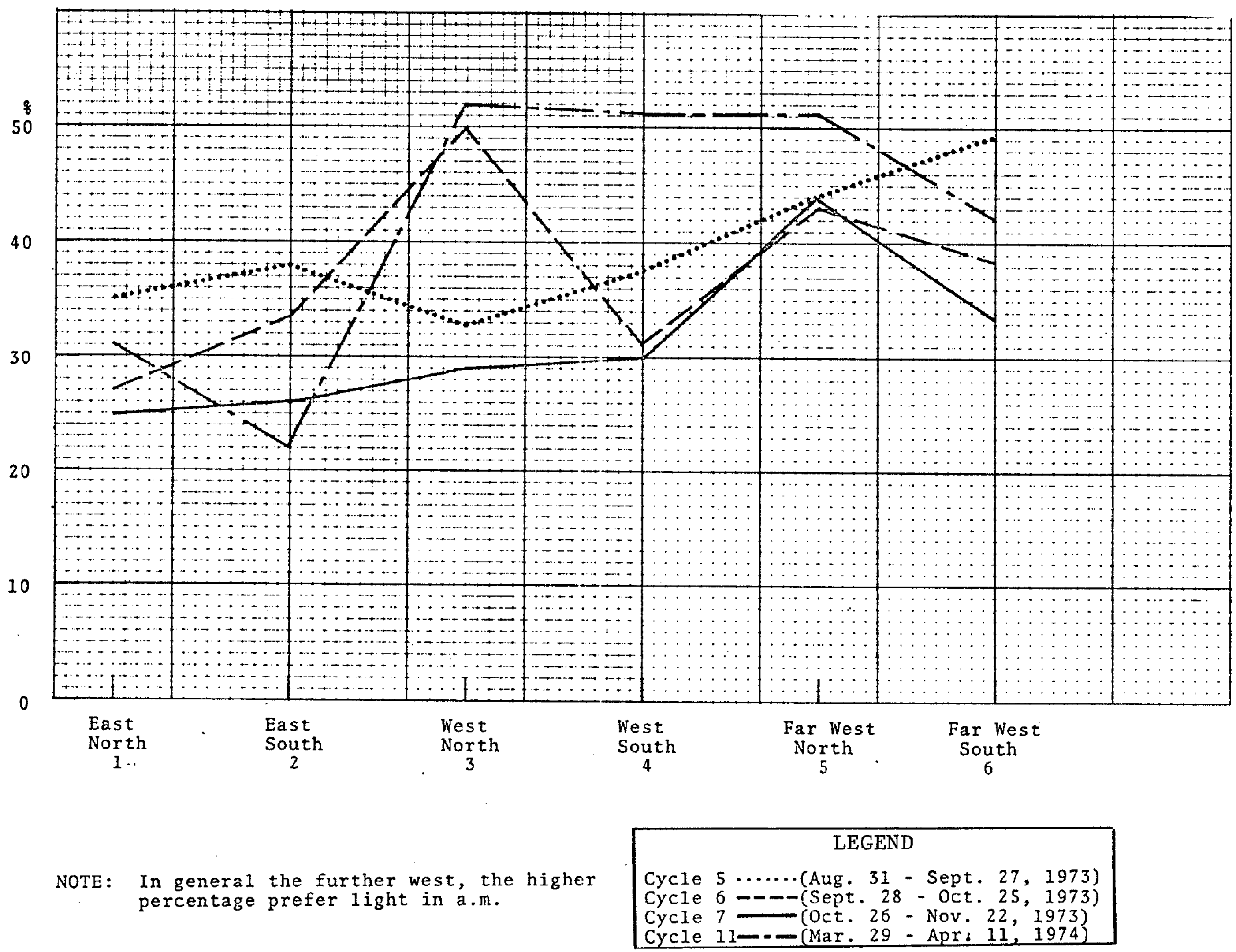
RETROSPECTIVE FEELINGS ABOUT DST IN DEC. 1973 BEFORE YEAR ROUND DST BY DST IMPACT ZONE



(March 29 - April 11, 1974)

Figure E.20

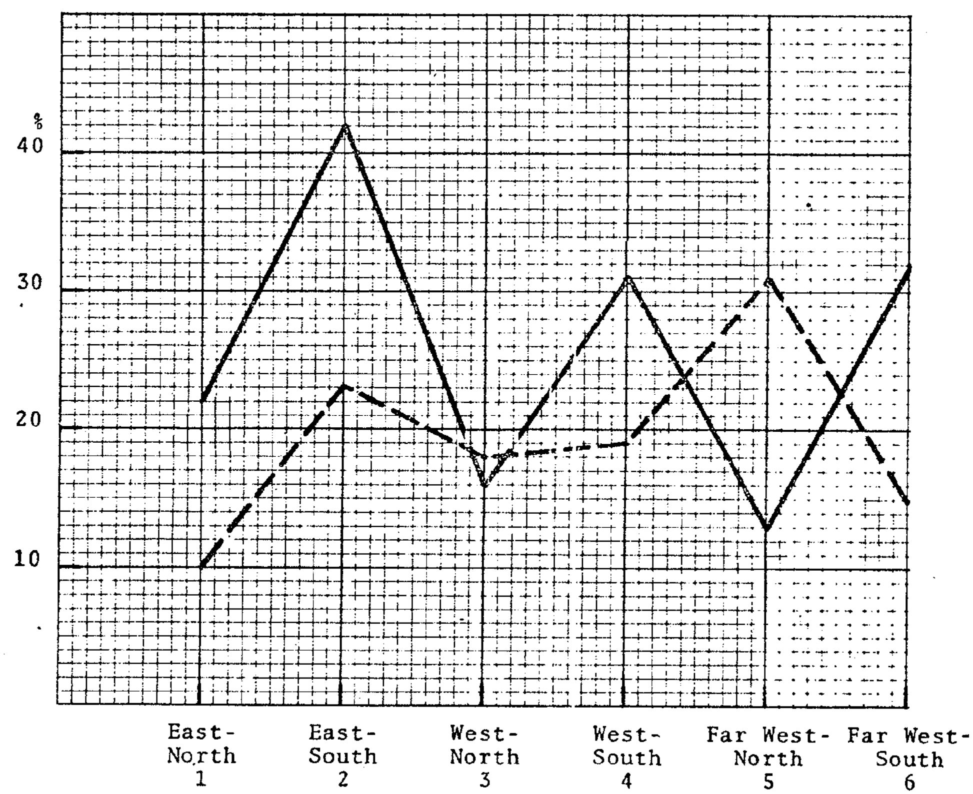
PREFER TO HAVE LIGHT IN A.M. BY DST IMPACT ZONE



NOTE: In general the further west, the higher percentage prefer light in a.m.

Figure E.21

DONE ANYTHING DIFFERENT IN MORNING, EVENING DUE TO DST BY DST IMPACT ZONE



(March 15 - April 11, 1974)

LEGEND

A.M. - - - - - - - -

P.M. ________

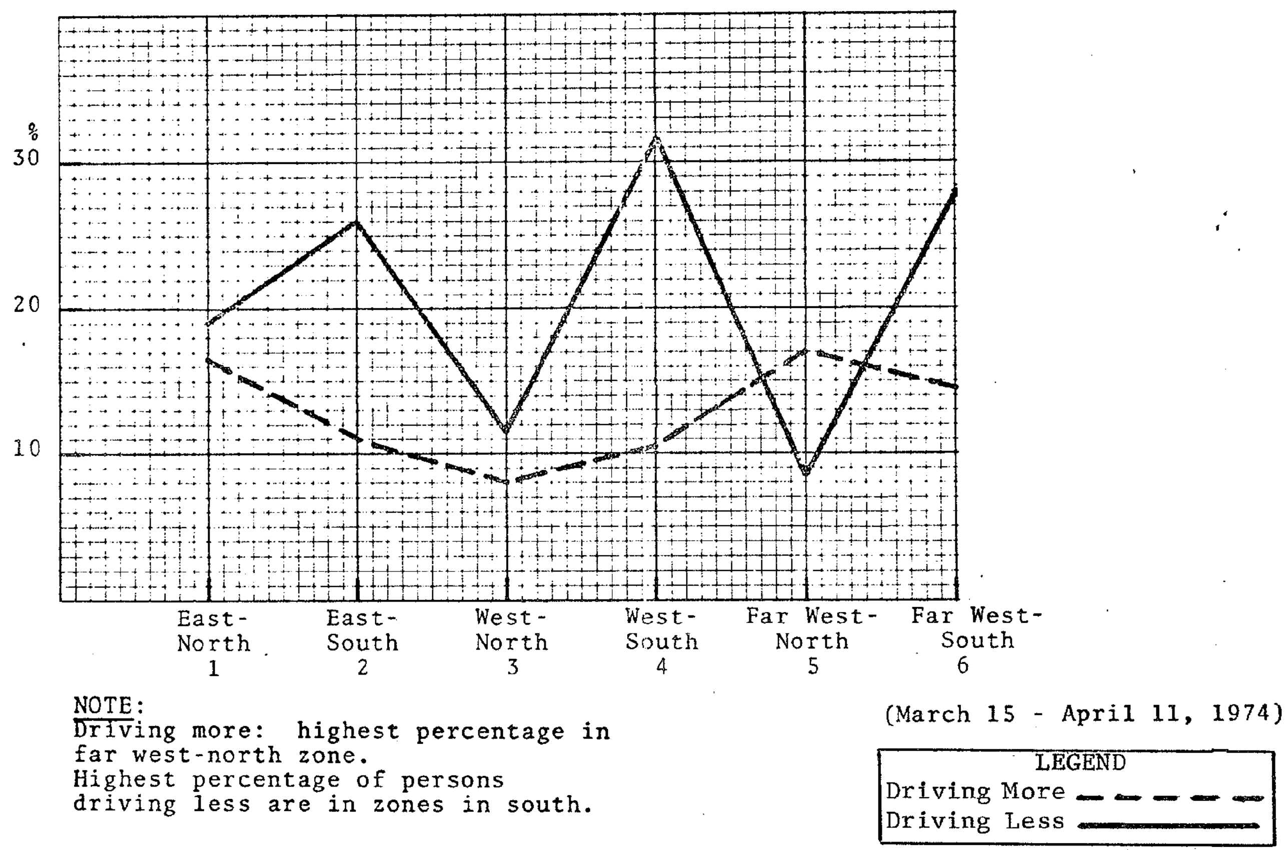
NOTE:

Highest percentage which report doing anything different in morning in far west-north.

Significant north-south differences reported in doing anything different in P.M. - higher percentage in south.

Figure E.22

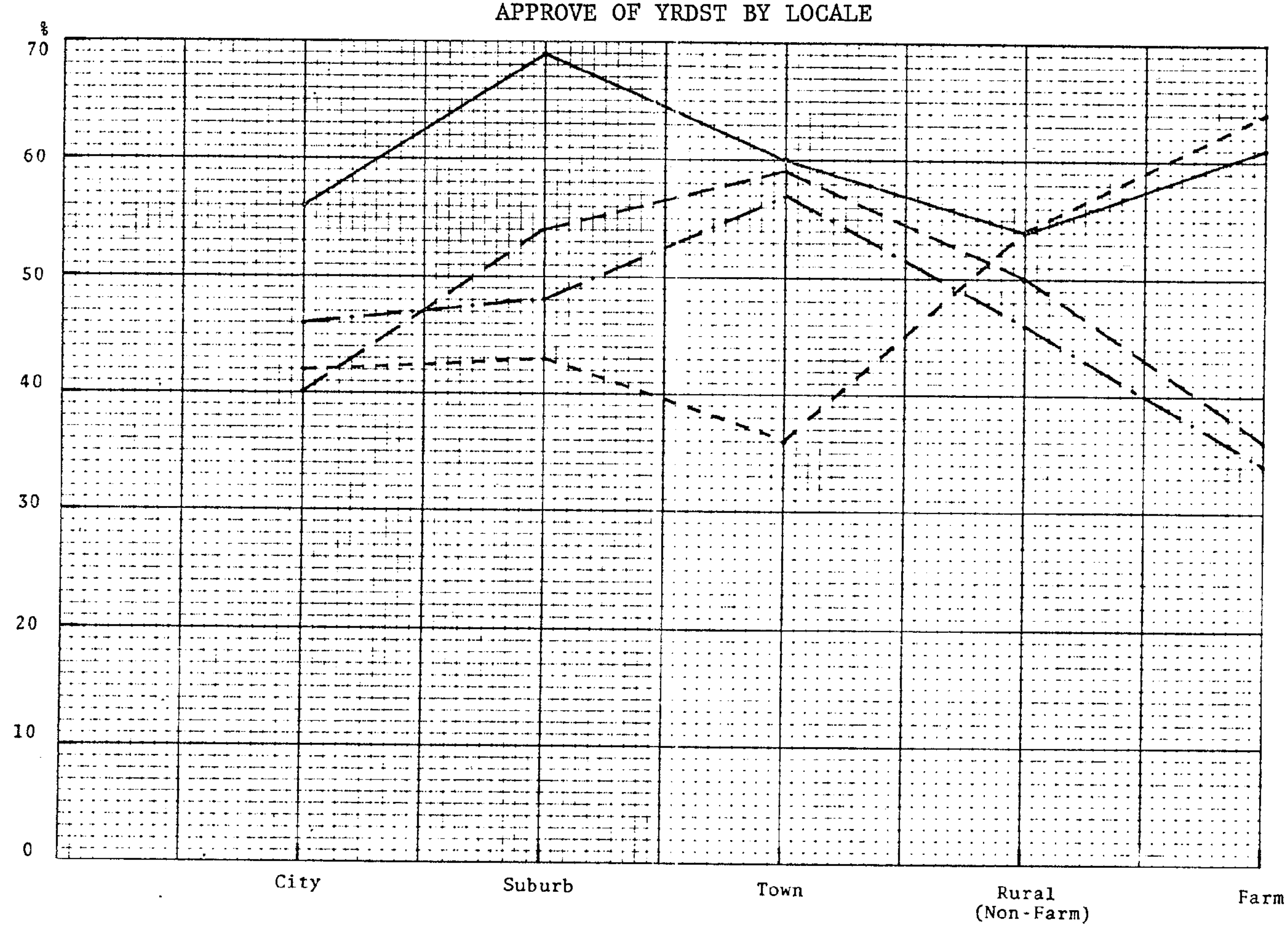
DRIVING MORE OR LESS IN LATE AFTERNOON THAN BEFORE WE WENT BACK ONTO DST BY DST IMPACT ZONE



NOTE:
Driving more: highest percentage in far west-north zone.
Highest percentage of persons driving less are in zones in south.

Figure E.23

APPROVE OF YRDST BY LOCALE



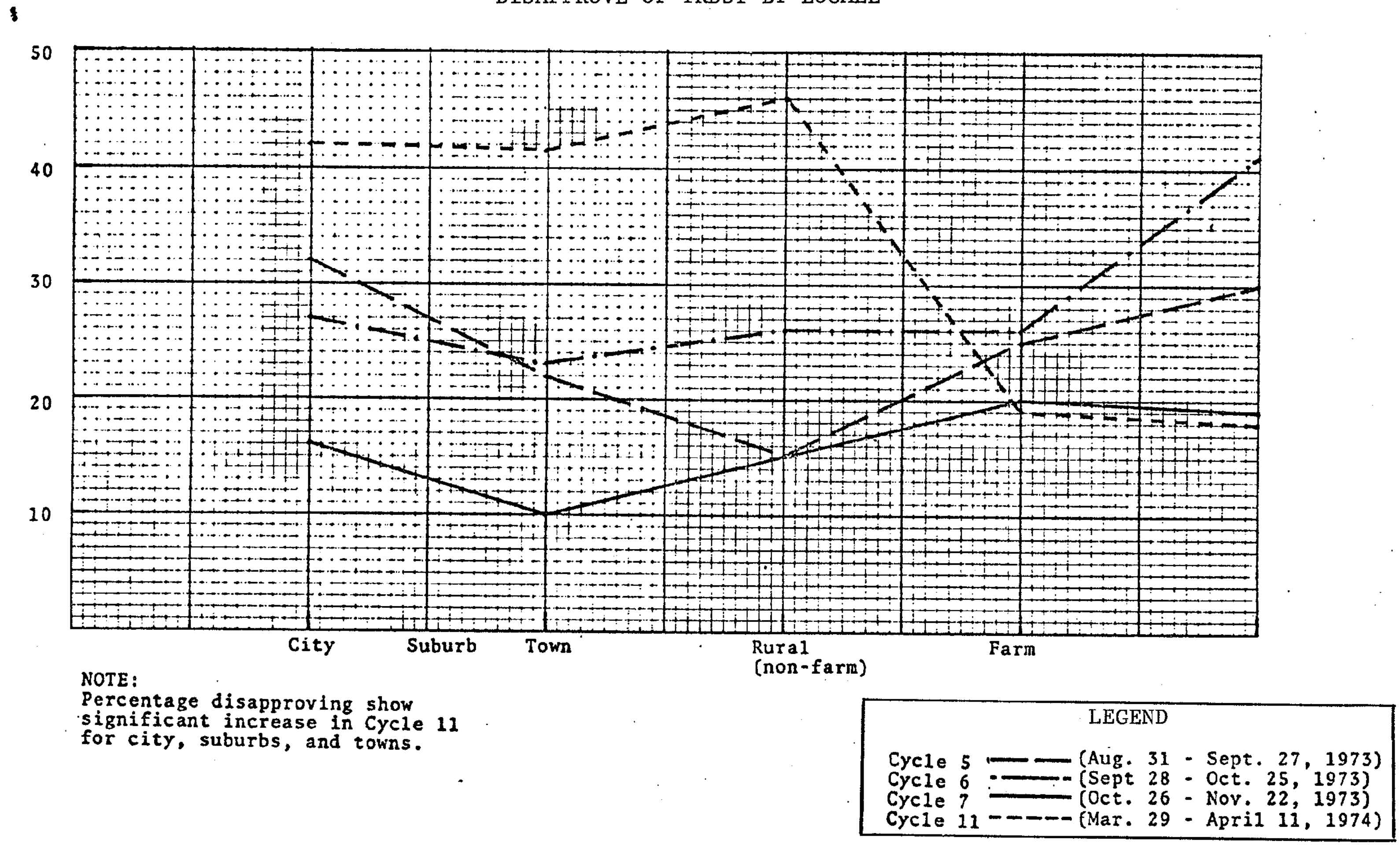
LEGEND

Cycle 5 (Aug. 31 - Sept 27, 1973)
Cycle 6 (Sept. 28 - Oct. 25, 1973)
Cycle 7 (Oct 26 - Nov. 22, 1973)
Cycle 11 (March 29 - April 11, 1974)

NOTES:
Cycles 5, 6, 7 - town and rural areas maintain levels of approval.
Cycle 7 - city, suburb, and farm areas indicate significant increase in percentage approving.
Cycle 11 - city suburb, town show significant decrease in percentage approving.

Figure E.24

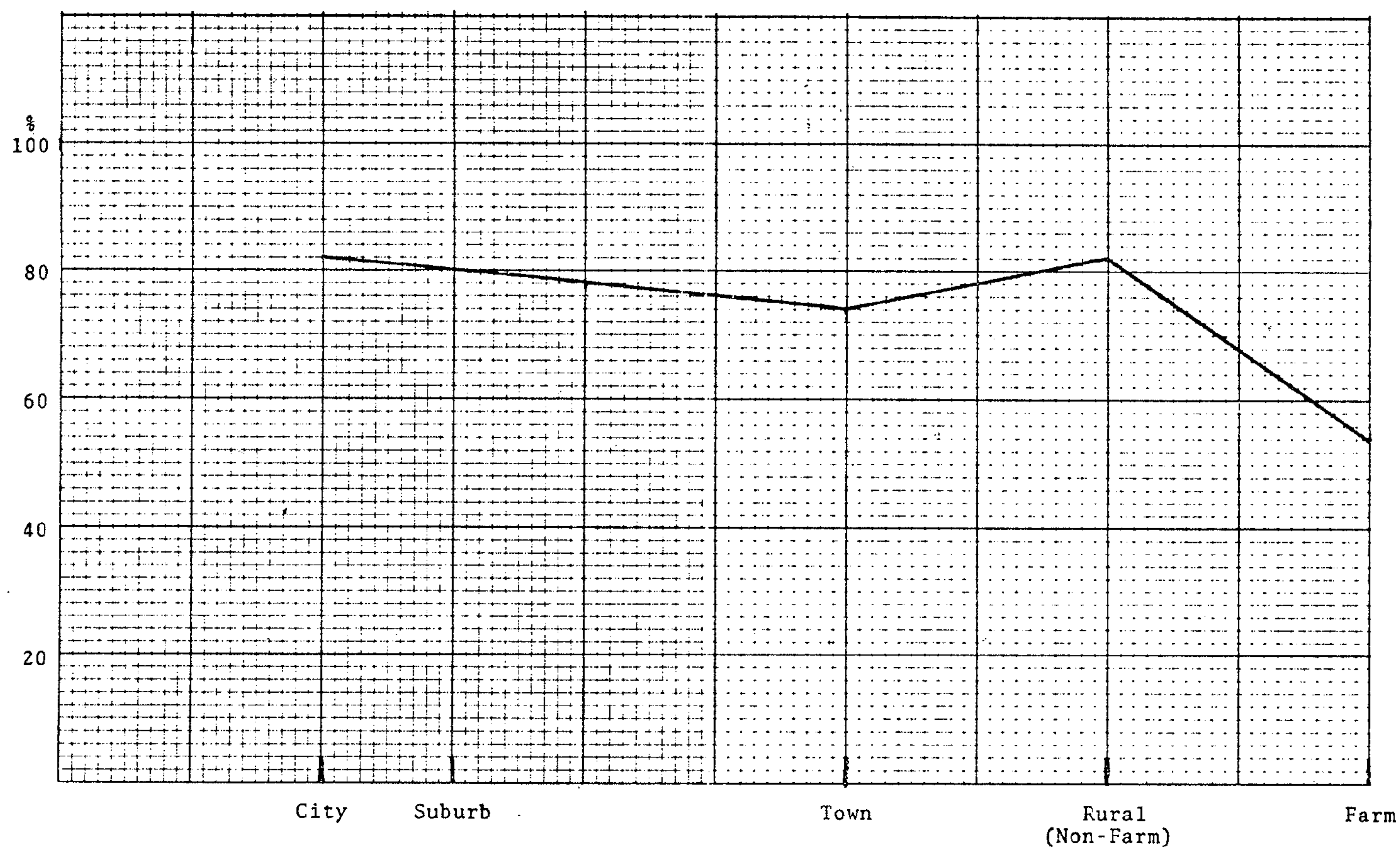
DISAPPROVE OF YRDST BY LOCALE



NOTE:
Percentage disapproving show significant increase in Cycle 11 for city, suburbs, and towns.

Figure E. 25

PREFER YEAR ROUND DST BY LOCALE

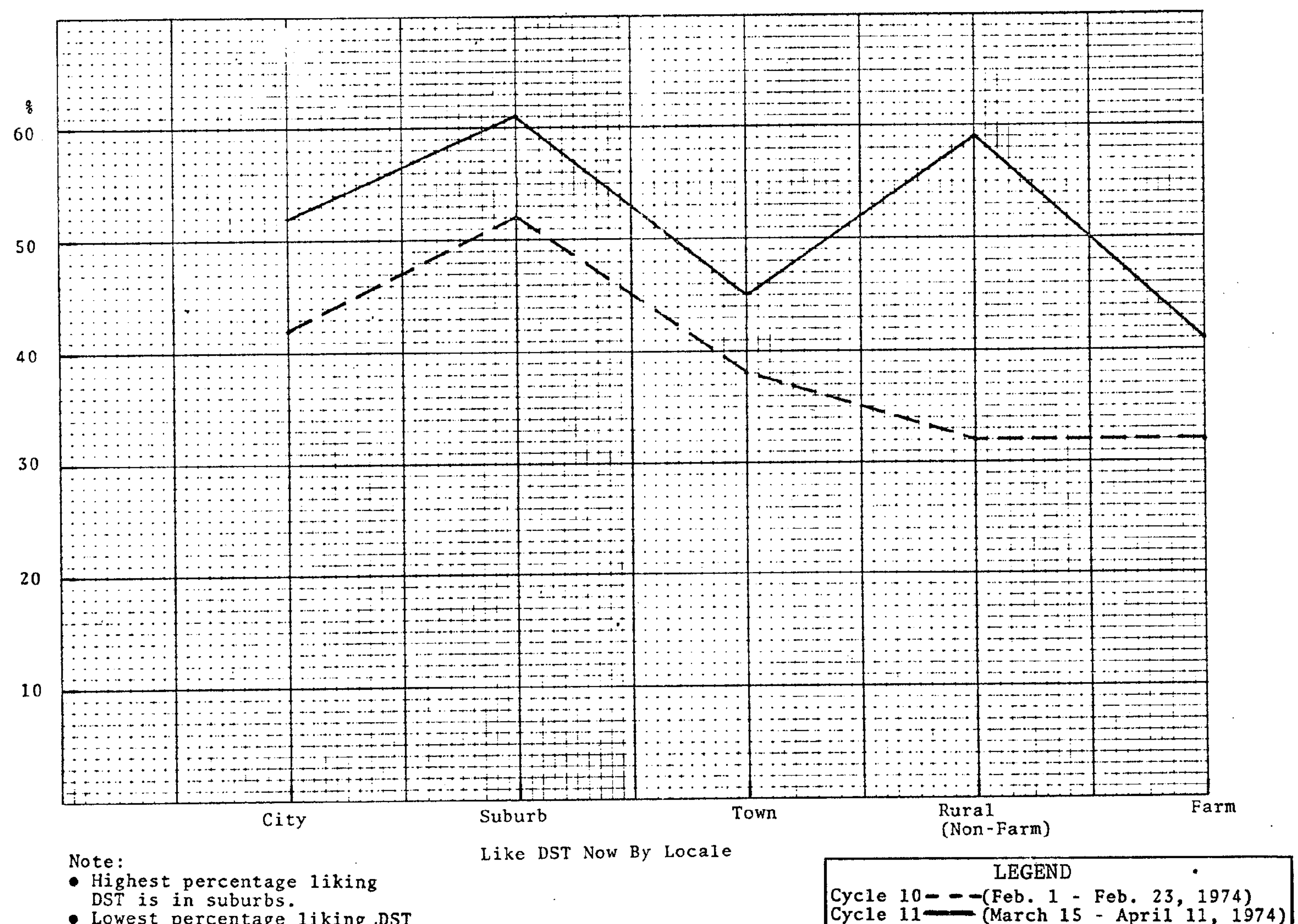


NOTE: Lowest percentage preferring DST is in farm areas

(Nov. 23 - Dec. 20, 1973)

Figure E.26

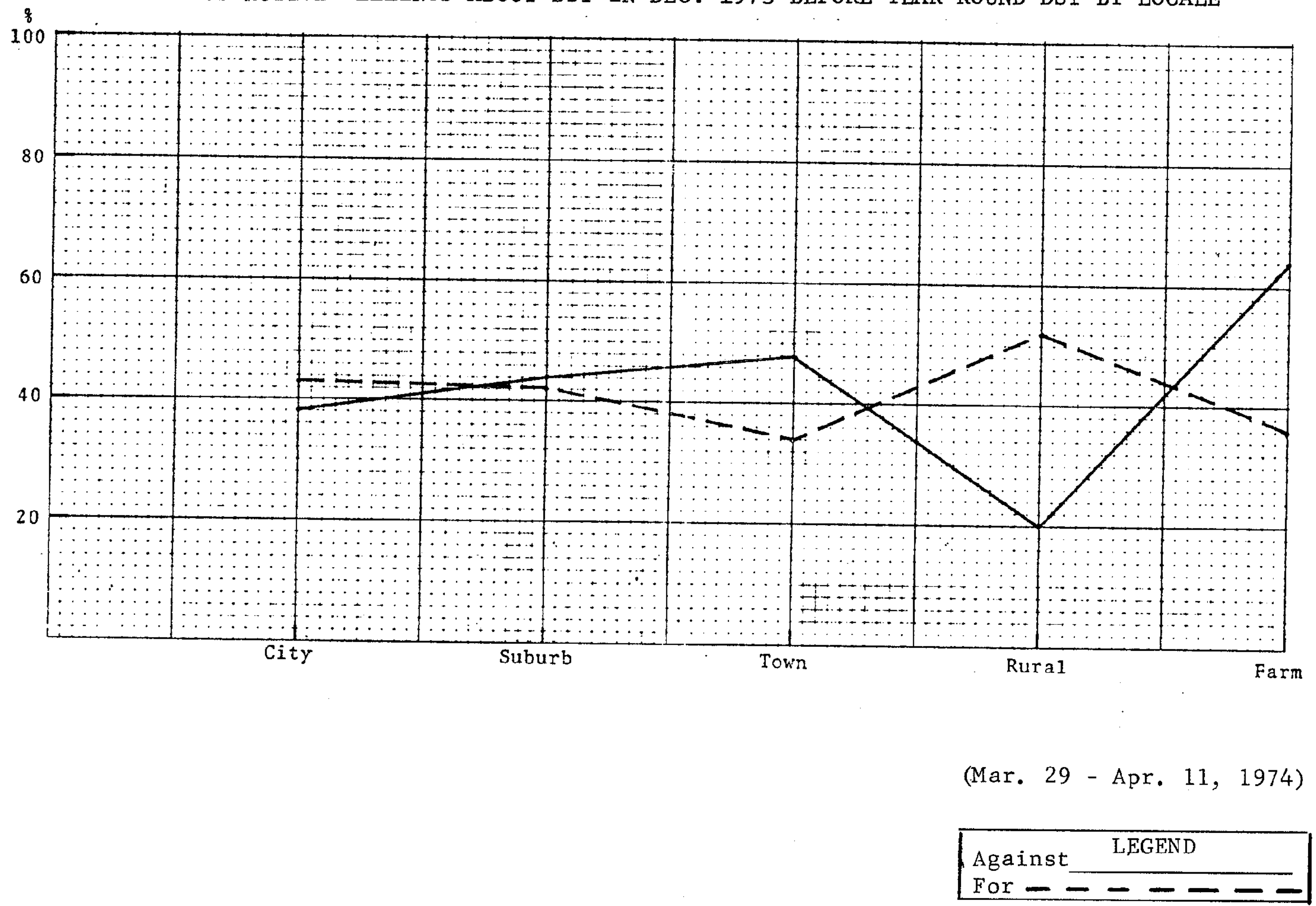
LIKE DST NOW BY LOCALE



Note:
- Highest percentage liking DST is in suburbs.
- Lowest percentage liking DST is in farm areas

Figure E.27

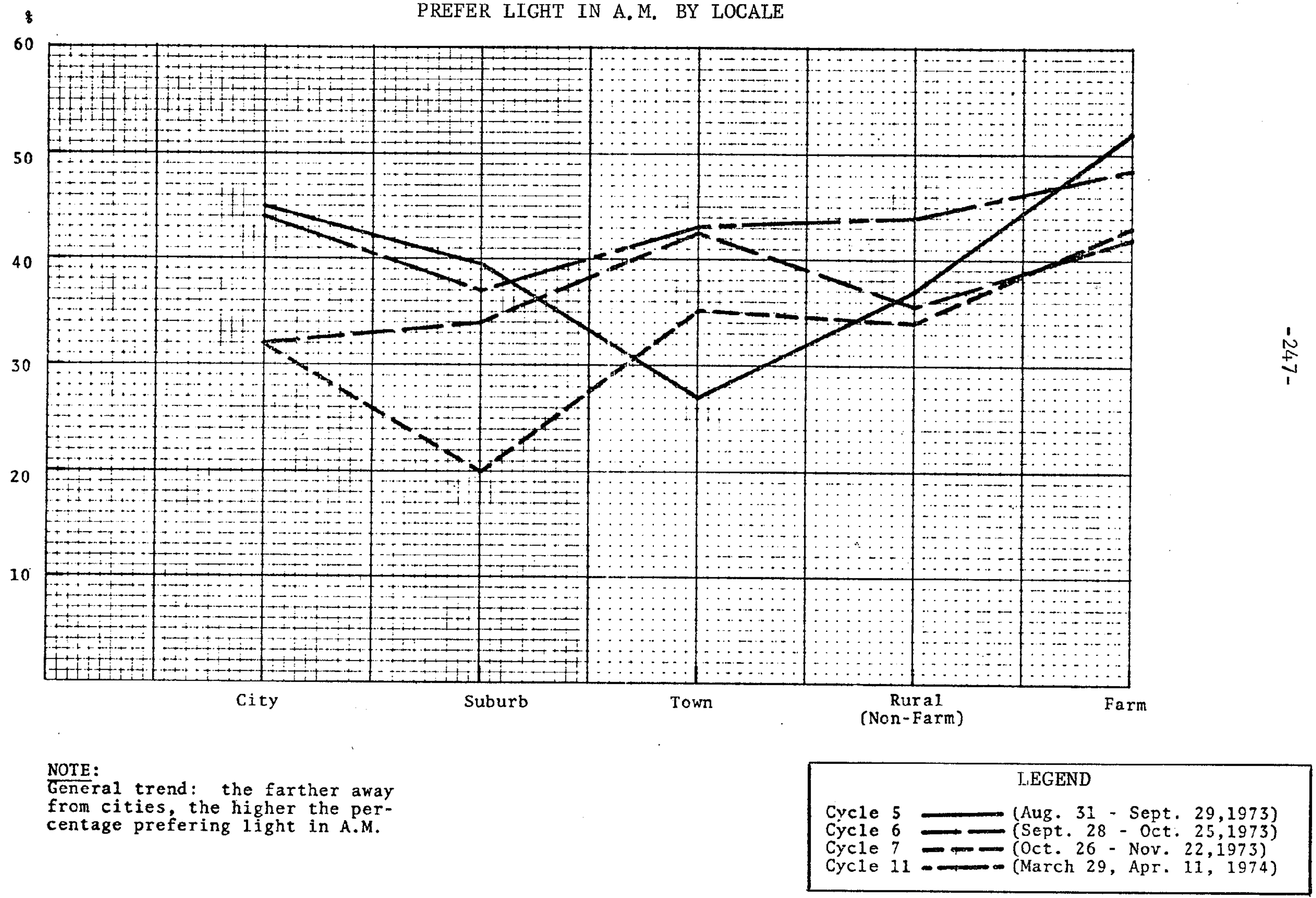
RETROSPECTIVE FEELINGS ABOUT DST IN DEC. 1973 BEFORE YEAR ROUND DST BY LOCALE



(Mar. 29 - Apr. 11, 1974)

Figure E. 28

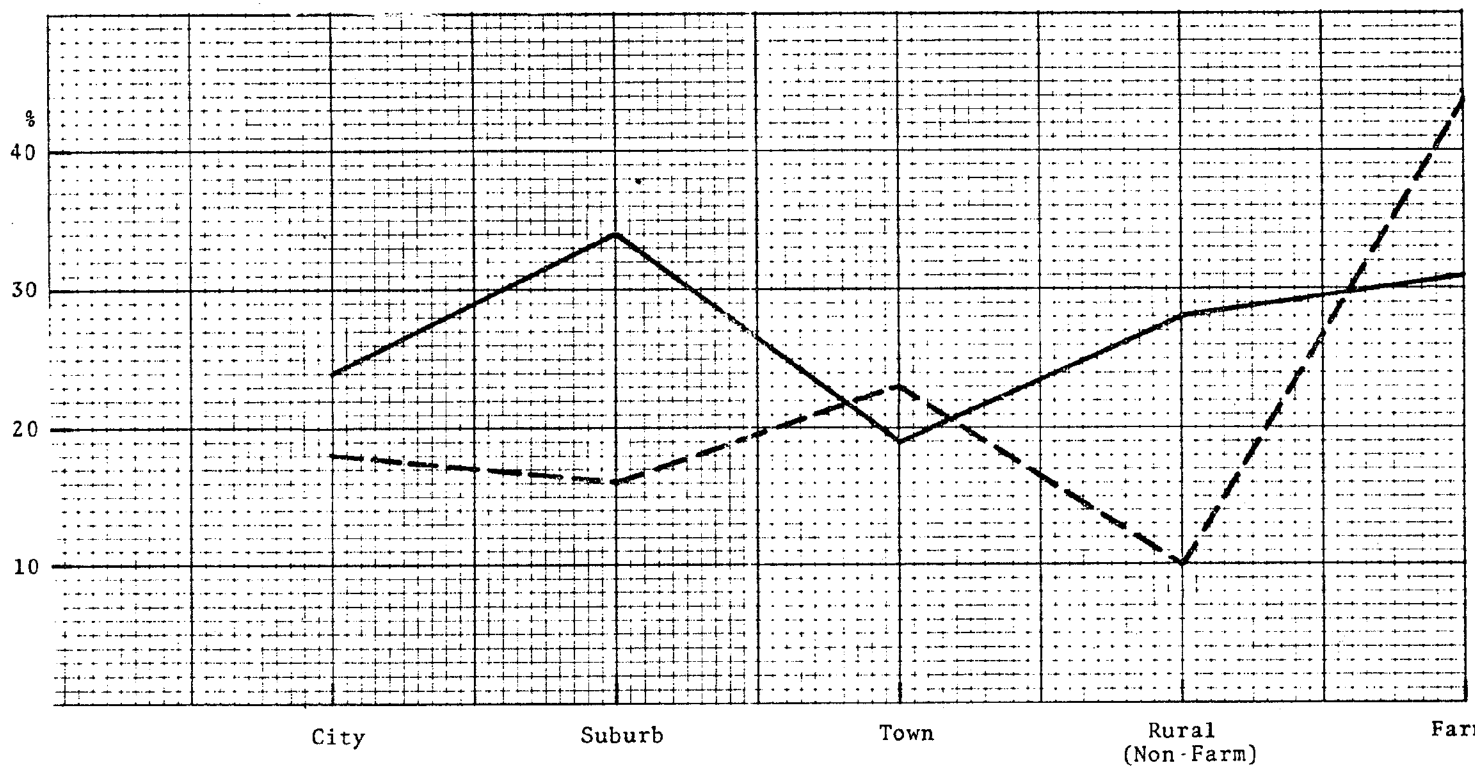
PREFER LIGHT IN A.M. BY LOCALE



NOTE:
General trend: the farther away from cities, the higher the percentage prefering light in A.M.

Figure E.29

DONE ANYTHING DIFFERENT IN MORNING, EVENING DUE TO DST BY LOCALE



NOTE:
Doing anything different in A.M. highest percentage is in farm areas.
Doing anything different in P.M. highest percentage is in suburbs and farm areas.

(March 15 - April 11, 1974)

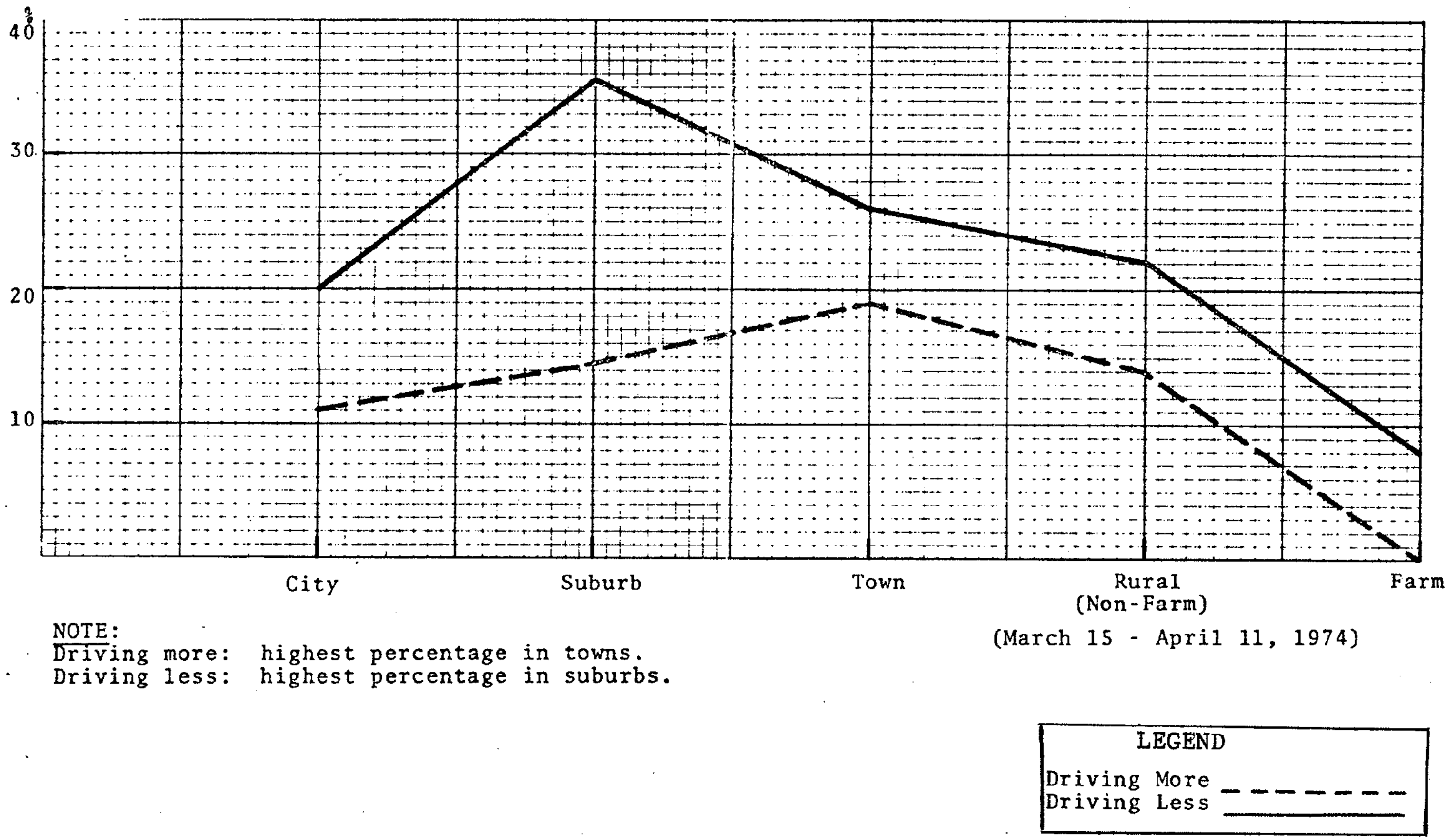
LEGEND

A.M. — — — —

P.M. ————

Figure E.30

DRIVING MORE OR LESS IN LATE AFTERNOON THAN BEFORE WE WENT BACK ONTO DST BY LOCALE

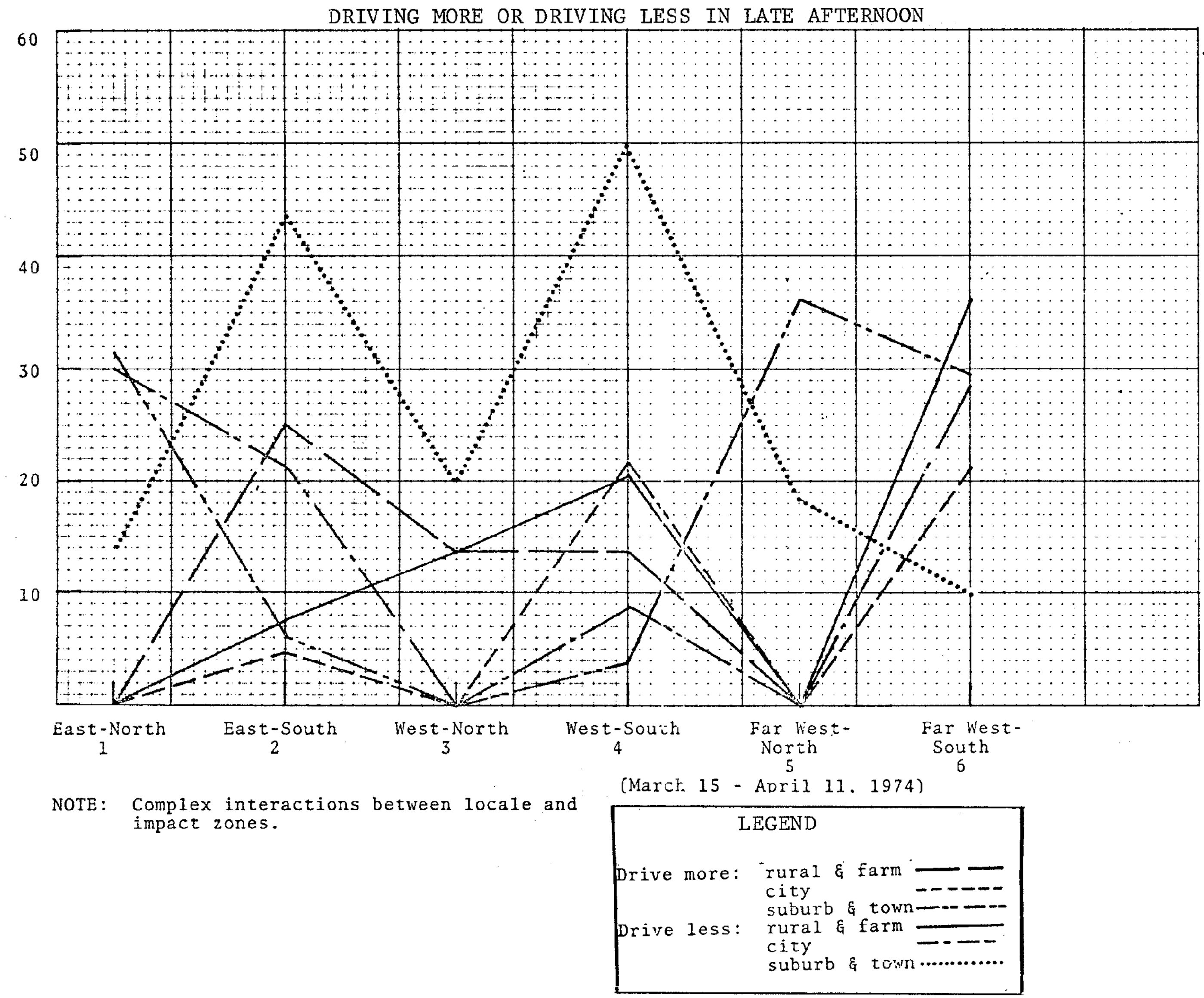


(March 15 - April 11, 1974)

NOTE:
Driving more: highest percentage in towns.
Driving less: highest percentage in suburbs.

Figure E.31

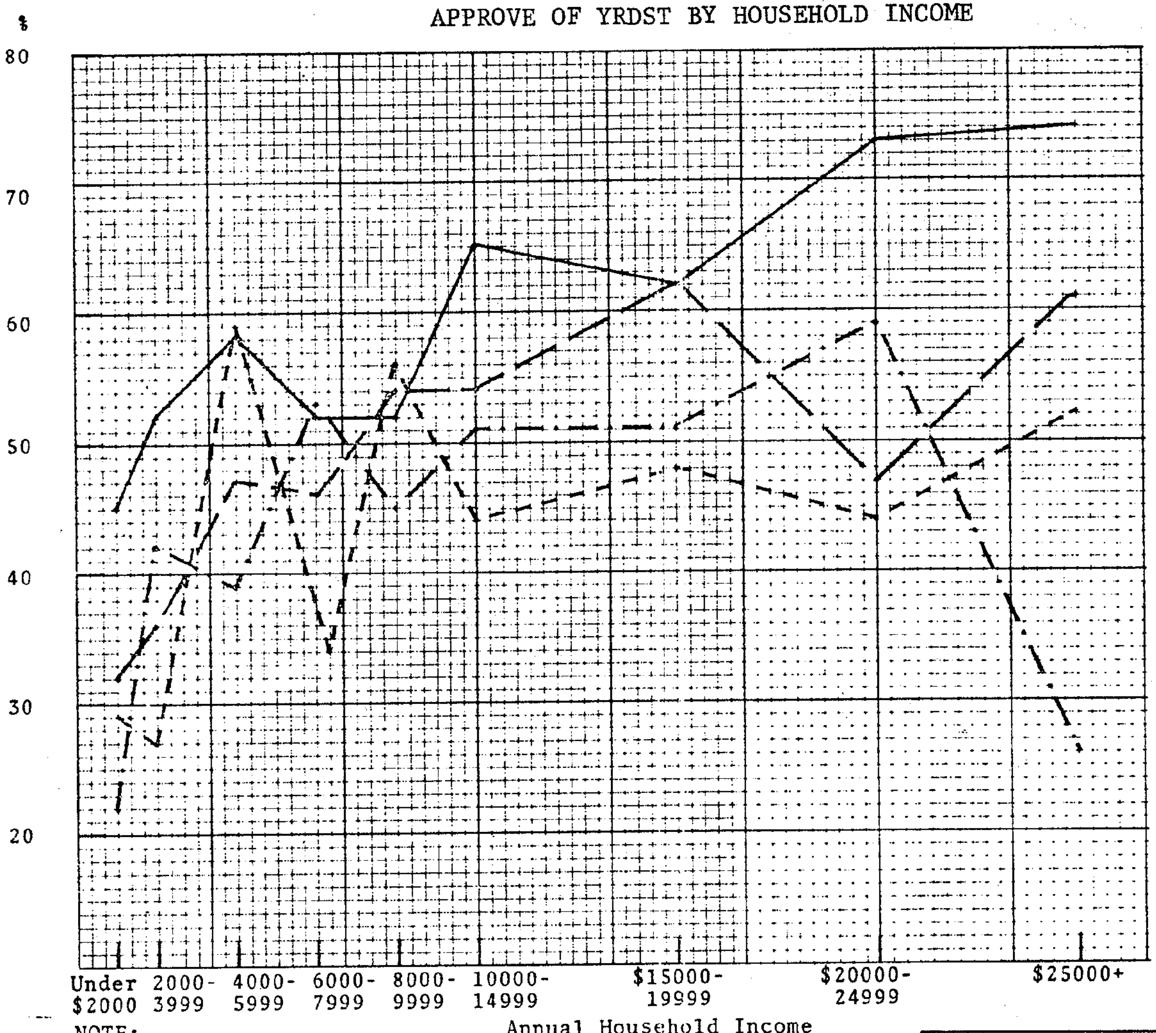
DRIVING MORE OR DRIVING LESS IN LATE AFTERNOON



NOTE: Complex interactions between locale and impact zones.

Figure E.32

APPROVE OF YRDST BY HOUSEHOLD INCOME



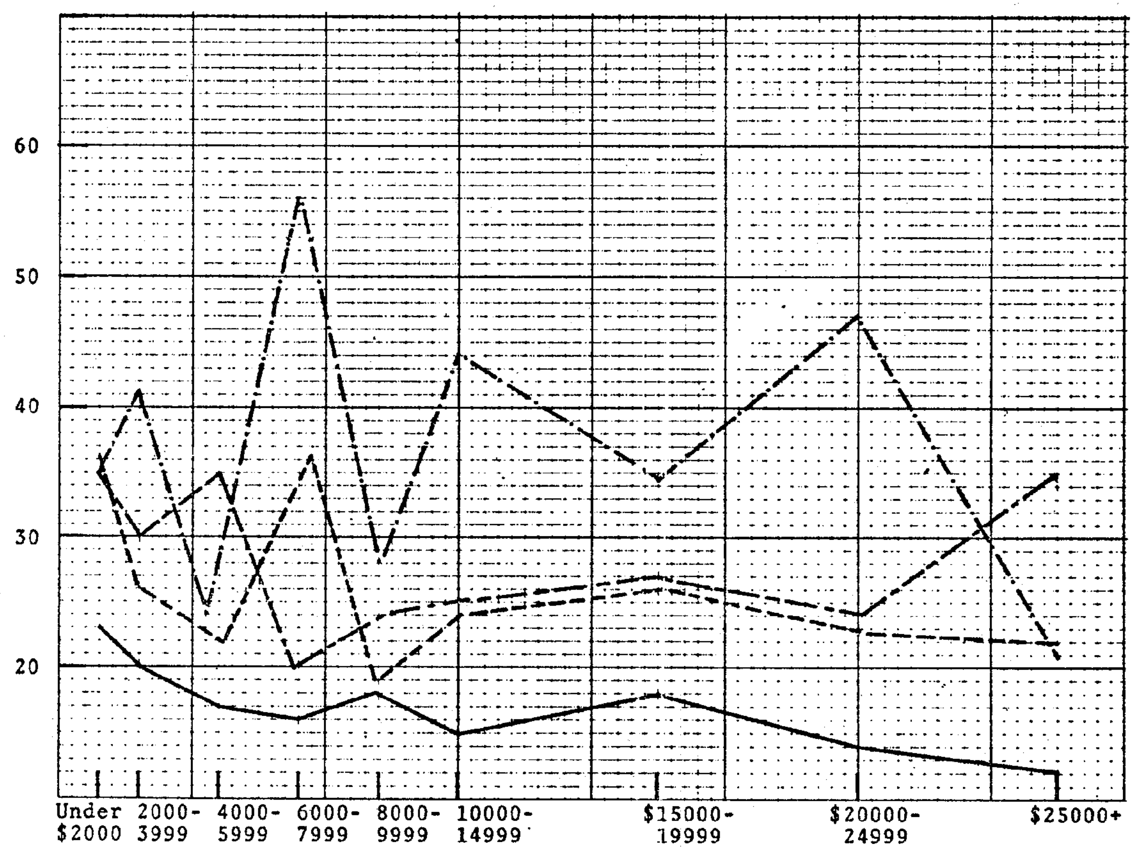
NOTE:
No consistent relationships - slight trend for higher income groups to have higher percentage of persons approving.

LEGEND

Cycle 5 — — (Aug. 31 - Sept. 27, 1973)
Cycle 6 —·— (Sept. 28 - Oct. 25, 1973
Cycle 7 ——— (Oct. 26 - Nov. 22, 1973)
Cycle 11 - - - (Mar. 29 - Apr. 11, 1974)

Figure E. 33

DISAPPROVE OF YRDST BY HOUSEHOLD INCOME



Annual Household Income

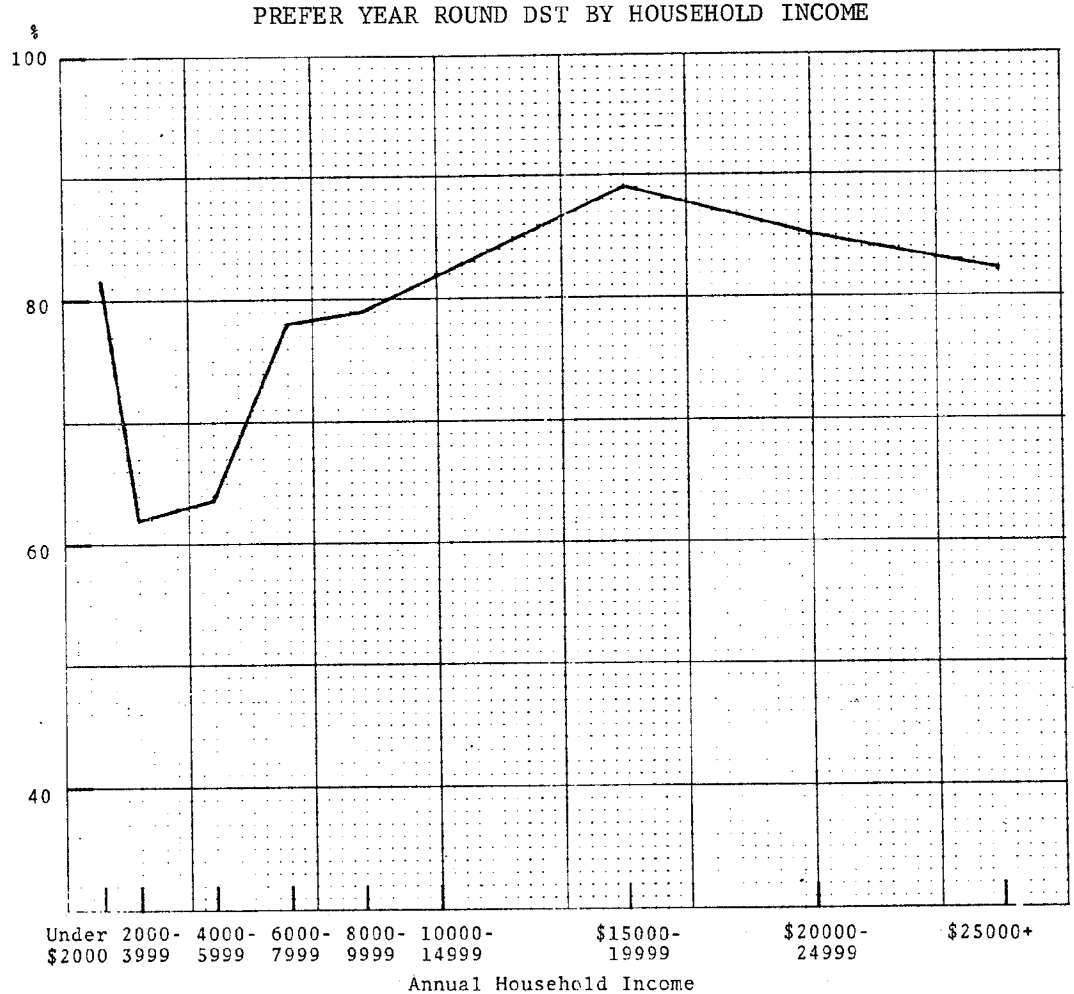
NOTE:
Percentage of disapproval slightly less in higher income classes.

LEGEND

Cycle 5 (Aug. 31 - Sept. 27, 1973)
Cycle 6 (Sept. 28 - Oct. 25, 1973)
Cycle 7 (Oct. 26 - Nov. 22, 1973)
Cycle 11 (March 29 - April 11. 1973)

Figure E. 34

PREFER YEAR ROUND DST BY HOUSEHOLD INCOME



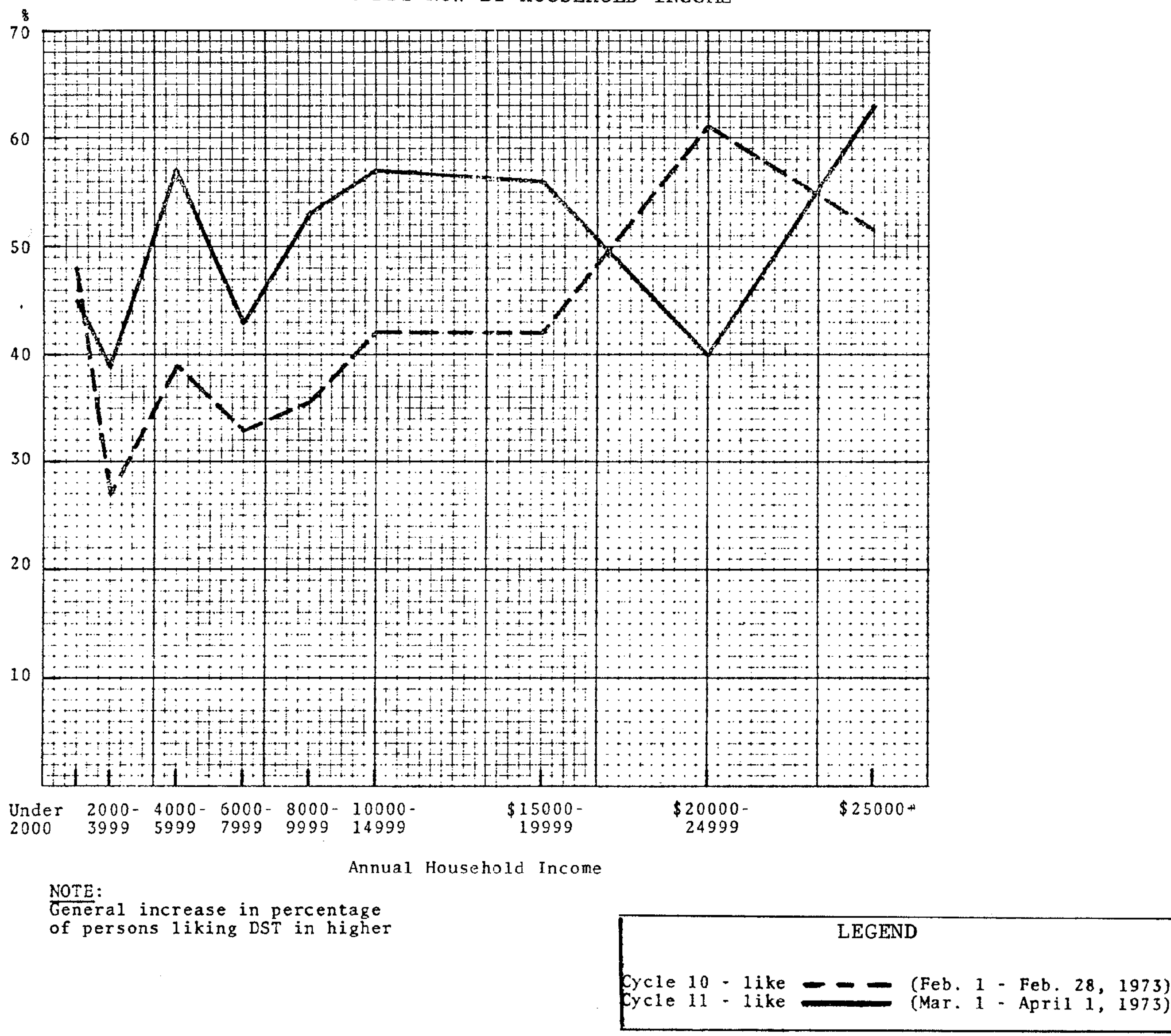
NOTE: Middle and high income groups: about same percentage prefer DST.

Lowest percentage preference for DST in lower income classes.

(Nov. 23 - Dec. 20, 1973)

Figure E.35

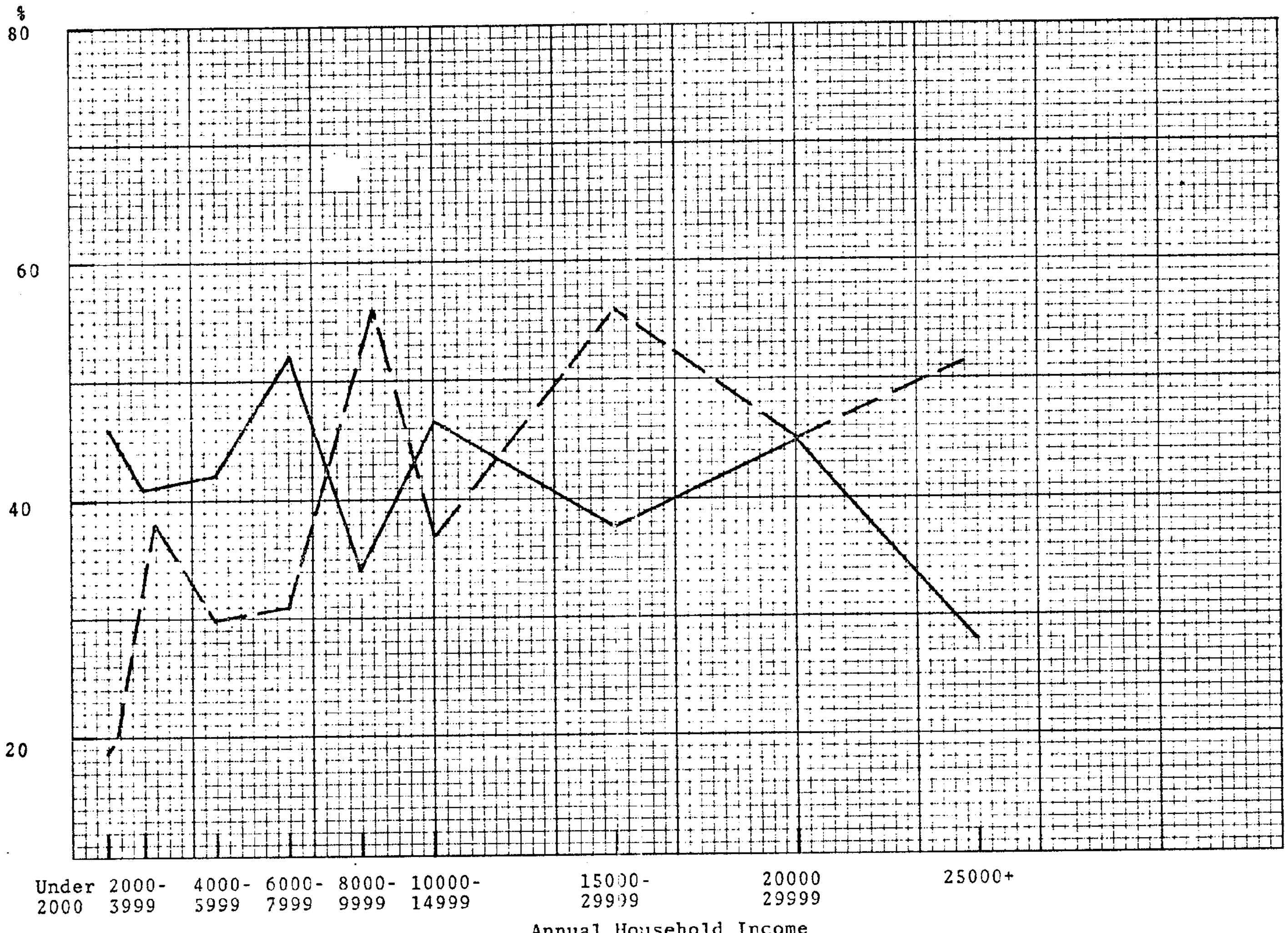
LIKE DST NOW BY HOUSEHOLD INCOME



NOTE:
General increase in percentage of persons liking DST in higher

Figure E.36

RETROSPECTIVE FEELINGS ABOUT DST IN DEC. 1973 BEFORE YEAR ROUND DST
BY HOUSEHOLD INCOME



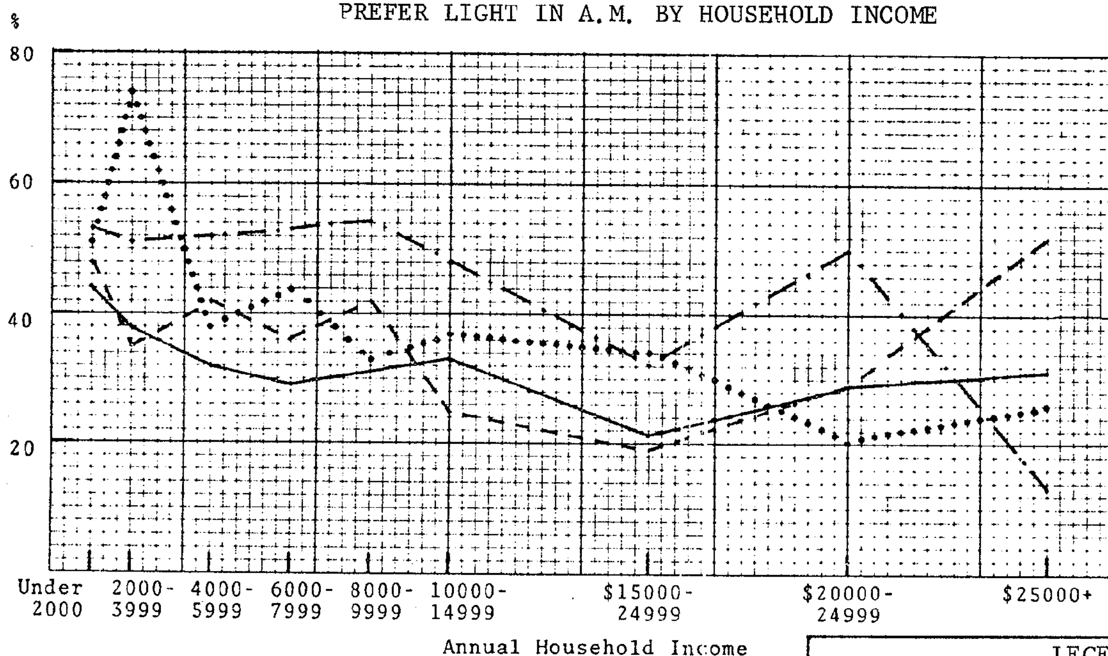
NOTE: Similar to current attitudes. Slight trend of higher percent age of persons in favor of DST in higher income classes.

(Mar. 29 - Apr. 11, 1974)

LEGEND
Against ________
In favor of — — —

Figure E.37

PREFER LIGHT IN A.M. BY HOUSEHOLD INCOME



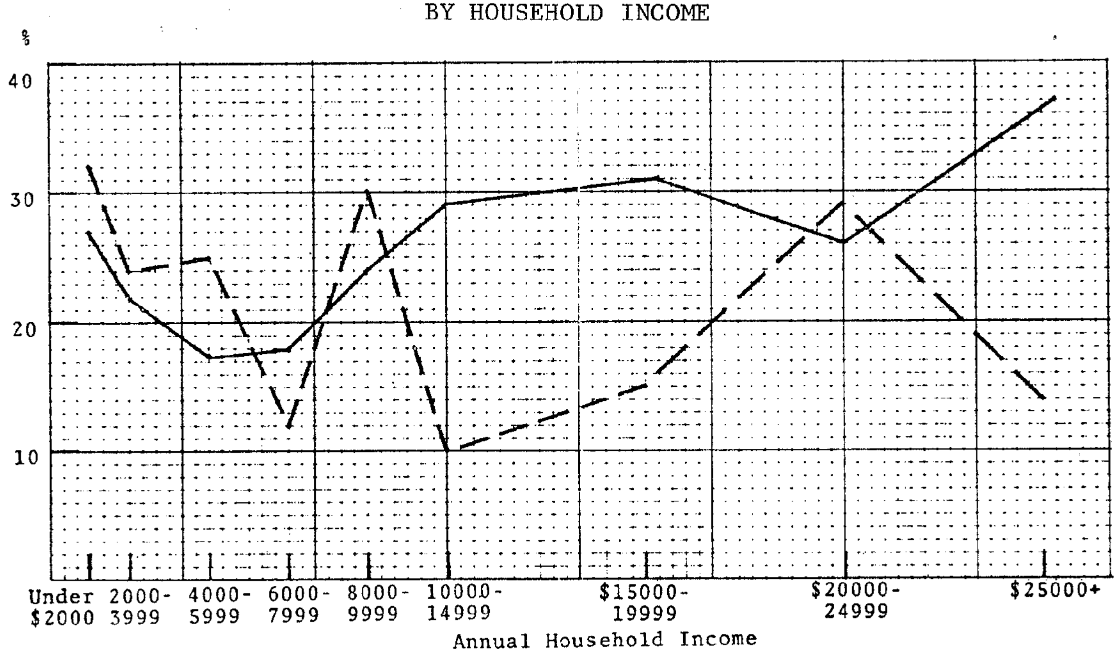
LEGEND

Cycle 5......(Aug. 31 - Sept. 27, 1973)
Cycle 6 — — — (Sept. 28 - Oct. 25, 1973)
Cycle 7 ——— (Oct. 26 - Nov. 22, 1973)
Cycle 11 —·— (Mar. 29 - April 11, 1974)

NOTE:
Generally, higher percentage prefer light in A.M. in lower income classes.

Figure E. 38

DONE ANYTHING DIFFERENT IN MORNING, EVENING DUE TO DST
BY HOUSEHOLD INCOME



NOTE:

Higher income classes have highest percentage reporting doing something different in p.m.

(Mar. 15 - April 11, 1974)

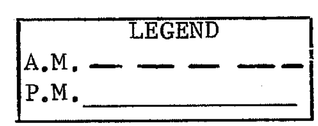
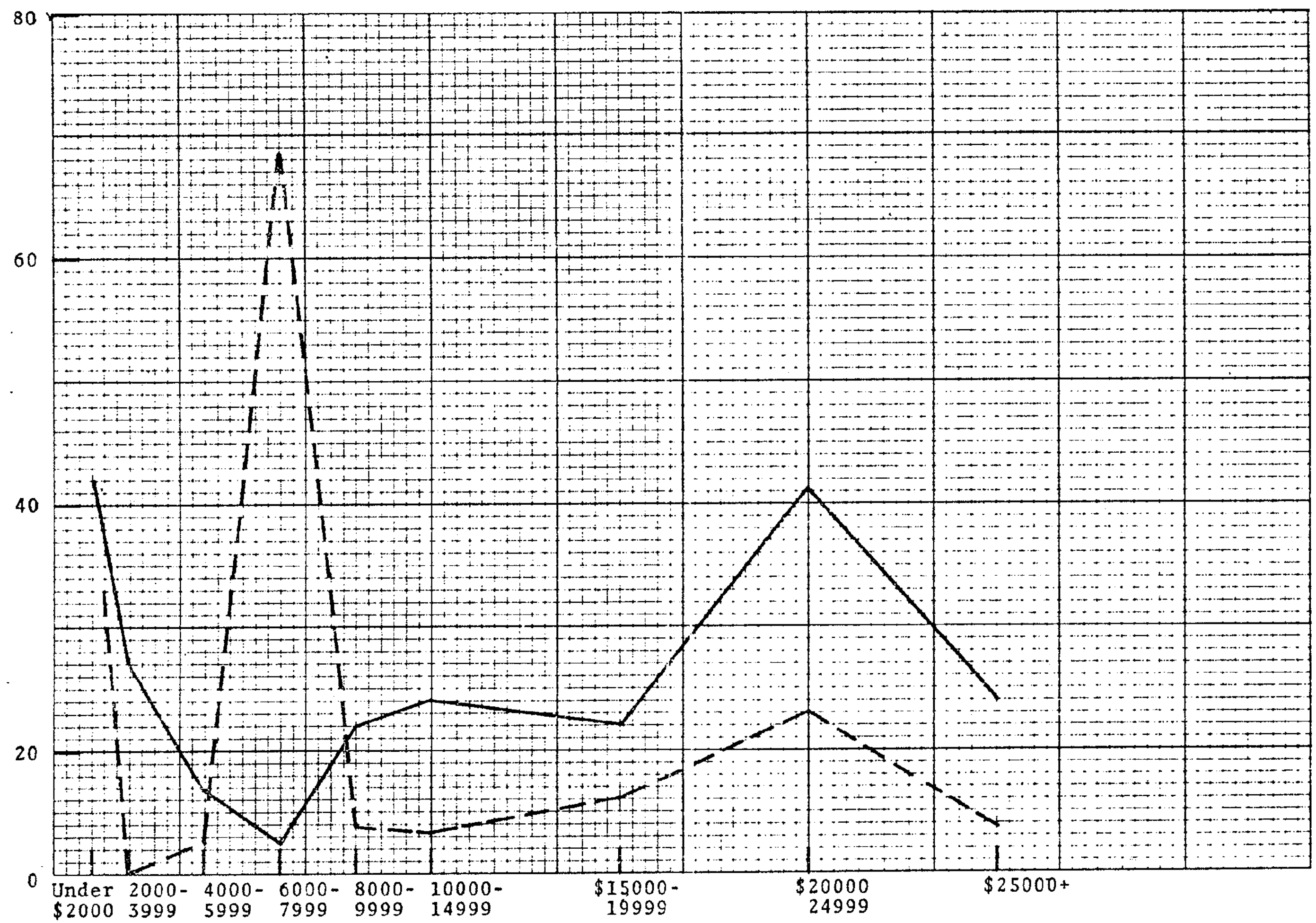


Figure E.39

DRIVING MORE OR LESS IN LATE AFTERNOON THAN BEFORE WE WENT BACK ONTO DST
BY HOUSEHOLD INCOME



NOTE:
- Highest per cent driving more is in higher income classes.

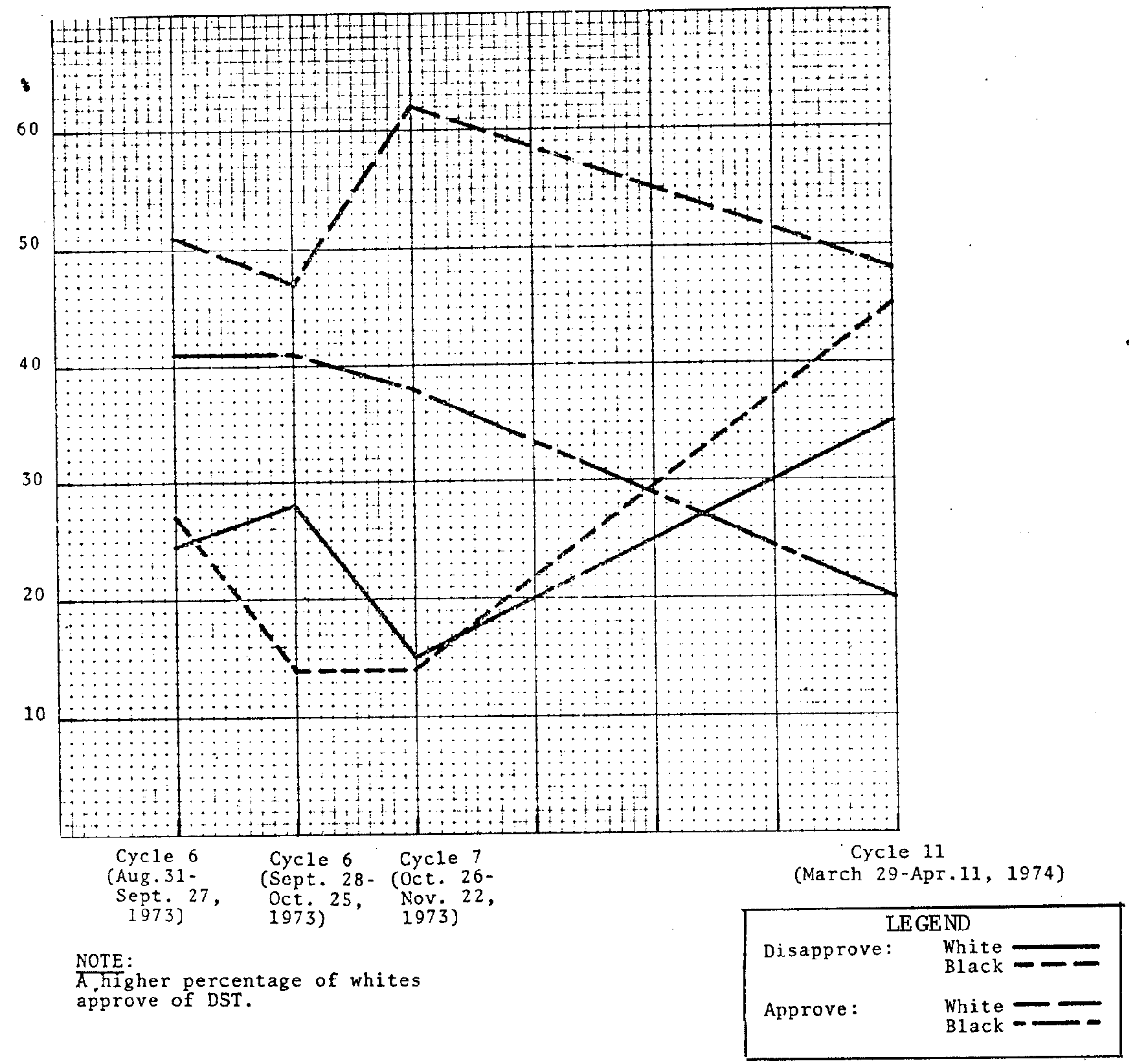
(Mar. 15 - Apr. 11, 1974)

LEGEND

Driving More ----
Driving Less ——

Figure E.40

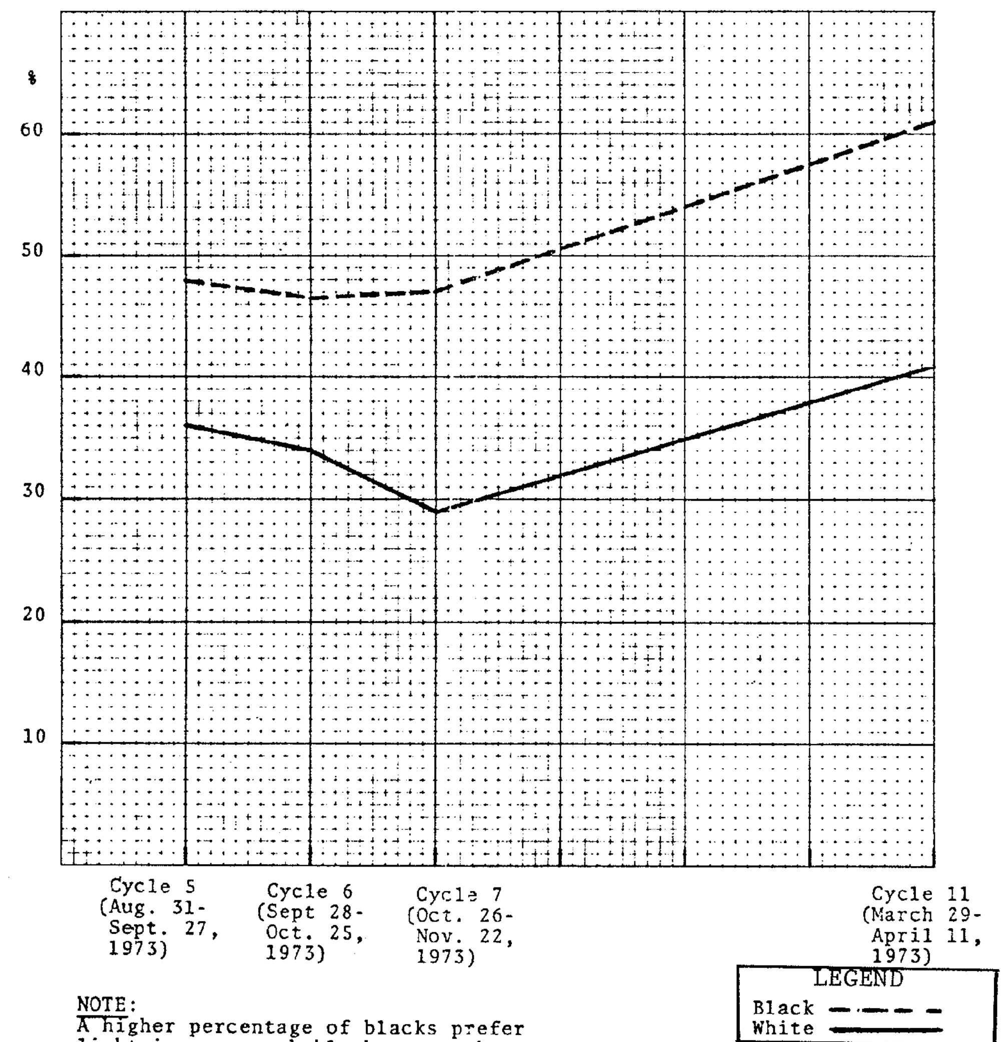
APPROVE OR DISAPPROVE OF YRDST BY RACE



NOTE:
A higher percentage of whites approve of DST.

Figure E. 41

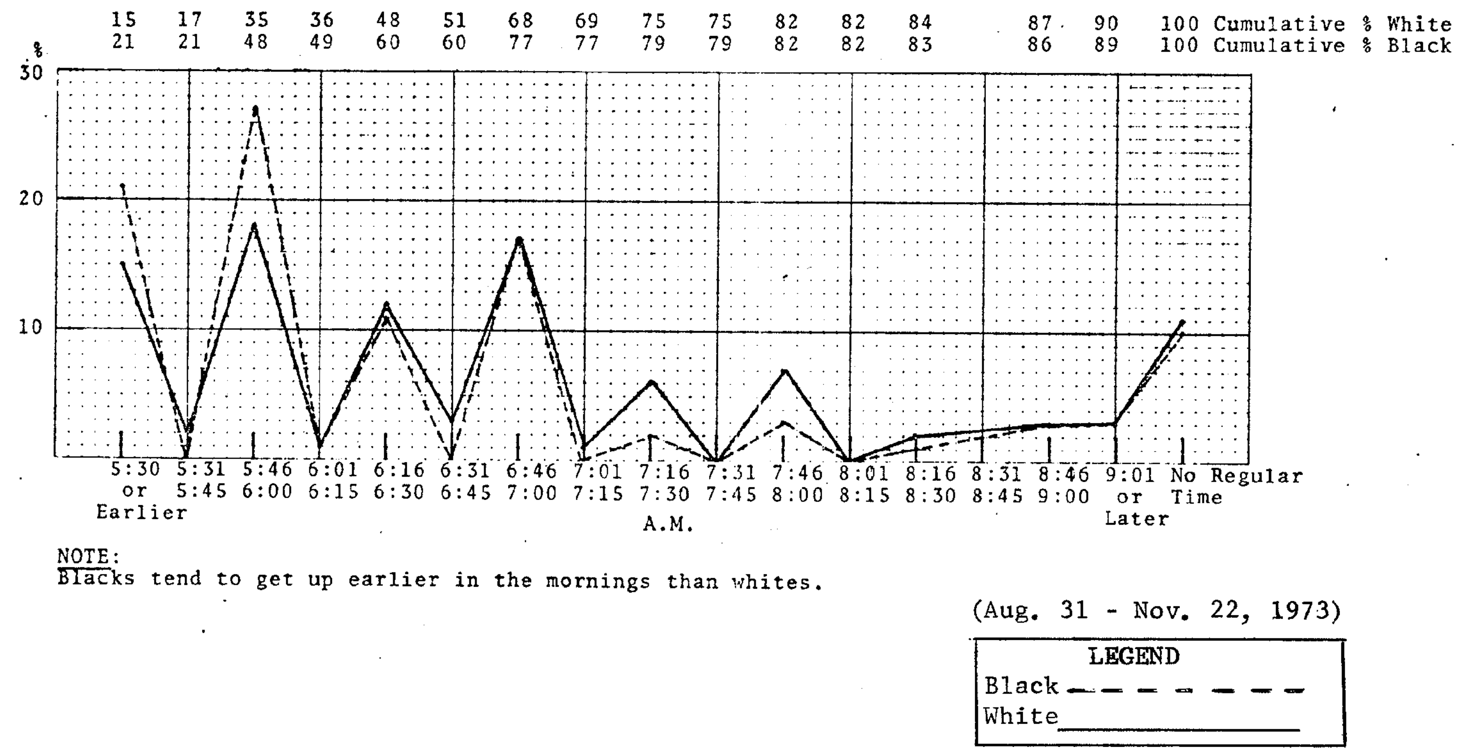
PREFER LIGHT IN A.M. BY RACE



NOTE:
A higher percentage of blacks prefer light in a.m. probably because they get up earlier in the morning

Figure E. 42

TIME GET UP IN MORNING BY RACE

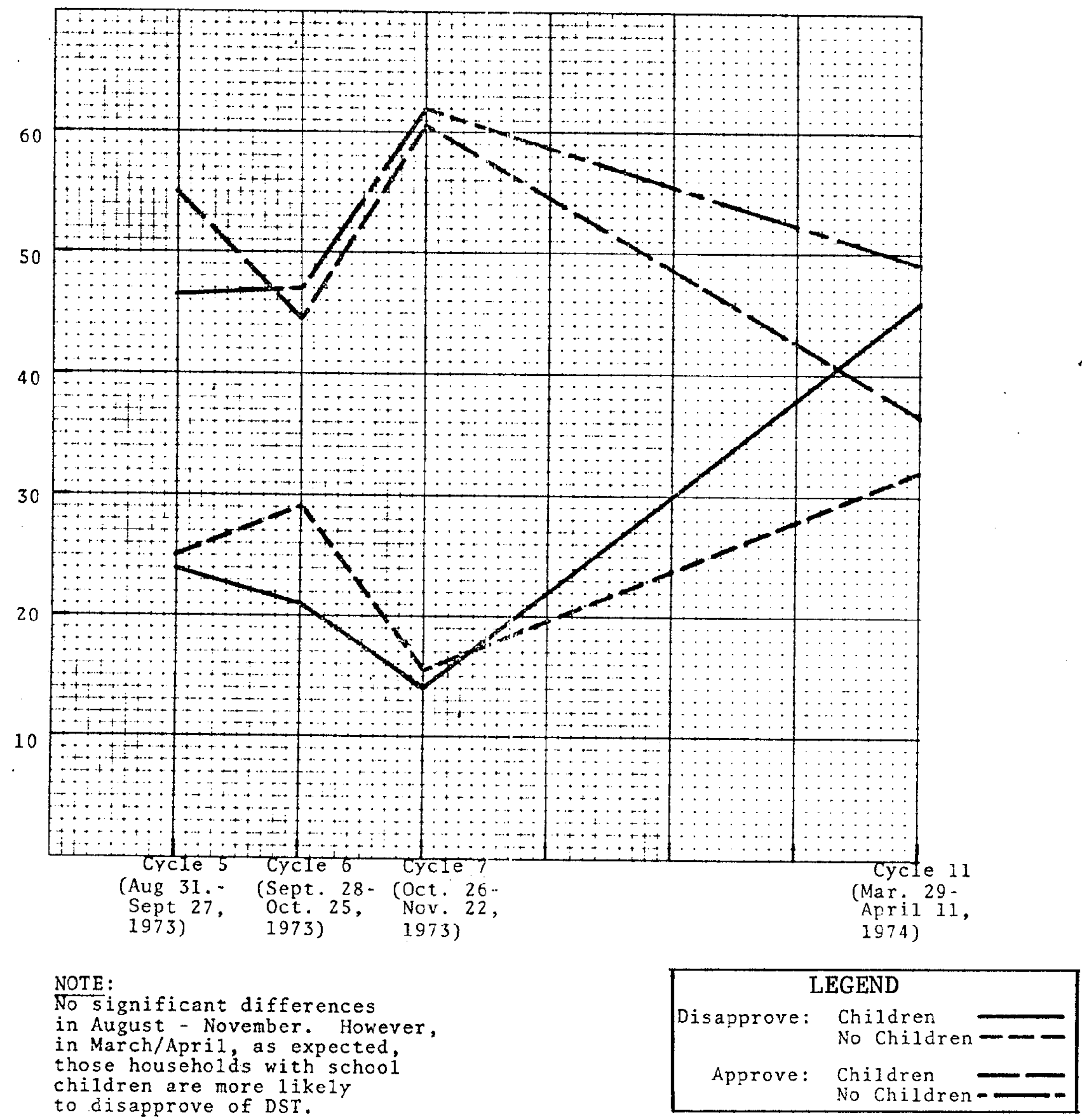


NOTE:
Blacks tend to get up earlier in the mornings than whites.

(Aug. 31 - Nov. 22, 1973)

Figure E. 43

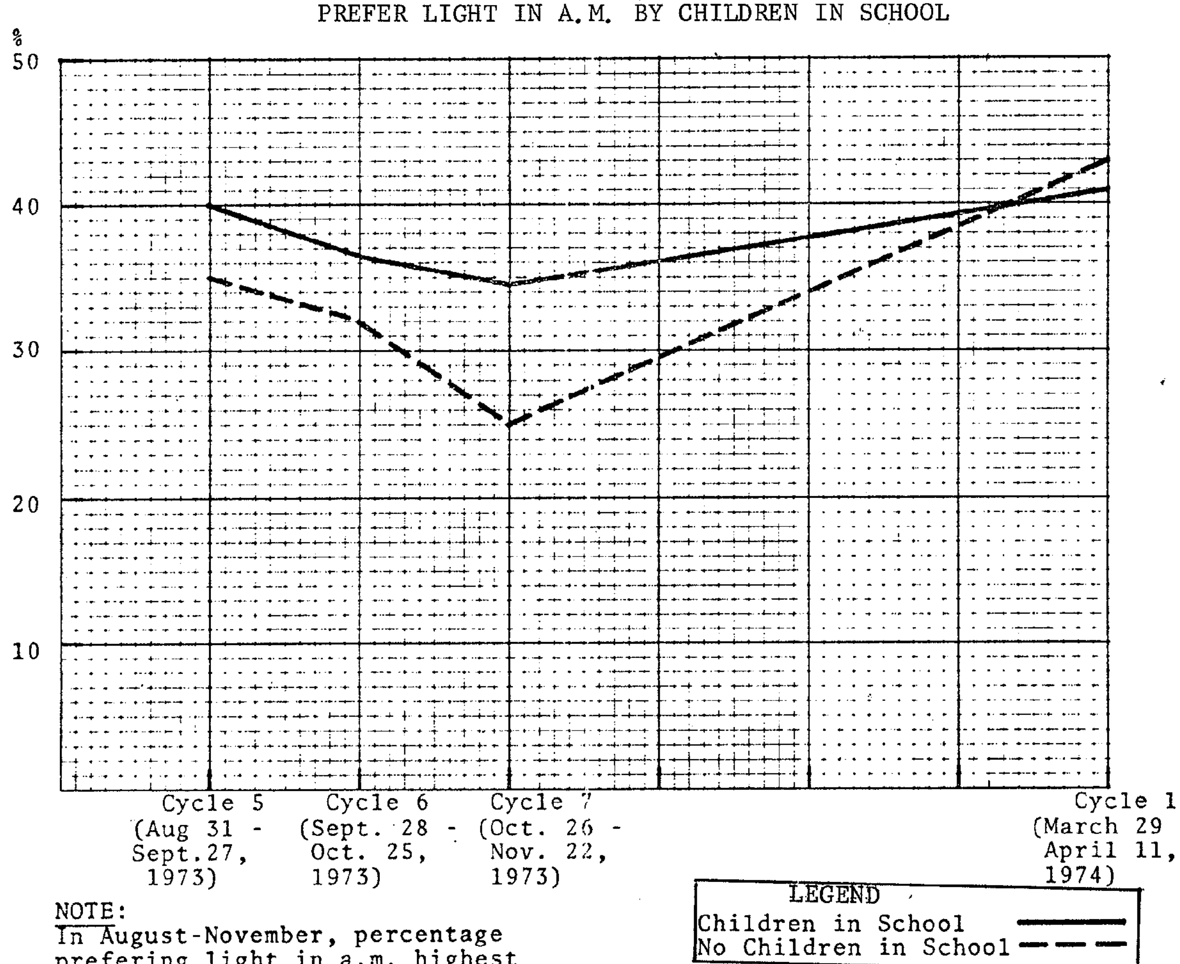
APPROVE OR DISAPPROVE OF YRDST BY CHILDREN IN SCHOOL



NOTE:
No significant differences in August - November. However, in March/April, as expected, those households with school children are more likely to disapprove of DST.

Figure E. 44

PREFER LIGHT IN A.M. BY CHILDREN IN SCHOOL



NOTE:
In August-November, percentage prefering light in a.m. highest in households with school children; in March/April, no difference.

Table E. 19

ATTITUDES AND BEHAVIOR BY RACE AND BY CHILDREN IN SCHOOL OR NOT

Dates →	Nov. 23-Dec. 20, 1973	Feb. 1-28, 1974		Mar. 15-Apr. 11, 1974				Mar. 15-Apr. 11, 1974			
Question →	Prefer DST % Yes	Like DST	Dislike DST	Like DST	Dislike DST	Differ in A.M.	Differ in P.M.	Favor DST Dec. '73	Against DST Dec. '73	Driving more	Driving less
Black	81%	29%	62%	45%	53%	26%	19%	13%	51%	14%	21%
White	78%	42%	49%	54%	37%	18%	26%	45%	38%	13%	25%
Have children in school ..	81%	42%	53%	54%	41%	21%	25%	40%	45%	15%	17%
No children in school ..	78%	41%	48%	53%	36%	17%	27%	43%	36%	12%	28%

NOTE:
- In February and March/April, a higher per cent of whites like DST.
- No major differences between attitudes and related behaviors of households with school children and households without school children.

APPENDIX F: EXPECTATIONS

Figure F.1

PER CENT OF CAR OWNING HOUSEHOLDS WHO EXPECT PROBLEMS OBTAINING GASOLINE IN THE NEXT YEAR

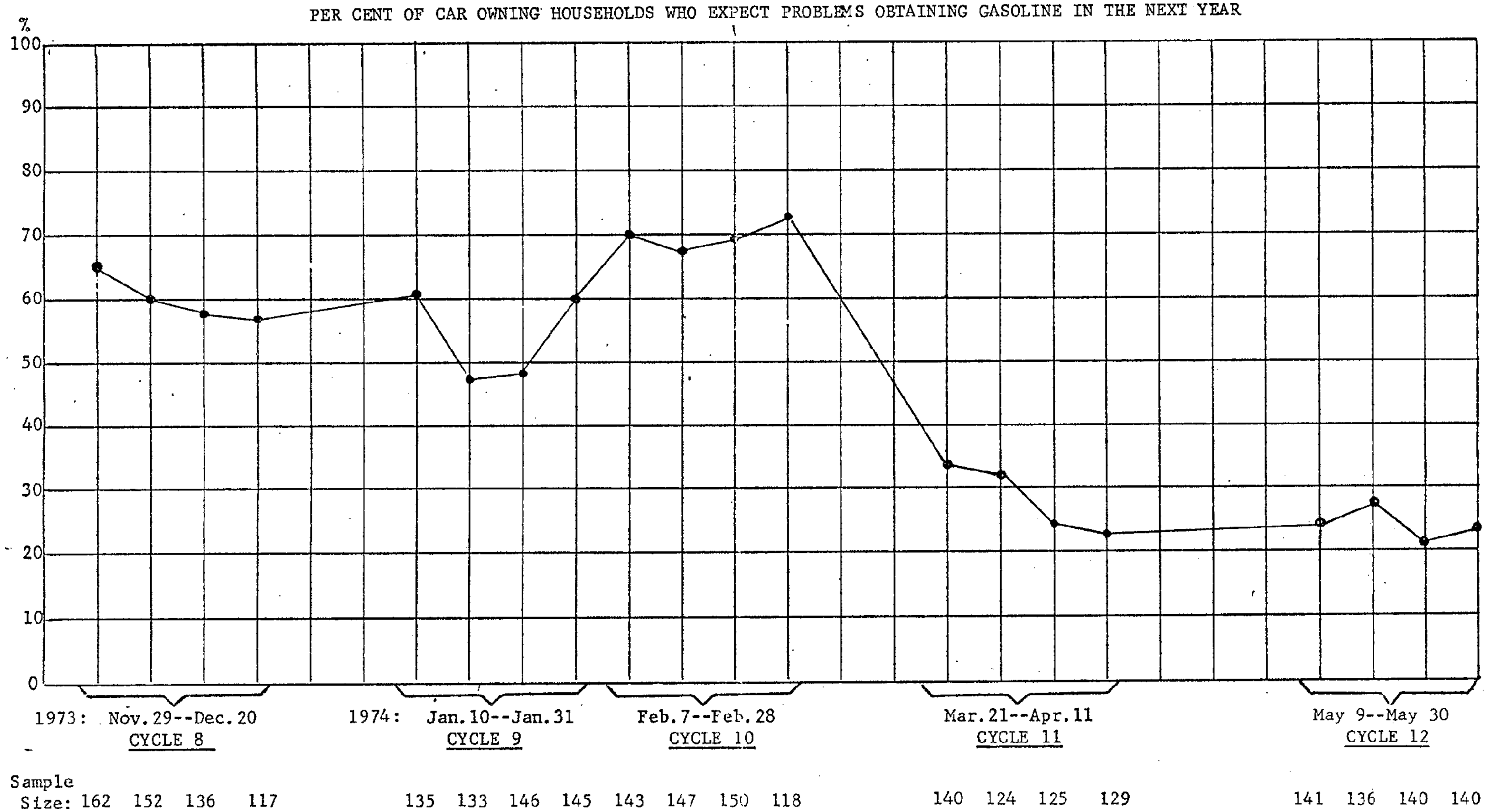


Figure F.2

PER CENT OF HOMEOWNERS WHO EXPECT PROBLEMS OBTAINING FUEL FOR HEATING THEIR HOMES IN THE NEXT YEAR

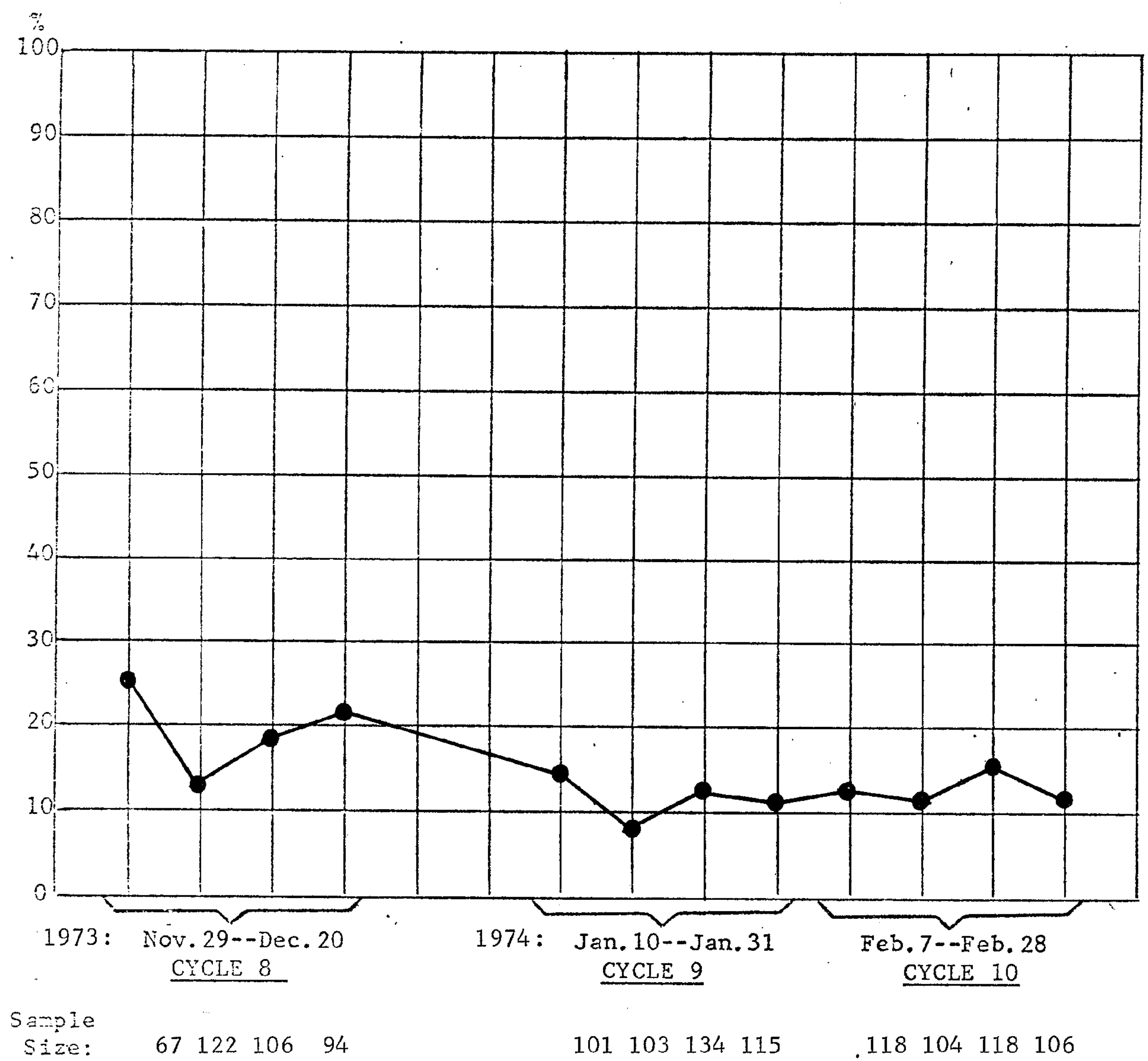


Figure F.3

PER CENT OF HOUSEHOLDS WHO EXPECT PROBLEMS IN OBTAINING ELECTRICITY IN THE NEXT YEAR

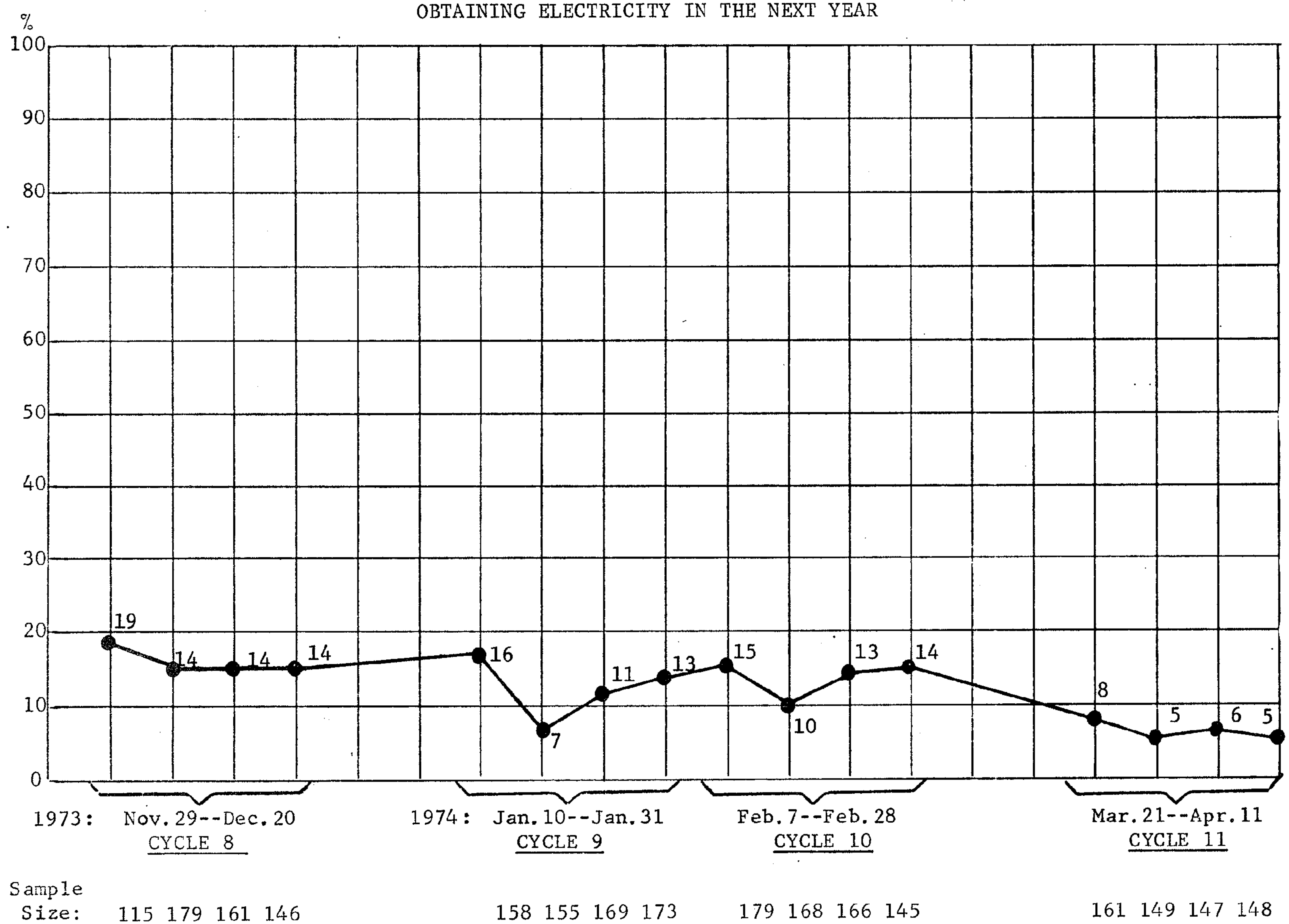


Table F.1

PER CENT REPORTING HAVING TROUBLE GETTING GASOLINE, FUEL OIL, AND ELECTRICITY BY PER CENT WHO EXPECT TROUBLE

Had Trouble Getting:	Expect Trouble Getting:		
	Gasoline	Heating Fuel	Electricity
Cycle 8 (11/23 - 12/30, 1973)			
Gasoline	85	29	24
Fuel Oil	0	100	0
Electricity	65	31	44
Cycle 9 (1/4 - 1/31, 1974)			
Gasoline	74	12	17
Fuel Oil	100	75	0
Electricity	78	11	27
Cycle 10 (2/1 - 2/28, 1974)			
Gasoline	84	11	16
Fuel Oil	40	60	20
Electricity	76	21	29
Cycle 11 (3/15 - 4/11, 1974)			
Gasoline	51	--	11
Fuel Oil	--	43	0
Cycle 12 (5/3 - 5/30, 1974)			
Gasoline	40	--	--
Electricity	33	--	--

Table F.2

PER CENT REPORTING NO TROUBLE GETTING GASOLINE, FUEL OIL, AND ELECTRICITY BY PER CENT WHO EXPECT TROUBLE

Did Not Have Trouble Getting:	Expect Trouble Getting:		
	Gasoline	Heating Fuel	Electricity
Cycle 8 (11/23 - 12/20, 1973)			
Gasoline	56	16	13
Fuel Oil	65	27	13
Electricity	60	18	13
Cycle 9 (1/4 - 1/31, 1974)			
Gasoline	39	10	7
Fuel Oil	58	21	10
Electricity	53	11	11
Cycle 10 (2/1 - 2/28, 1974)			
Gasoline	52	14	7
Fuel Oil	65	15	8
Electricity	70	12	12
Cycle 11 (3/15 - 4/11, 1974)			
Gasoline	14	--	3
Fuel Oil	--	30	7
Cycle 12 (5/3 - 5/30, 1974)			
Gasoline	21	--	--
Electricity	24	--	--

Figure F.4

MEDIAN ESTIMATED PRICE OF GASOLINE AFTER
ONE-MONTH WITH NO PRICE CONTROLS

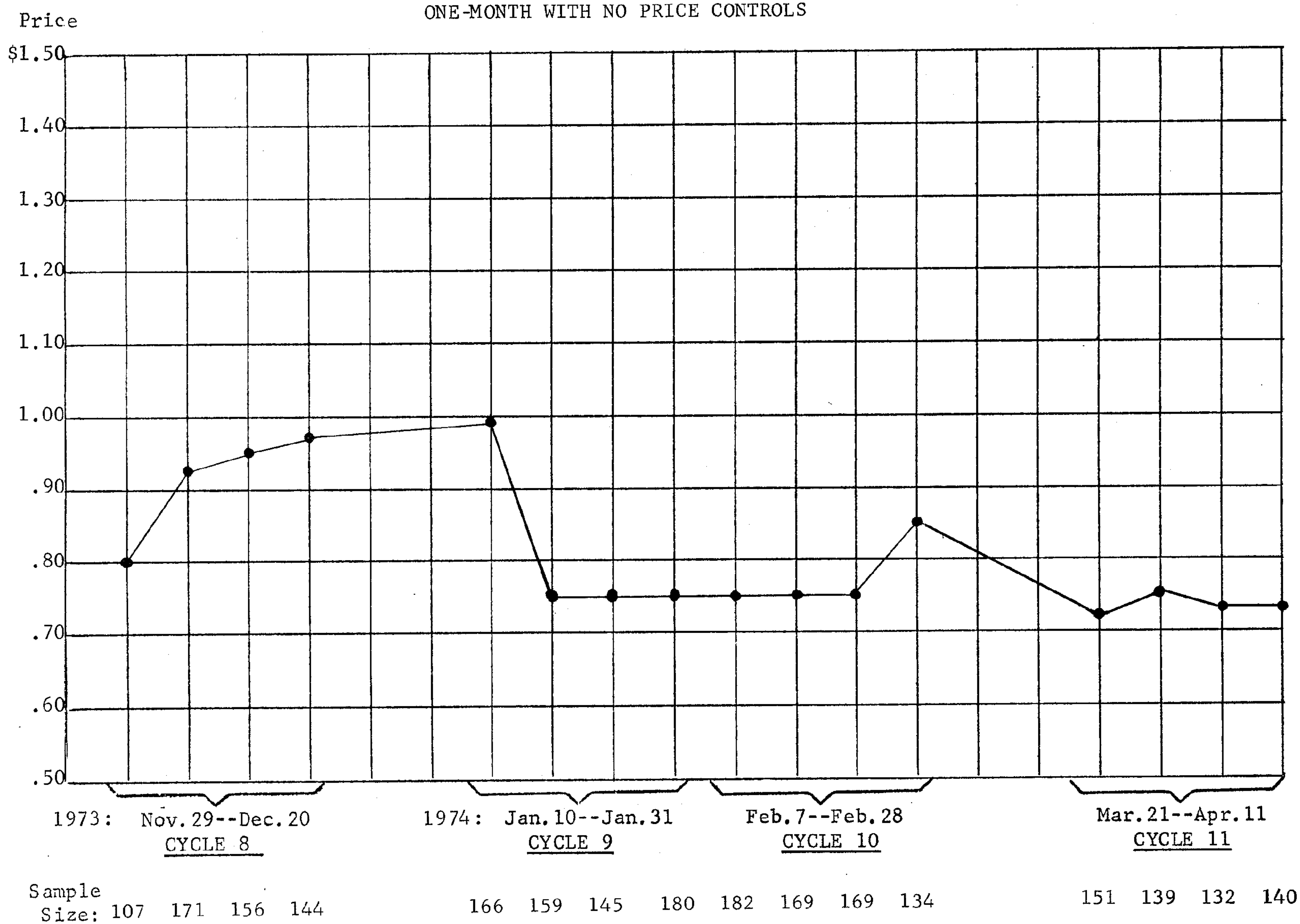


Table F. 3

RESPONSES TO QUESTIONS ON THE OUTLOOK FOR THE NATION'S ECONOMY

(Cycle 11)

Question	Response Category	Per Cent Answering	N
What do you think is the outlook for our nation's economy during the year to come? Do you think the economy will probably grow, stay at about the same level, or decline?	The economy will probably grow .	33	601
	Stay at about the same level . .	30	
	Decline	36	
IF DECLINE: A. How much of a decline do you think there will be in the economy? A moderate recession, a serious recession, or a real depression?	A moderate recession	53	216
	A serious recession	29	
	A real depression	18	
B. Do you think that the decline will be completely due to the energy shortage, partly due to the energy shortage, or not due to the energy shortage at all?	Completely due to the energy shortage	6	217
	Partly due to the energy shortage	67	
	Not due to the energy shortage at all	27	

APPENDIX G: CONSERVATION BEHAVIORS

APPENDIX G: CONSERVATION BEHAVIORS--Continued

Figure G.1

MEDIAN DAYTIME TEMPERATURE WINTER 1972-73 AND WINTER 1973-74

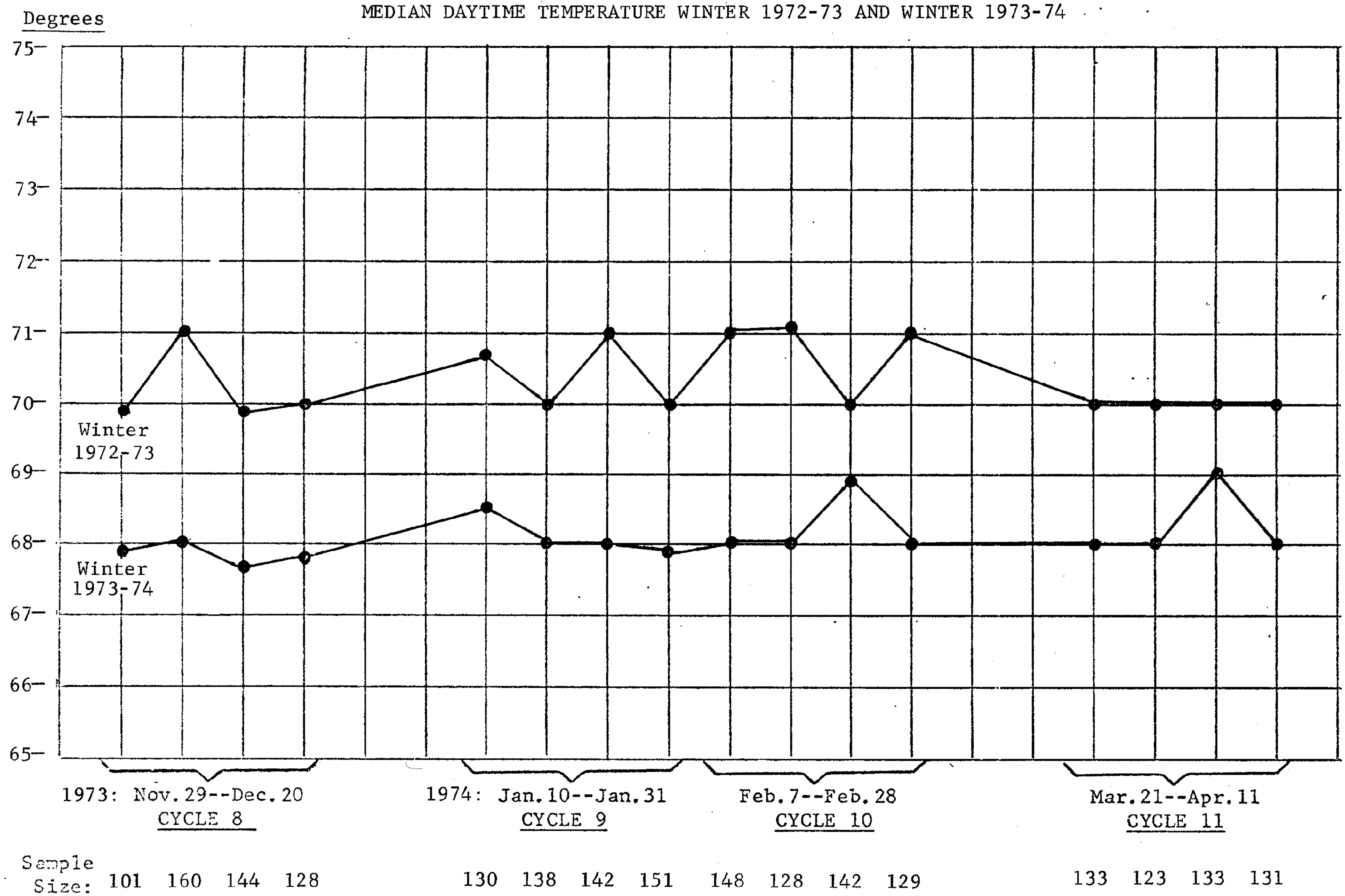


Figure G.2

PER CENT OF HOUSEHOLDS WHO HAVE TURNED DOWN THERMOSTAT--SINCE WINTER OF 1972-73 (ONLY THOSE WHO CAN CONTROL TEMPERATURE)

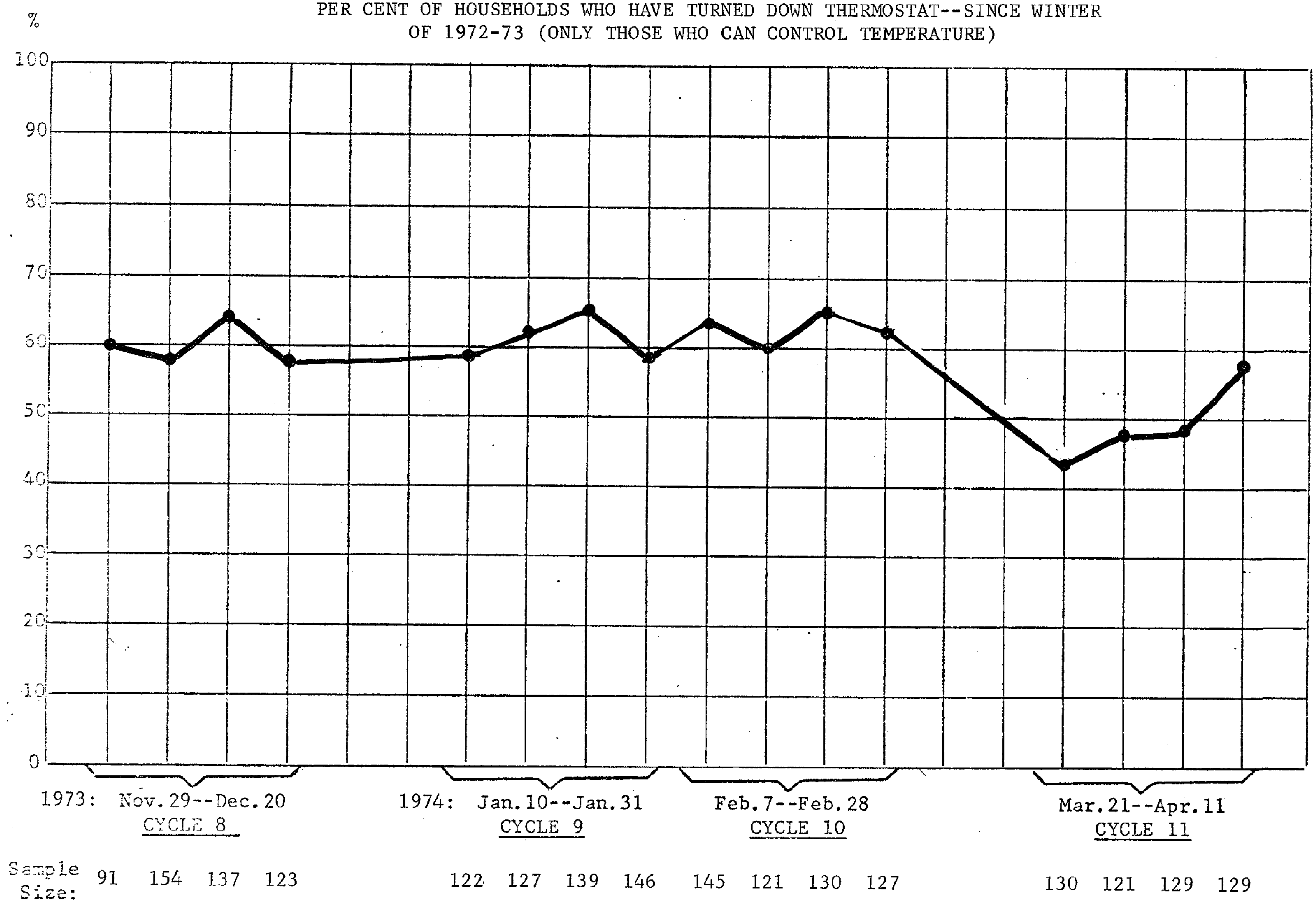
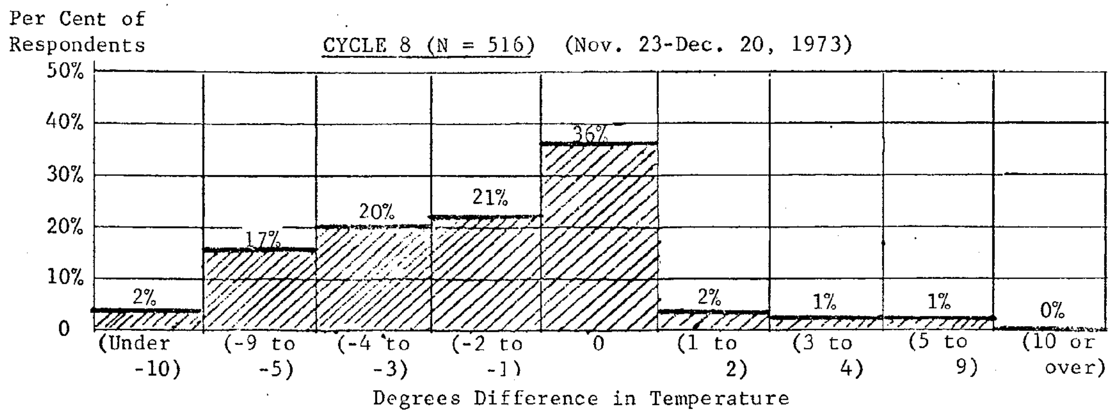


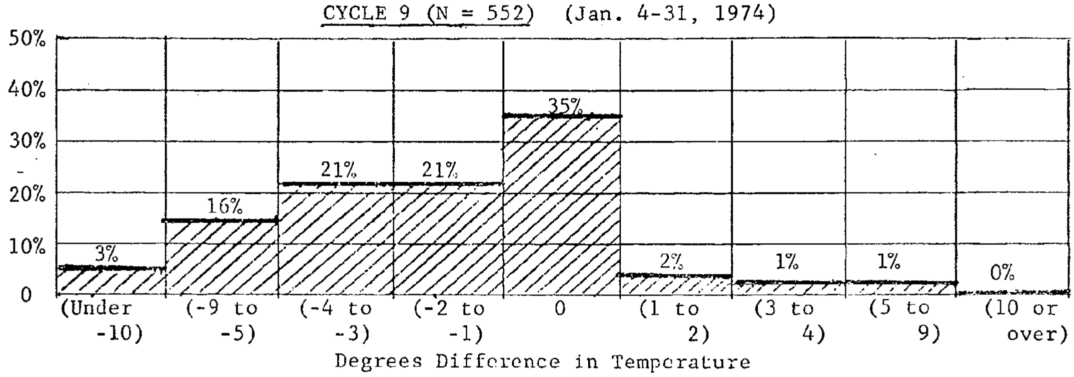
TABLE G. 1

DAYTIME TEMPERATURE WINTER 1973 MINUS DAYTIME TEMPERATURE WINTER 1974

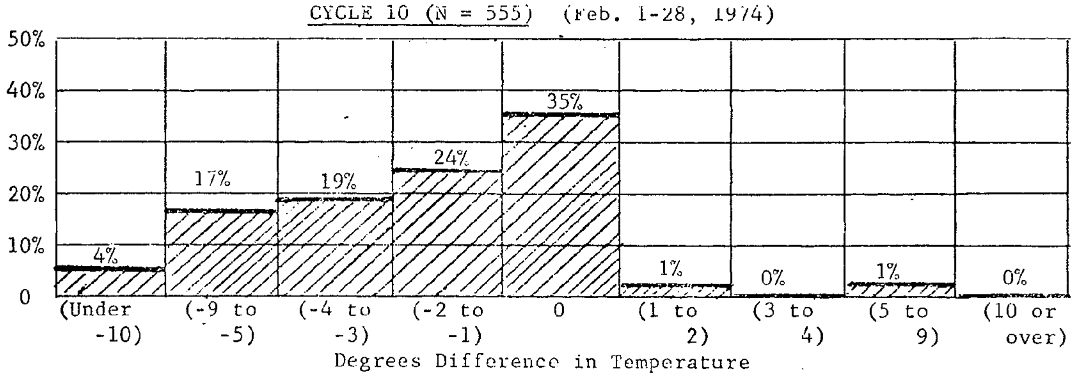
CYCLE 8 (N = 516) (Nov. 23-Dec. 20, 1973)



CYCLE 9 (N = 552) (Jan. 4-31, 1974)



CYCLE 10 (N = 555) (Feb. 1-28, 1974)



CYCLE 11 (N = 509) (March 15-April 11, 1974)

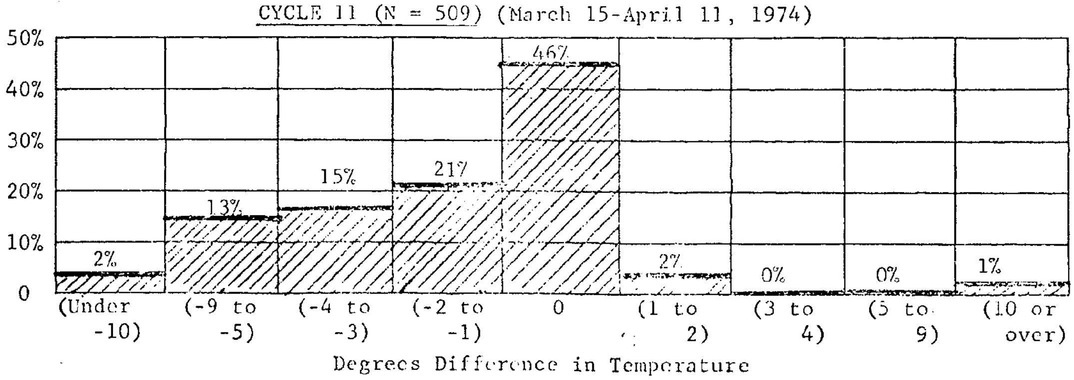


TABLE G.2

HOUSEHOLDS REDUCING DAYTIME TEMPERATURE FOR EACH TYPE OF FUEL USED FOR HOME HEATING (OWNERS AND RENTERS INCLUDED)

Heating Fuel	Sample N	Per cent of households in sample using fuel type	1970 Census N	Per cent of households using fuel type in 1970	Per cent reducing temperature
Cycle 8: November 23 - December 20, 1973					
Natural gas	273	54	35,013,745	55	57
Propane (LP)	35	7	3,806,948	6	51
Fuel oil	134	27	16,473,470	26	75
Coal	6	1	1,820,952	3	17
Electricity	53	11	4,876,038	8	53
Other	4	1	1,060,194	2	25
Cycle 9: January 4 - January 31, 1974					
Natural gas	304	57	35,013,745	55	58
Propane (LP)	27	5	3,806,948	6	67
Fuel oil	142	27	16,473,470	26	73
Coal	05	1	1,820,952	3	40
Electricity	49	9	4,876,038	8	51
Other	09	2	1,060,194	2	33
Cycle 10: February 1 - February 28, 1974					
Natural gas	309	57	35,013,745	55	60
Propane (LP)	33	6	3,806,948	6	55
Fuel oil	129	24	16,473,470	26	78
Coal	7	1	1,820,952	3	43
Electricity	64	12	4,876,038	8	56
Other	1	0	1,060,194	2	X
Cycle 11: March 15 - April 11, 1974					
Natural gas	264	54	35,013,745	55	47
Propane (LP)	30	6	3,806,948	6	50
Fuel oil	128	26	16,473,470	26	64
Coal	4	1	1,820,952	3	25
Electricity	56	12	4,876,038	8	50
Other	7	1	1,060,194	2	29

Figure G.3

PER CENT OF HOUSEHOLDS TRYING TO CUT DOWN ON ELECTRICITY BY CENSUS REGION
(Sample Size Given in Parentheses)

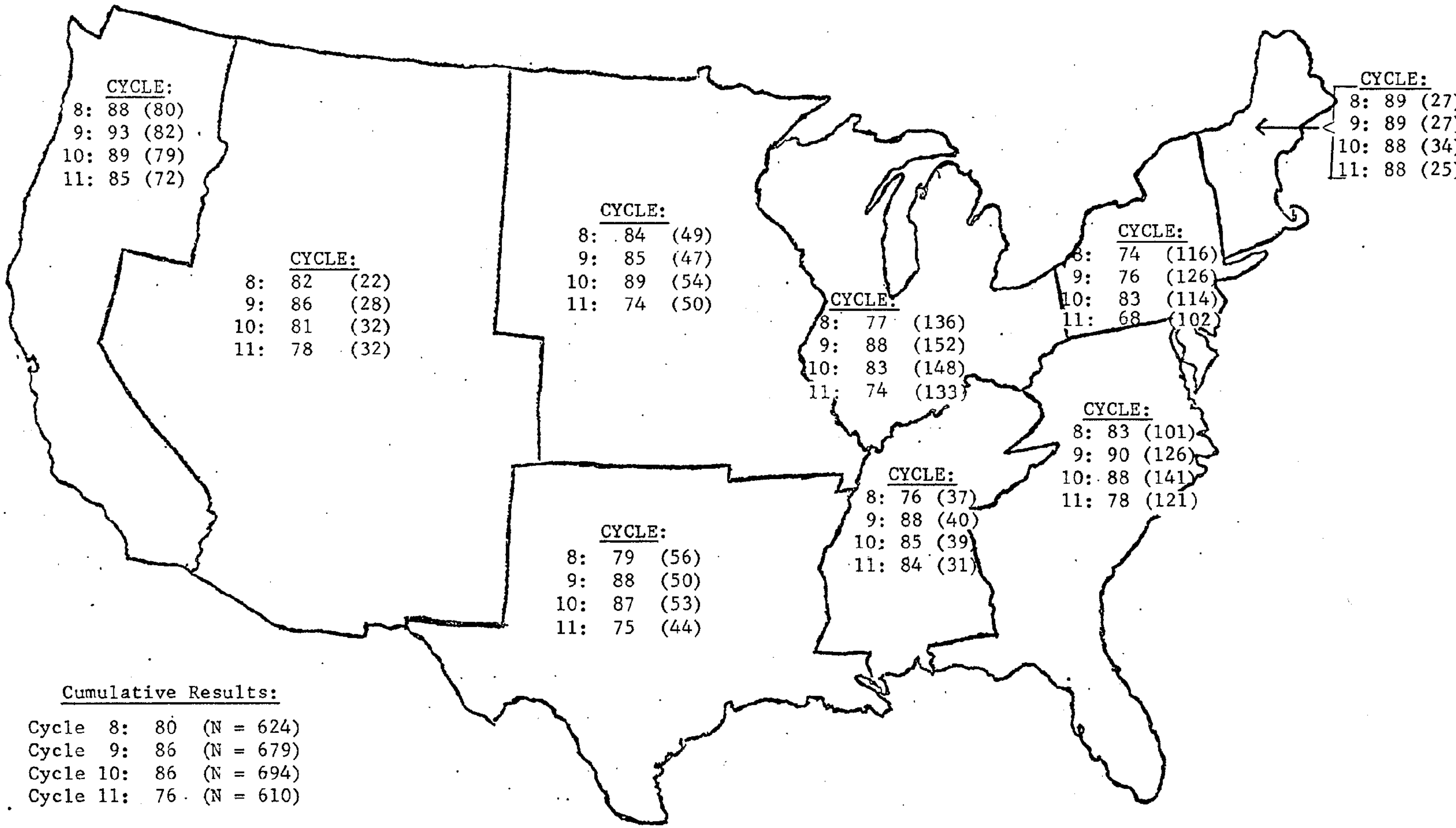


Figure G.4

PER CENT OF HOUSEHOLDS RUNNING MAJOR APPLIANCES LESS

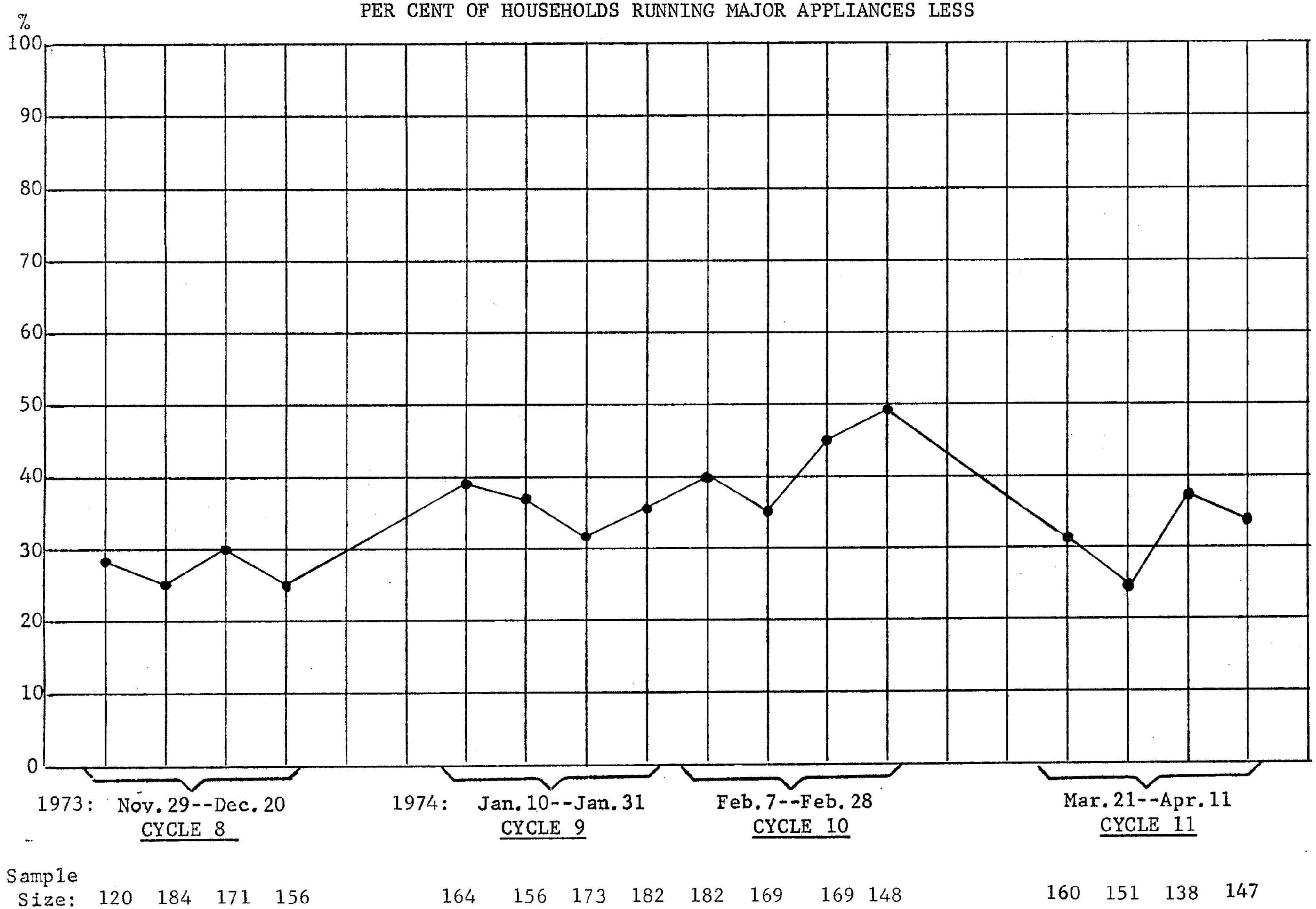


Figure G.5

PER CENT OF HOUSEHOLDS WHO REPORT TURNING OFF LIGHTS TO SAVE ENERGY

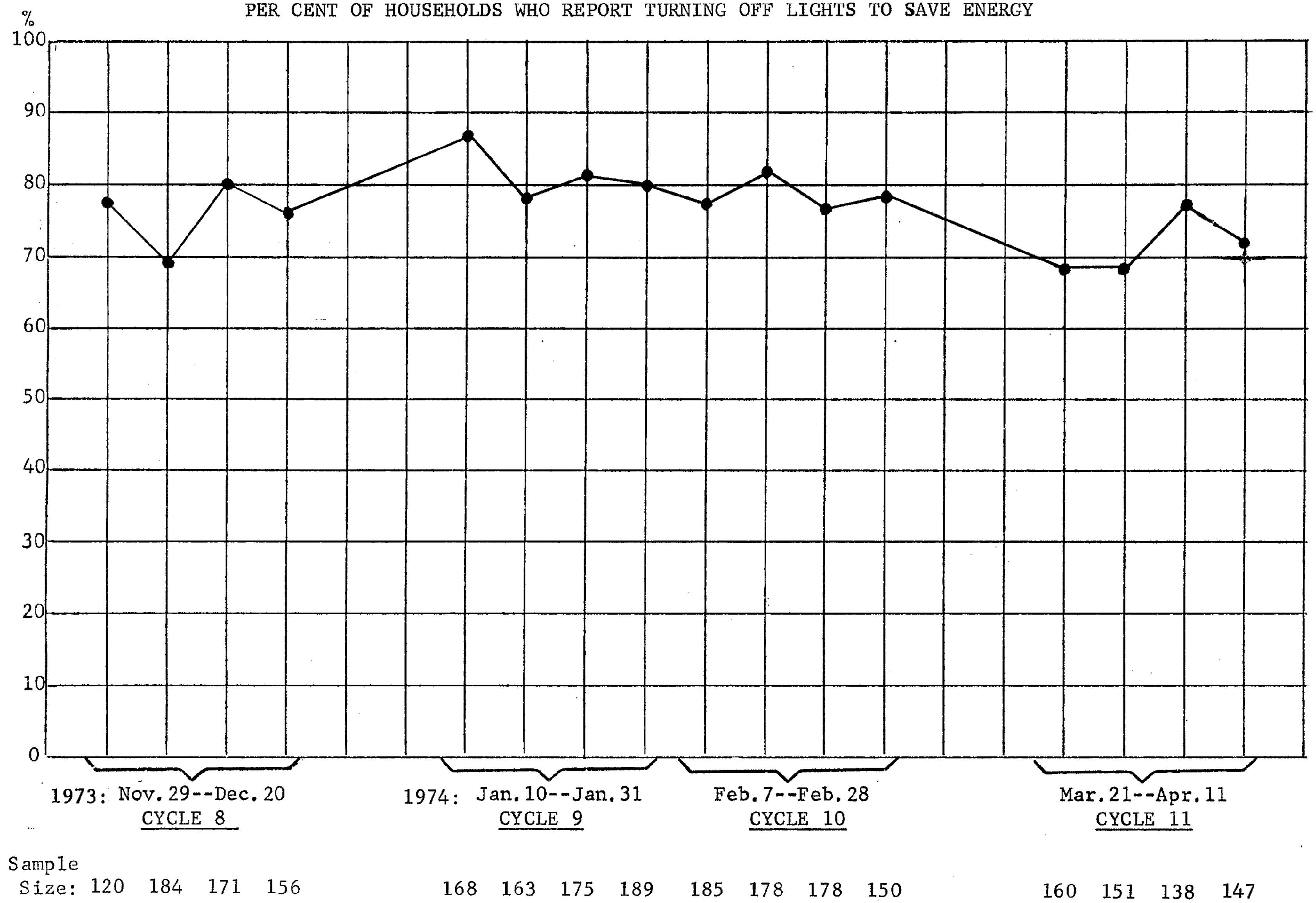


Figure G.6

PER CENT OF CAR OWNING HOUSEHOLDS CUTTING DOWN ON DRIVING

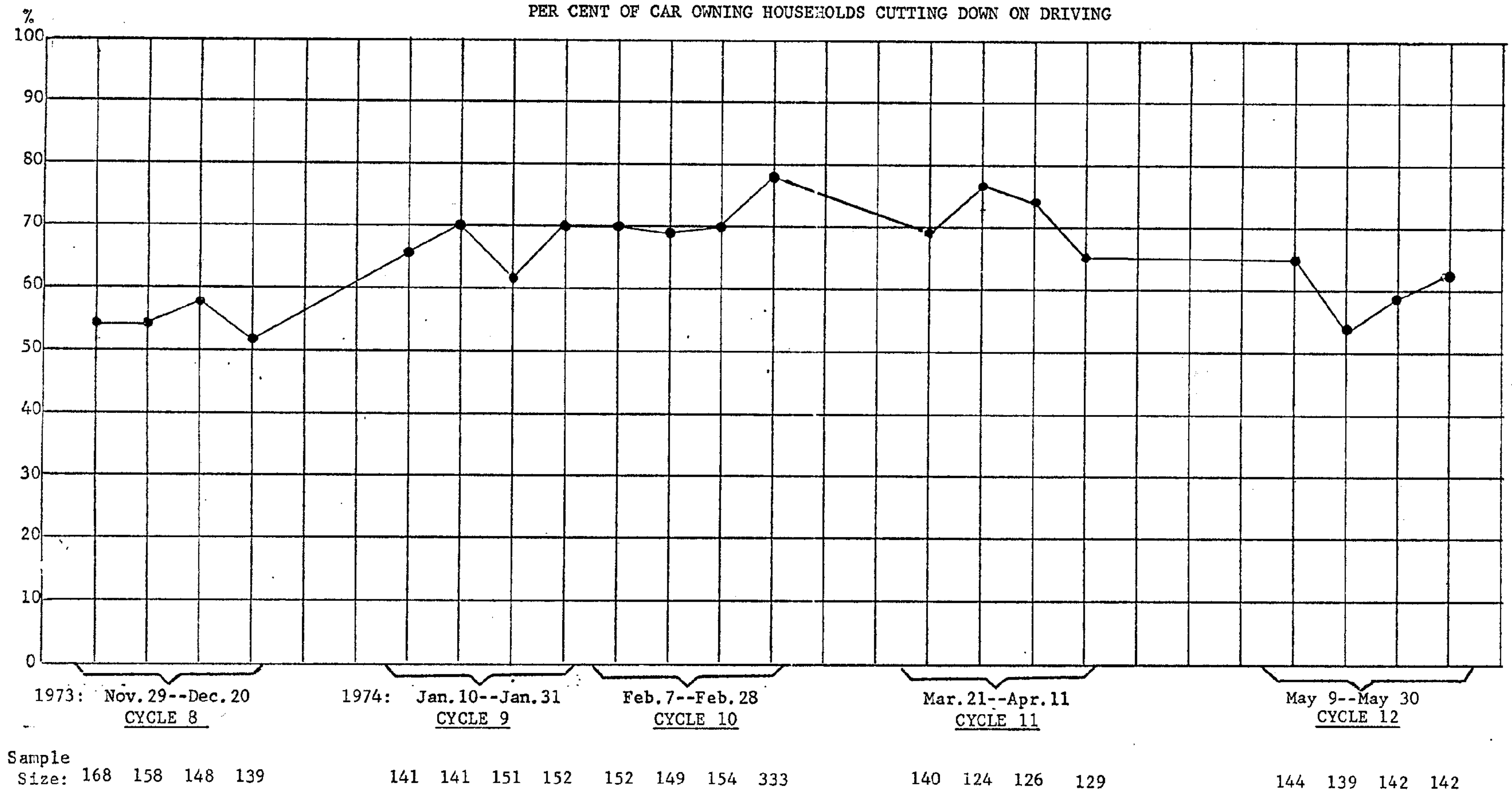


Figure G.7

HOW HOUSEHOLD MANAGED TO CUT DOWN DRIVING

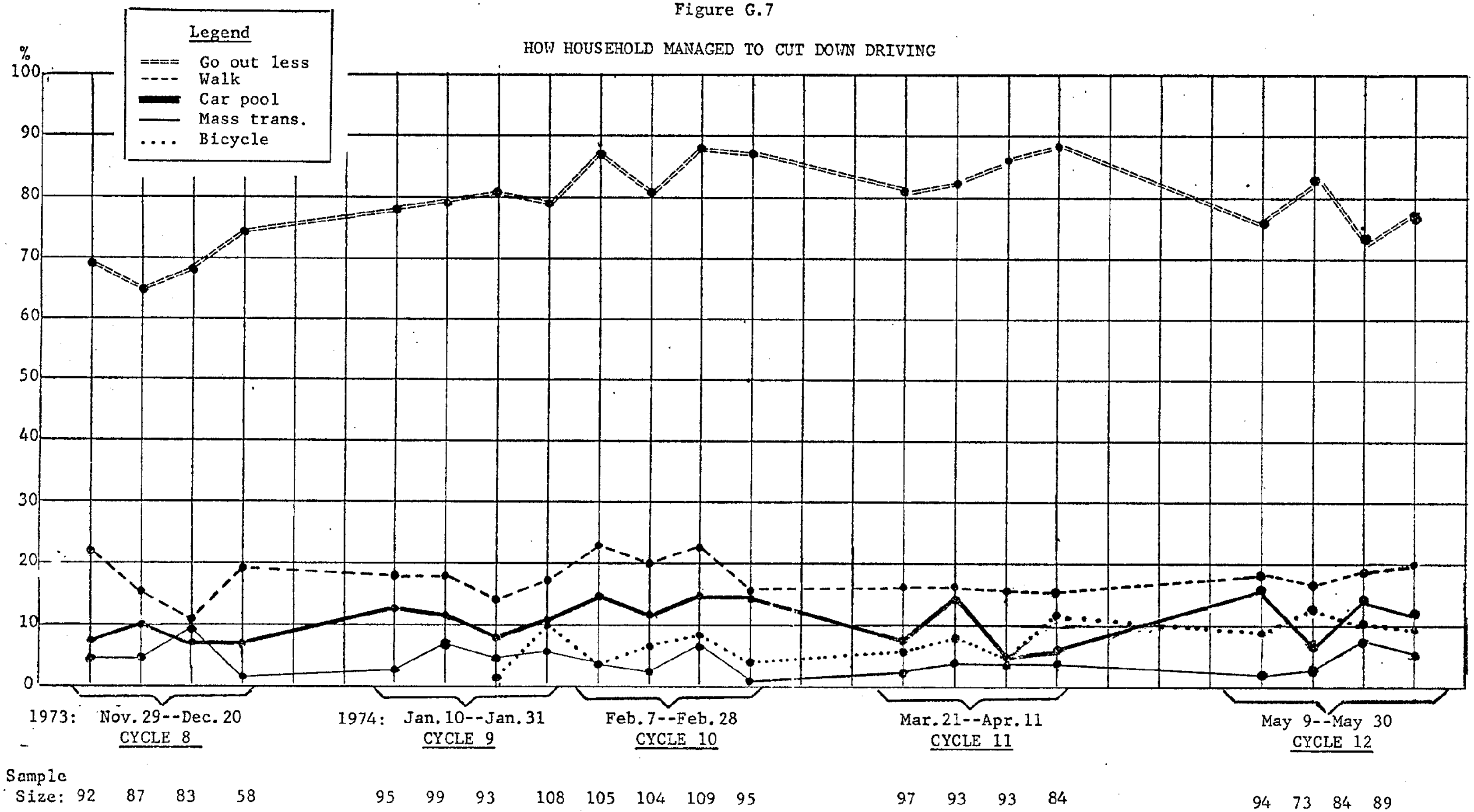


Figure G.8

WHAT KIND OF DRIVING WAS CUT DOWN (OR PLANS TO CUT DOWN)

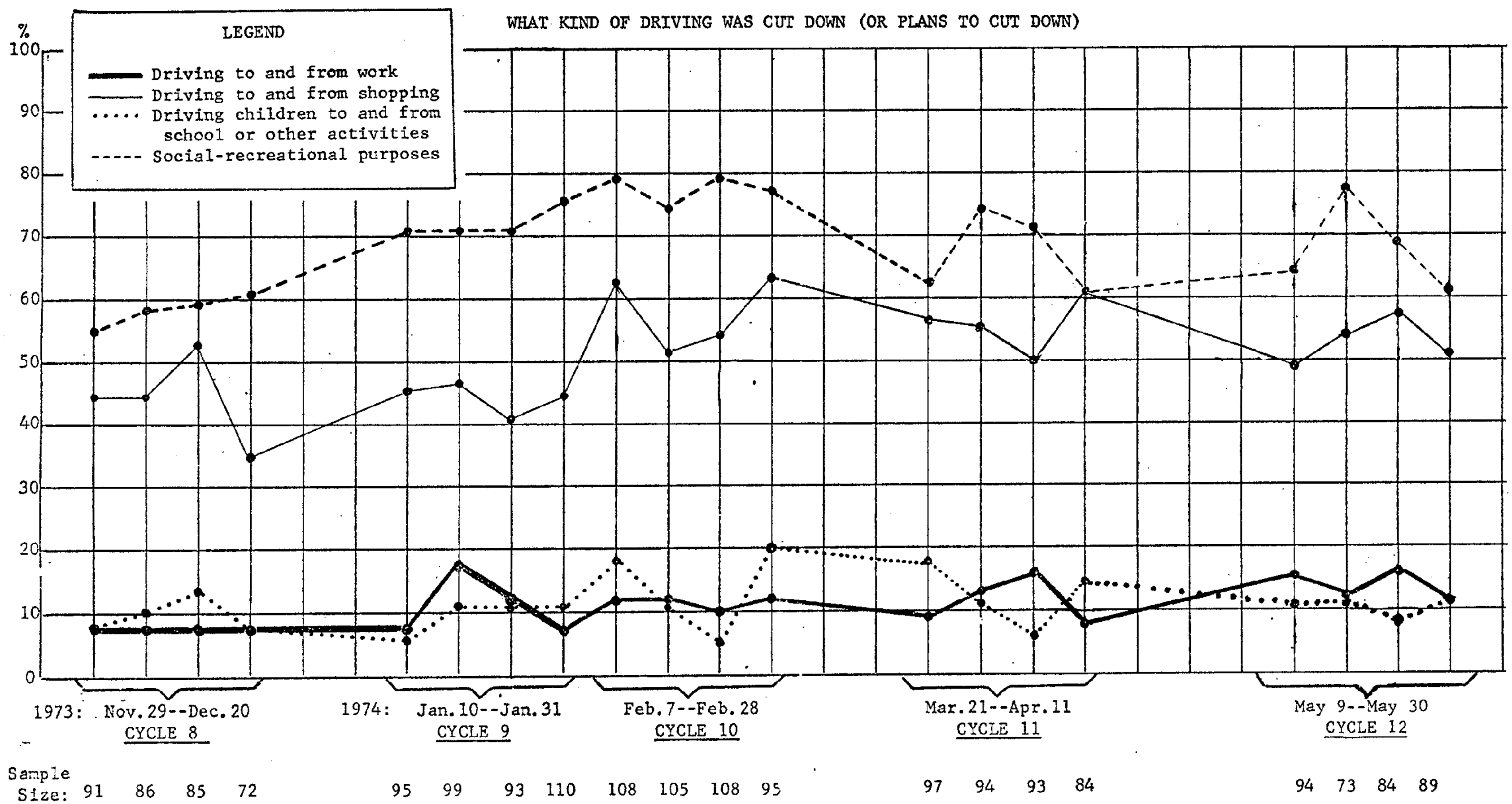


Table G.3

RESPONSES TO QUESTIONS CONCERNING WAYS OF CUTTING DOWN ON GASOLINE

(Per Cent)

Question	Response Categories	Cycle 9	Cycle 10	Cycle 11	Cycle 12
(Those respondents who reported they or anyone else in their household have been trying to cut down on gasoline use in the past month were asked:) Why did you or others in your household decide to cut down?	Gasoline is too expensive	--	42	54	73
	Gasoline is harder to get; stations are often closed or crowded	--	29	27	13
	We have been asked to conserve so we will have enough when we really need it . .	--	20	21	16
	If we all cut down, we can avoid rationing	--	3	1	1
	So I will have enough gasoline for important needs	--	14	9	3
	Because of fuel shortage	--	21	23	30
	Healthier and easier to walk	--	2	1	2
N	. . . .	--	488	419	390
Those respondents who reported that their households have not cut gasoline use were asked why they have not cut down.	We use very little gasoline	--	40	43	40
	No other transportation available . . .	--	5	6	7
	Use car for business purposes	--	8	10	10
	There is no real shortage	--	8	13	10
	Never drive excessively	--	38	40	38
N	. . . .	---	111	106	179
Respondents reporting a decrease in the amount of driving were asked: Would you say that you (cut/are planning to cut) down driving mostly on ...	Short trips (under 50 miles one way) . .	76	75	72	81
	Long trips (over 50 miles one way) . . .	24	25	28	19
N	. . . .	381	425	370	337
Would you say that you (cut/are planning to cut) down on driving ...	During the week	54	58	57	61
	On Saturdays	56	59	58	51
	On Sundays	71	69	68	58
N	. . . .	391	430	372	340

Figure G.9

USUAL MODE OF TRANSPORTATION TO WORK, NATIONAL RESULTS

(Monthly results from April 1973 to May 1974)

Legend
Car, Driver
Car, Passenger
.... Public Transportation (Bus, Train, Subway, Taxi)
---- Walk (or Bike, Motorcycle, Work at Home)

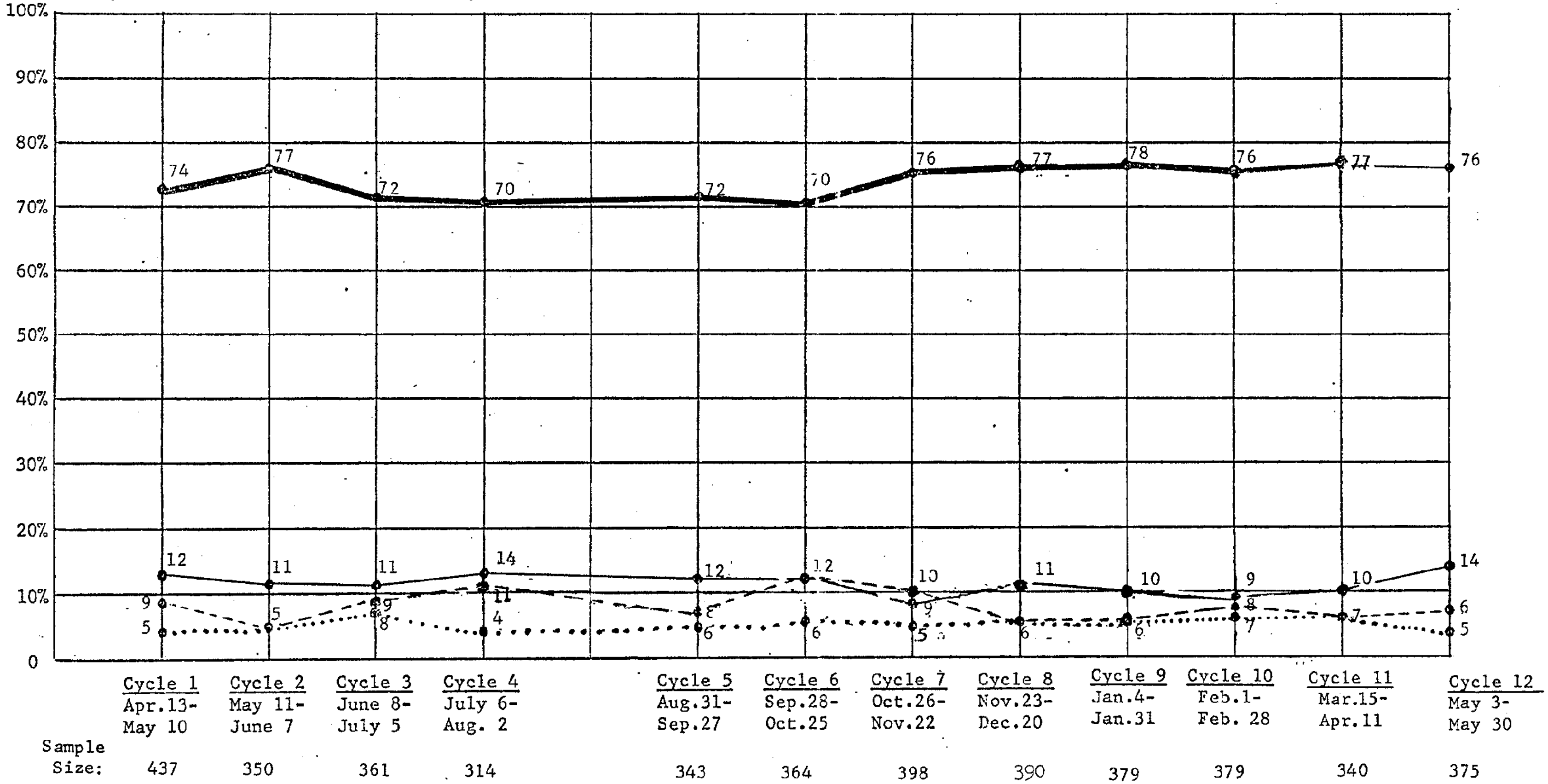


Figure G.10

NATIONAL RESULTS: CAR OCCUPANCY RATE FOR TRIP TO WORK ($\frac{\#\ \text{Drivers} + \#\ \text{Passengers}}{\#\ \text{Drivers}}$)

(Monthly results from April 1973 to May 1974)

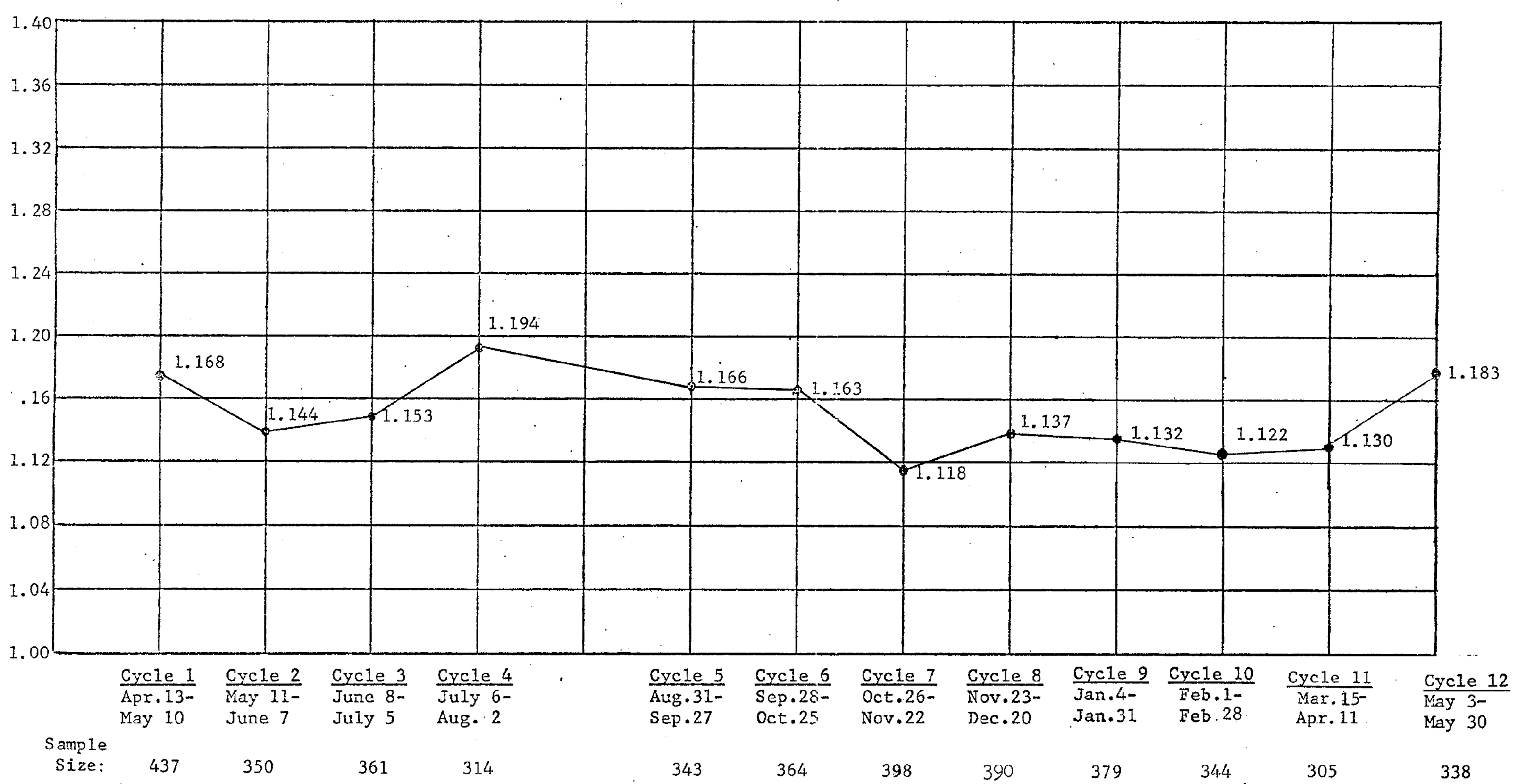


Figure G.11

PER CENT OF DRIVERS GOING TO WORK ALONE

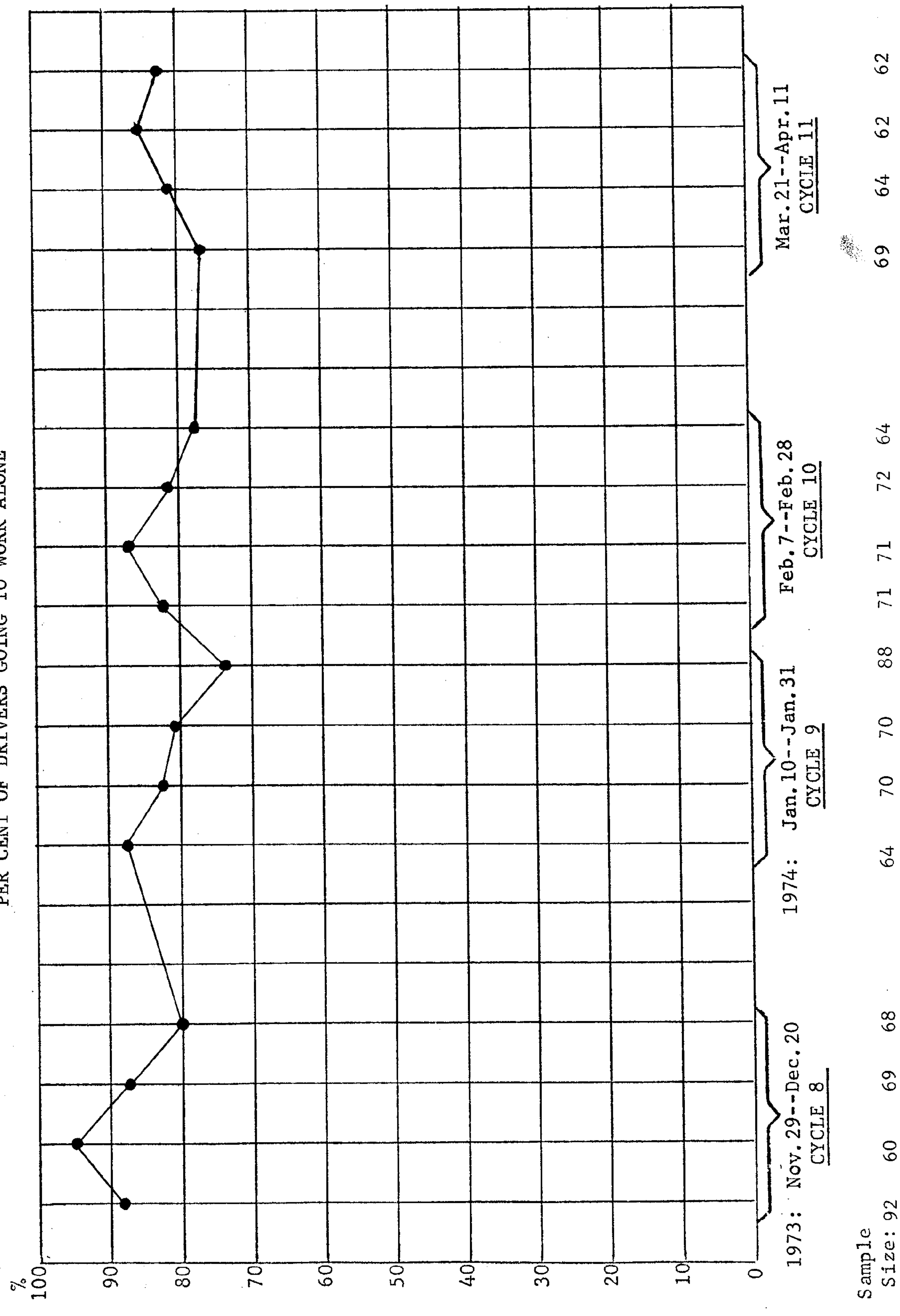


Table G.4

WHAT MATTERS MOST ABOUT THE TRIP TO WORK BY USUAL MODE OF TRANSPORTATION TO WORK

(Per Cent)

What Matters Most About Trip to Work	MODE OF TRANSPORTATION														
	CAR					PUBLIC TRANSPORTATION (Bus, Subway, Train, Taxi)					OTHER				
	May 3 - May 30 (N=333)	Mar 15- Apr 11 (N=291)	Feb. 1-28 (N=321)	Jan. 4-31 (N=332)	Nov 23/ Dec 20 (N=337)	May 3 - May 30 (N=17)	Mar 15- Apr 11 (N=22)	Feb. 1-28 (N=30)	Jan. 4-31 (N=22)	Nov 23/ Dec 20 (N=24)	May 3- May 30 (N=22)	Mar 15- Apr 11 (N=21)	Feb. 1-28 (N=26)	Jan. 4-31 (N=22)	Nov 23/ Dec 20 (N=24)
Speed of Trip	27	20	21	19	23	24	23	10	18	13	41	29	427	35	50
How Direct the Route is	20	21	24	19	17	06	05	13	09	04	23	33	08	09	04
Cost	05	09	07	10	06	0	05	20	05	04	05	14	15	05	04
Dependability of Transportation	17	19	18	24	23	24	10	27	41	29	0	05	0	0	04
Convenience of Transportation	14	12	11	11	12	18	32	10	05	21	05	05	04	0	04
Safety of Transportation from Accidents	11	11	12	10	11	0	10	07	09	08	09	05	04	0	04
Other (Comfort, Number of Transfers, etc.)	05	08	07	07	08	28	15	13	14	25	17	09	27	50	30

Table G.5

USE OF CAR POOLS

A. Car Pools	Nov. 23-Dec. 20, 1973	Jan. 1974	Feb. 1974	Mar. 15-Apr. 11, 1974
Per cent of workers usually using a car to work (drivers and passengers)	88 (386)	88 (379)	83 (344)	87 (340)
Per cent of those using a car to work having any passengers	23 (326)	29 (333)	17 (289)	28 (295)
Per cent of riders who share costs of trip	43 (54)	39 (55)	25 (48)	40 (57)

B. Per Cent of Car Pools Started in Each Period	Before Oct., 1973	Oct. or Nov., 1973	Dec. 1973	Jan. 1974	Feb. 1974	Mar. 15-Apr. 1974
Nov. 23/Dec. 20 Interviews (N = 50)	84	12	4	--	--	--
January Interviews (N = 55)	64	18	9	9	--	--
February Interviews (N = 47)	64	11	4	6	15	--
March 15-Apr. 11 Interviews (N = 56)	61	9	4	18	4	5

Table G.6

RESPONSES TO QUESTIONS CONCERNING CAR POOLS

(Per Cent)

Question and Response Category	Nov. 23-Dec. 20, 1973	Jan. 4-31, 1974	Feb. 1-28, 1974	March 15-April 11, 1974
Number of riders:				
1	77	71	75	73
2	15	18	15	19
3	5	6	5	6
4	2	3	5	1
5	1	1	0	1
6 or more	0	1	0	0
N	(326)	(333)	(321)	(295)
Where did you get together with others in the car pool?				
At work	50	68	60	68
In my neighborhood	35	21	28	21
Other	11	9	13	11
N	(54)	(55)	(47)	(57)
Per cent of car pools with passengers in same household as driver	28	28	27	12
N	(75)	(78)	(66)	(65)

Table G.7

DRIVERS' REASONS FOR JOINING CAR POOLS

Responses	Nov. 23-Dec. 20, 1973	Jan. 4-31, 1974	Feb. 1-28, 1974	Mar. 15-Apr. 11, 1974
Wanted company in car	4	7	3	5
Knew someone needing a ride	21	23	37	26
Share expenses	46	29	18	30
Wanted to help save gasoline	7	20	37	28
Other	29	20	5	12
N	(24)	(44)	(38)	(43)

Figure G.12

MEDIAN REPORTED PRICE PAID PER GALLON OF GASOLINE

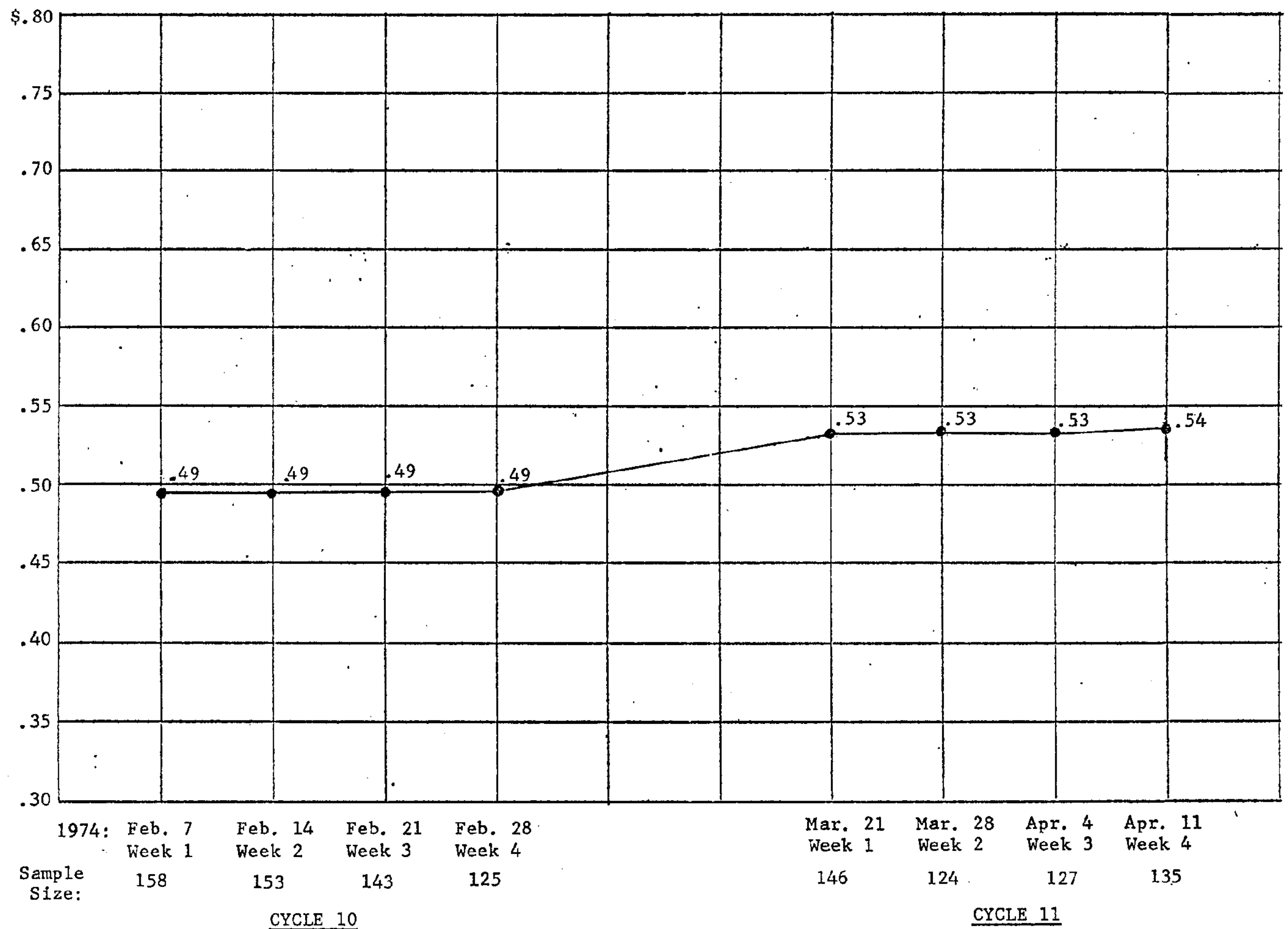


Figure G.13

RESPONDENTS REPORTED PRICE PAID PER GALLON OF GASOLINE

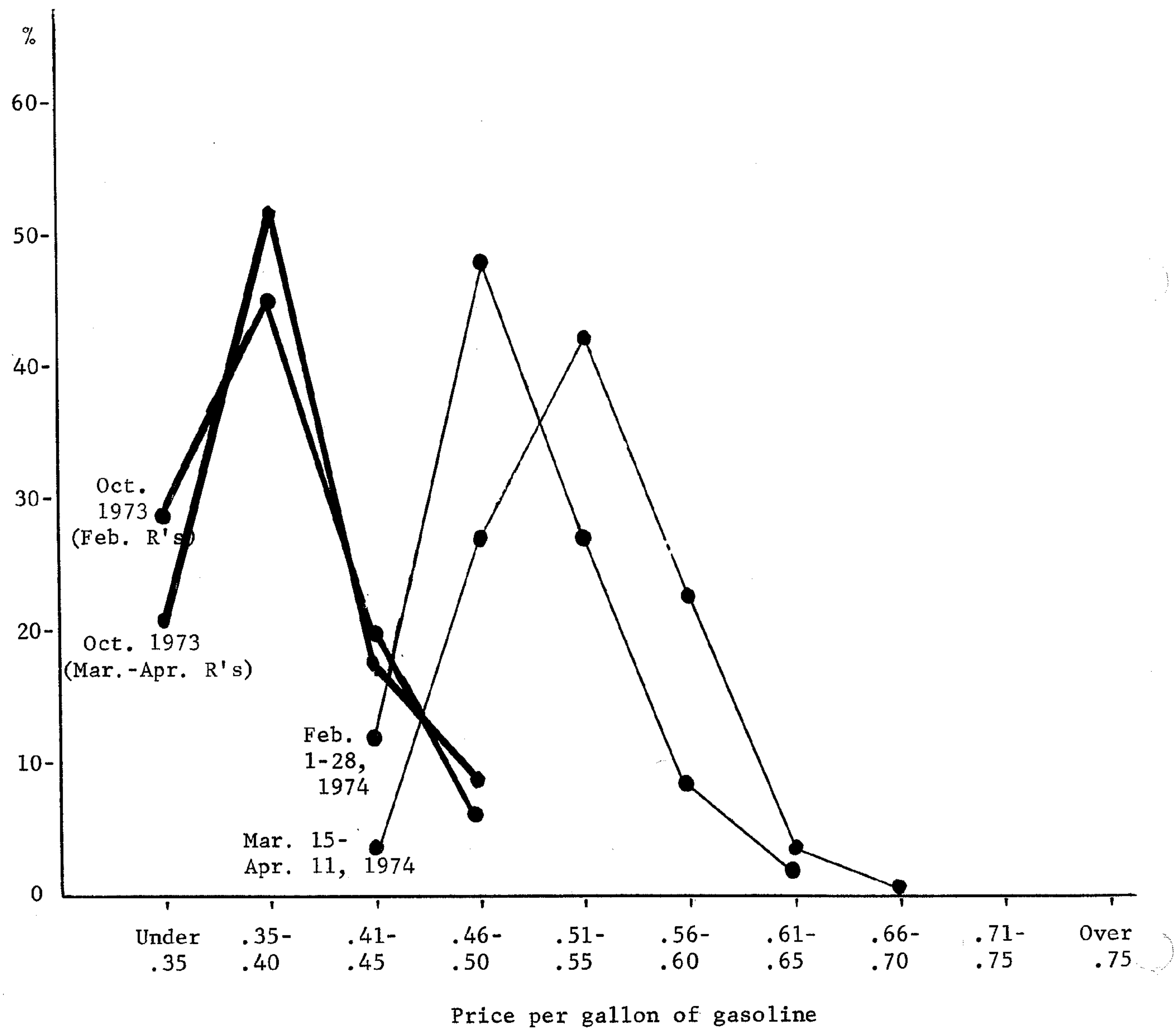


Table G.8

PRICE BY EXPOSURE, EVALUATIONS, EXPECTATION, POLICY PREFERENCE, AND CONSERVATION

(Per Cent for February 1-28, 1974 [N=596])

Price	Trouble Getting Gas	Energy Shortage Most Important Problem in Country	Energy Shortage Has Changed Life	Able to Use Car As Much As Want	Expect Trouble Getting Gas	Is Gas Rationing Necessary?			Cut Down Driving
						Yes	No	DK	
Price Now Paying For Gasoline:									
$.45 or less	45	23	72	66	58	27	61	12	63
$.46-.48	52	27	75	53	71	23	60	18	74
$.49-.50	54	27	80	46	67	30	61	8	71
$.51-.52	62	25	81	46	77	32	54	14	73
$.53 or more	71	29	78	30	79	38	52	11	77
Price Now Paying For Gasoline Minus Price Paid in October, 1973:									
$.00-.06	55	27	55	53	65	34	52	15	58
$.07-.08	50	26	71	51	64	27	65	8	71
$.09-.10	58	36	78	51	66	37	51	12	75
$.11-.12	58	23	85	43	68	26	60	14	74
$.13-.14	59	24	85	37	78	29	62	9	84
$.15-.18	55	26	78	47	72	30	57	13	69
$.19 or more	65	25	78	39	77	32	55	13	69

Table G.8--Continued

PRICE BY EXPOSURE, EVALUATIONS, EXPECTATION, POLICY PREFERENCE, AND CONSERVATION

(Per Cent for March 15-April 11, 1974 [N=515])

Price	Trouble Getting Gas	Energy Shortage Most Important Problem in Country	Energy Shortage Has Changed Life	Expect Trouble Getting Gas	Is Gas Rationing Necessary?			Cut Down Driving
					Yes	No	DK	
Price Now Paying For Gasoline:								
$.49 or less	39	15	64	24	17	77	5	66
$.50-.51	31	17	63	33	11	85	5	64
$.52-.54	38	21	74	23	11	86	4	77
$.55-.57	46	15	74	31	12	86	2	71
$.58 or more	46	20	74	32	16	80	4	73
Price Now Paying For Gasoline Minus Price Paid in October, 1973:								
$.09 or less	33	9	64	20	14	79	7	68
$.10-.11	38	25	68	30	15	84	2	67
$.12-.13	42	20	70	33	9	83	8	62
$.14-.15	42	11	78	32	11	86	2	74
$.16-.18	41	21	66	22	9	87	4	74
$.19-.21	38	16	81	35	19	78	3	83
$.22 or more	47	23	72	32	15	84	1	68

Table G. 9

RESPONSES TO QUESTIONS CONCERNING PURCHASE OF GASOLINE

(Cycle 11)

Question	Response Category	Per Cent Answering	N
When do you generally buy gas?	During the daytime	84	520
	During the evening hours .	16	
Do you generally buy it . . .	During the week	87	513
	On Saturdays	13	
If during the week, what day?	Monday	15	436
	Tuesday	9	
	Wednesday	14	
	Thursday	15	
	Friday	24	
	No particular day	23	

Table G.10

PER CENT OF HOUSEHOLDS REPORTING TROUBLE GETTING GASOLINE, FUEL OIL, AND ELECTRICITY BY PER CENT REPORTING REDUCED CONSUMPTION

Trouble Getting:	Conservation Behavior			
	Cut Down Driving	Per Cent Reduced Daytime Temperature	Run Major Appliances Less	Shut Off Lights
Cycle 8 (11/23 - 12/20, 1973)				
Gasoline	28	64	31	82
Fuel Oil	50	100	0	50
Electricity	65	68	22	85
Cycle 9 (1/4 - 1/31, 1974)				
Gasoline	76	69	40	96
Fuel Oil	100	75	50	100
Electricity	72	70	50	93
Cycle 10 (2/1 - 2/28, 1974)				
Gasoline	77	66	42	93
Fuel Oil	50	25	75	100
Electricity	76	72	41	96
Cycle 11 (3/15 - 4/11, 1974)				
Gasoline	80	56	35	94
Fuel Oil	72	38	0	100
Electricity	--	--	--	--
Cycle 12 (5/3 - 5/30, 1974)				
Gasoline	65	--	--	--
Fuel Oil	--	--	--	--
Electricity	78	--	--	--

NOTE: Fuel oil tables involve only those households using fuel oil to heat their homes.

Table G.11

PER CENT OF HOUSEHOLDS REPORTING NO TROUBLE GETTING GASOLINE, FUEL OIL, AND ELECTRICITY BY PER CENT REPORTING REDUCED CONSUMPTION

Did Not Have Trouble Getting:	Conservation Behavior			
	Cut Down Driving	Per Cent Reduced Daytime Temperature	Run Major Appliances Less	Shut Off Lights
Cycle 8 (11/23 - 12/20, 1973)				
Gasoline	61	62	27	76
Fuel Oil	56	78	34	81
Electricity	54	60	27	75
Cycle 9 (1/4 - 1/31, 1974)				
Gasoline	60	58	33	96
Fuel Oil	73	76	41	98
Electricity	67	61	35	95
Cycle 10 (2/1 - 2/28, 1974)				
Gasoline	65	60	44	95
Fuel Oil	70	77	41	94
Electricity	71	62	41	92
Cycle 11 (3/15 - 4/11, 1974)				
Gasoline	64	50	31	94
Fuel Oil	77	68	35	94
Electricity	--	--	--	--
Cycle 12 (5/3 - 5/30, 1974)				
Gasoline	59	--	--	--
Fuel Oil	--	--	--	--
Electricity	58	--	--	--

NOTE: Fuel oil figures involve only those households using fuel oil to heat their homes.

Table G.12

PER CENT OF HOUSEHOLDS REPORTING HOW IMPORTANT A PROBLEM THE ENERGY SHORTAGE IS, BY PER CENT REPORTING REDUCED CONSUMPTION

Degree of Importance	Conservation Behavior			
	Cut Down Driving	Reduced Daytime Temperature	Run Major Appliances Less	Shut Off Lights
Cycle 8 (11/23 - 12/20, 1973)				
Not a problem	36	45	16	65
Fairly important problem .	46	52	22	56
Very important problem . .	57	62	29	81
Most important problem . .	62	66	30	76
Cycle 9 (1/4 - 1/31, 1974)				
Not a problem	67	40	24	91
Fairly important problem .	80	58	25	97
Very important problem . .	82	65	39	95
Most important problem . .	87	60	38	96
Cycle 10 (2/1 - 2/28, 1974)				
Not a problem	48	35	34	85
Fairly important problem .	63	65	36	92
Very important problem . .	75	66	44	95
Most important problem . .	74	62	41	92
Cycle 11 (3/15 - 4/11, 1974)				
Not a problem	39	33	18	95
Fairly important problem .	66	51	31	89
Very important problem . .	74	53	33	95
Most important problem . .	79	56	35	90
Cycle 12 (5/3 - 5/30, 1974)				
Not a problem	38	--	--	--
Fairly important problem .	56	--	--	--
Very important problem . .	63	--	--	--
Most important problem . .	81	--	--	--

Table G.13

PER CENT WHO EXPECT TROUBLE GETTING
FUEL AND REPORT CONSERVATION BEHAVIOR

(Per Cent, With Sample Sizes Given in Parentheses)

Expectation	Conservation Behavior: November/ December 1973	January 1974	February 1974	March/ April 1974	May 1974
	Per Cent of Car-Owning Households that Cut Down Driving:				
Expect trouble getting gasoline	60 (315)	83 (276)	78 (404)	83 (149)	65 (133)
Do not expect trouble getting gasoline	40 (297)	81 (185)	58 (173)	66 (375)	58 (424)
	Per cent of Households Which can Control Temperature and Reported Reducing Their Daytime Temperature Since Winter 1972-1973:				
Expect trouble getting heating fuel	65 (65)	72 (43)	62 (45)	--	--
Do not expect trouble getting heating fuel . .	63 (295)	61 (361)	65 (364)	--	--
	Per Cent of Households That Report Running Major Appliances Less:				
Expect trouble getting electricity	30 (90)	40 (76)	49 (87)	41 (37)	--
Do not expect trouble getting electricity . .	27 (510)	35 (580)	40 (595)	31 (568)	--

APPENDIX H: BIWEEKLY TRENDS OF EXPECTATIONS, EVALUATIONS, AND CONSERVATION BEHAVIORS BY RACE, EDUCATION, AND ANNUAL HOUSEHOLD INCOME

Figure H.1

EXPECT TROUBLE GETTING GASOLINE BY RACE

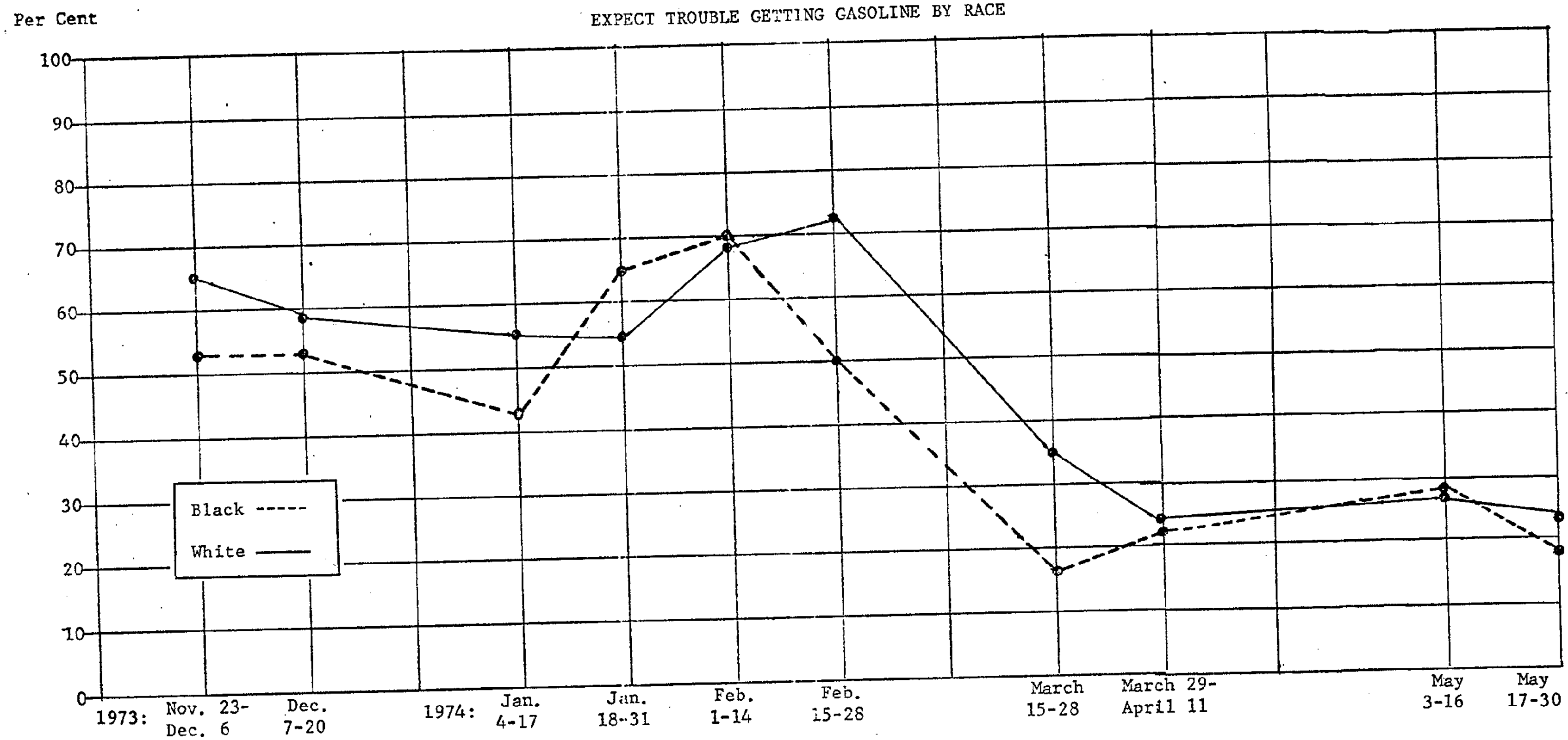


Figure H.2

ENERGY SHORTAGE IS MOST IMPORTANT PROBLEM IN THIS COUNTRY BY RACE

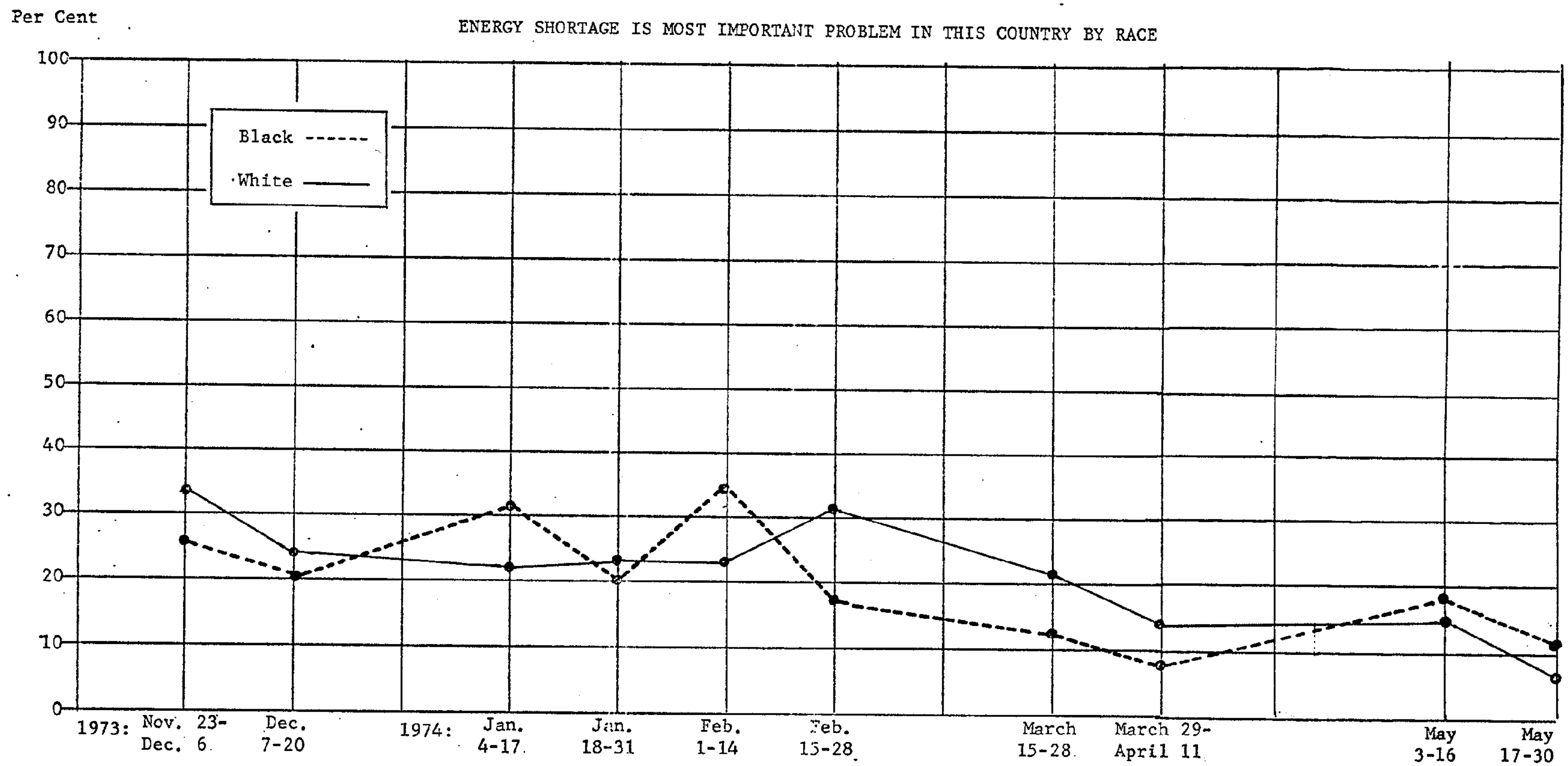


Figure H.3

TURNED DOWN THERMOSTAT SINCE WINTER OF 1972-73 BY RACE

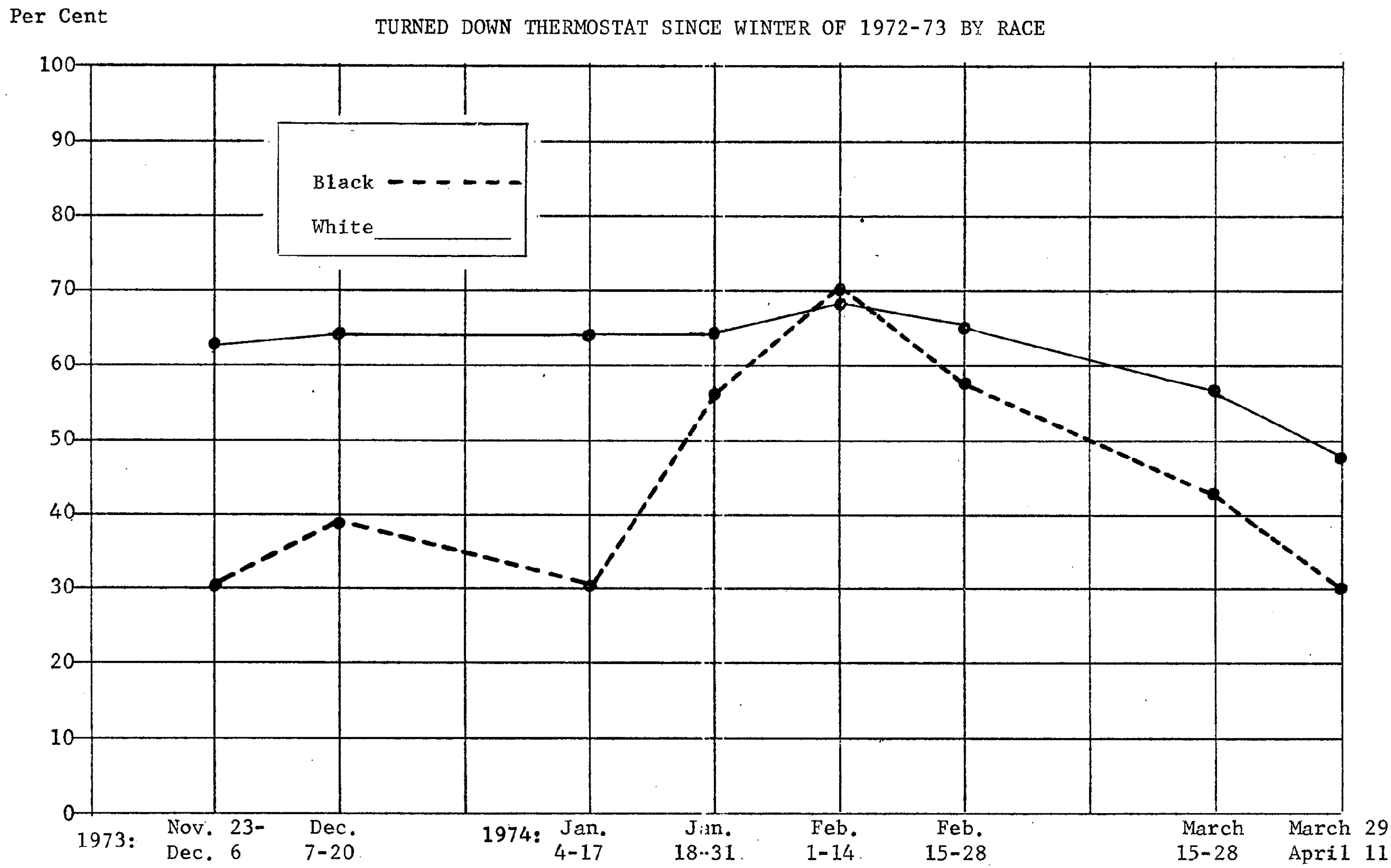


Figure H.4

RUN MAJOR APPLIANCES LESS BY RACE

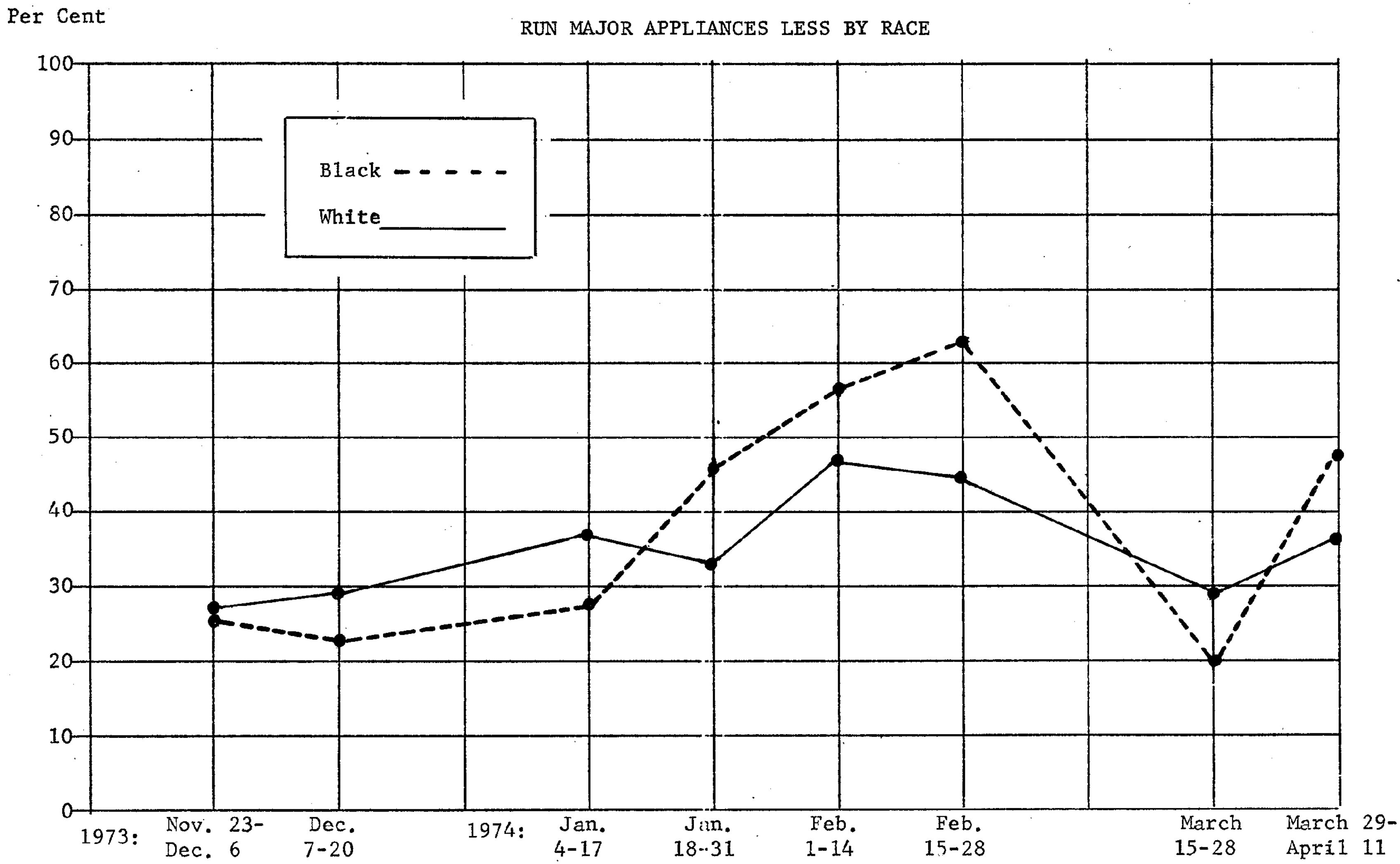


Figure H.5

SHUT OFF LIGHTS TO SAVE ENERGY BY RACE

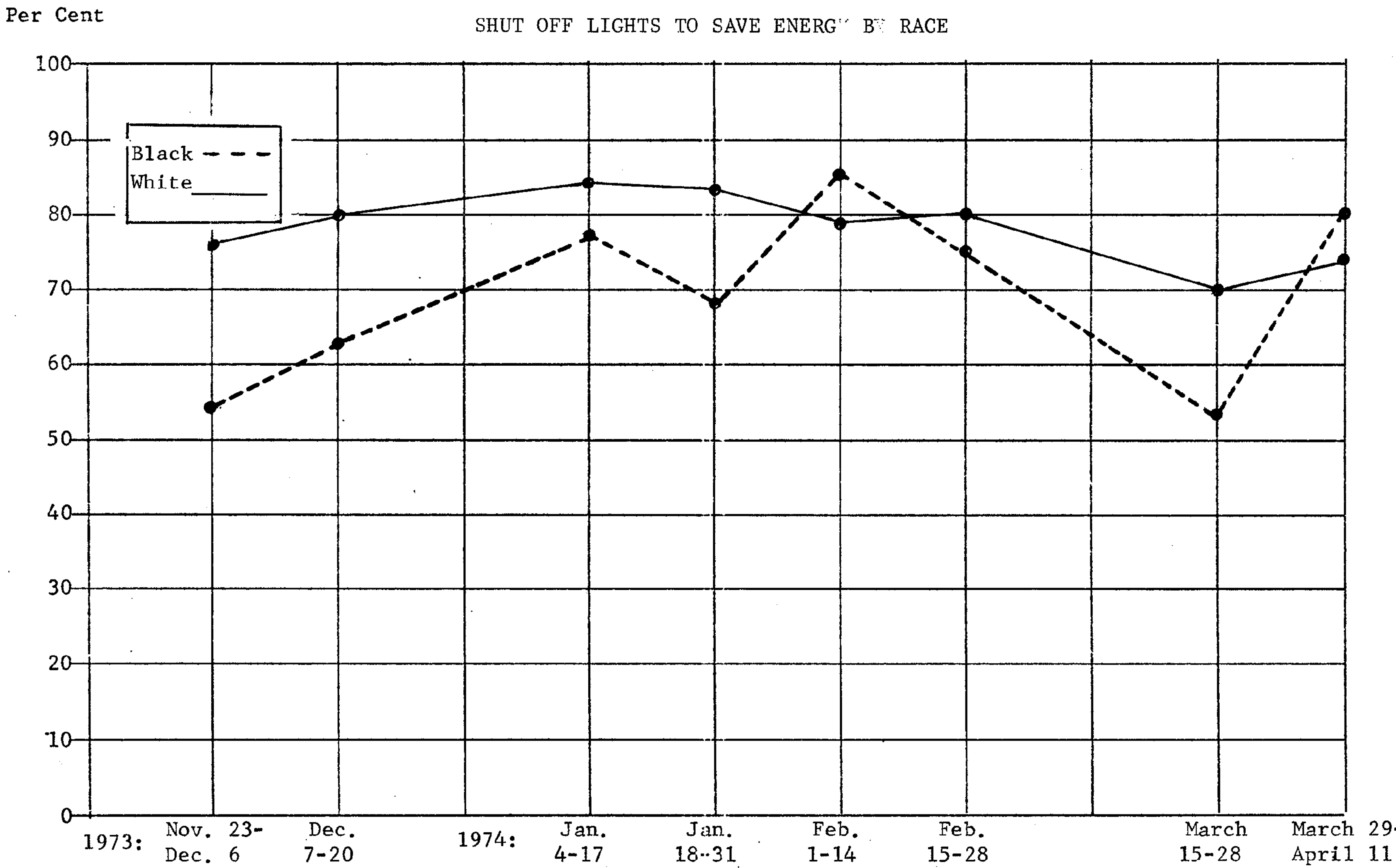


Figure H.6

CUT AMOUNT OF DRIVING BY RACE

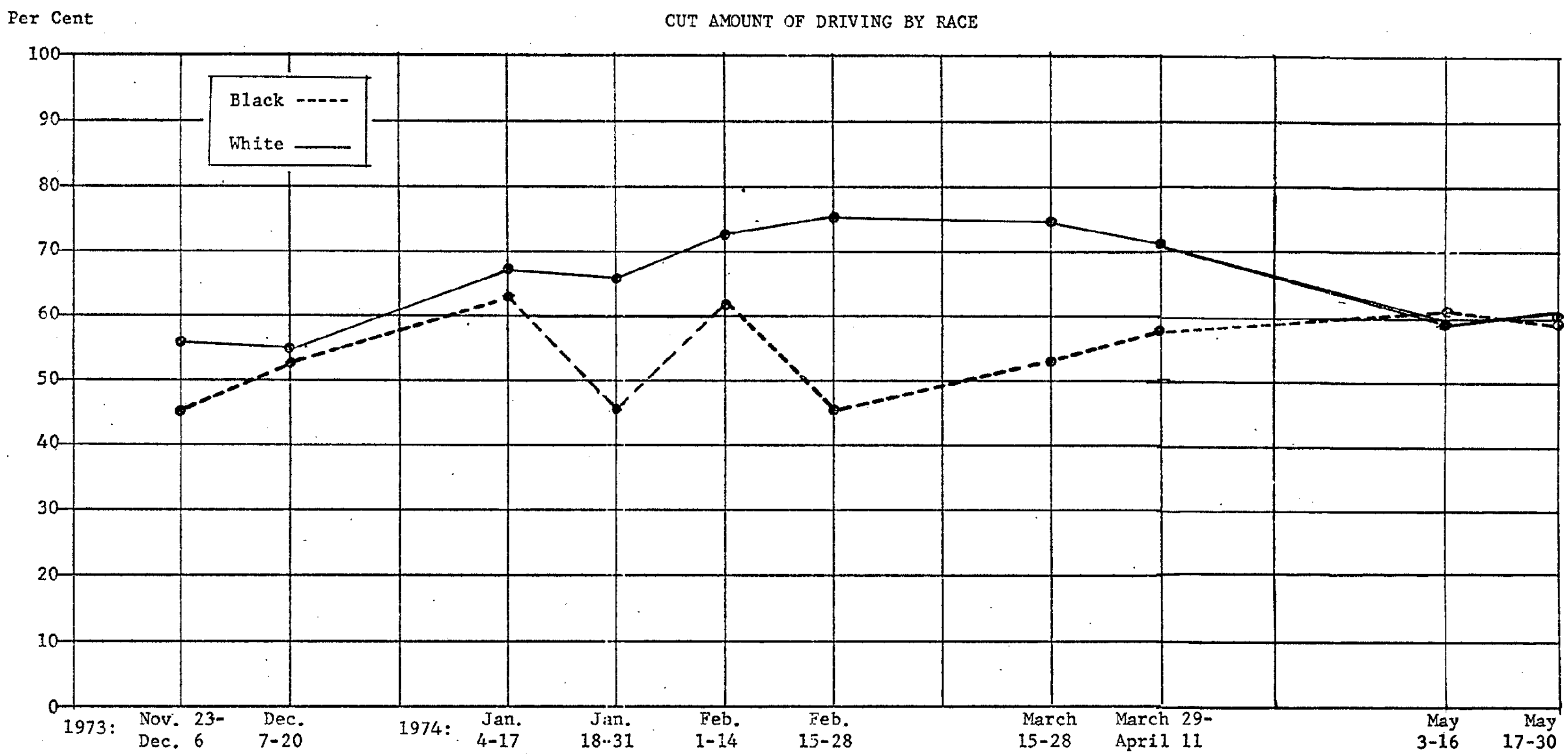


Figure H.7

EXPECT TROUBLE GETTING GASOLINE BY EDUCATION

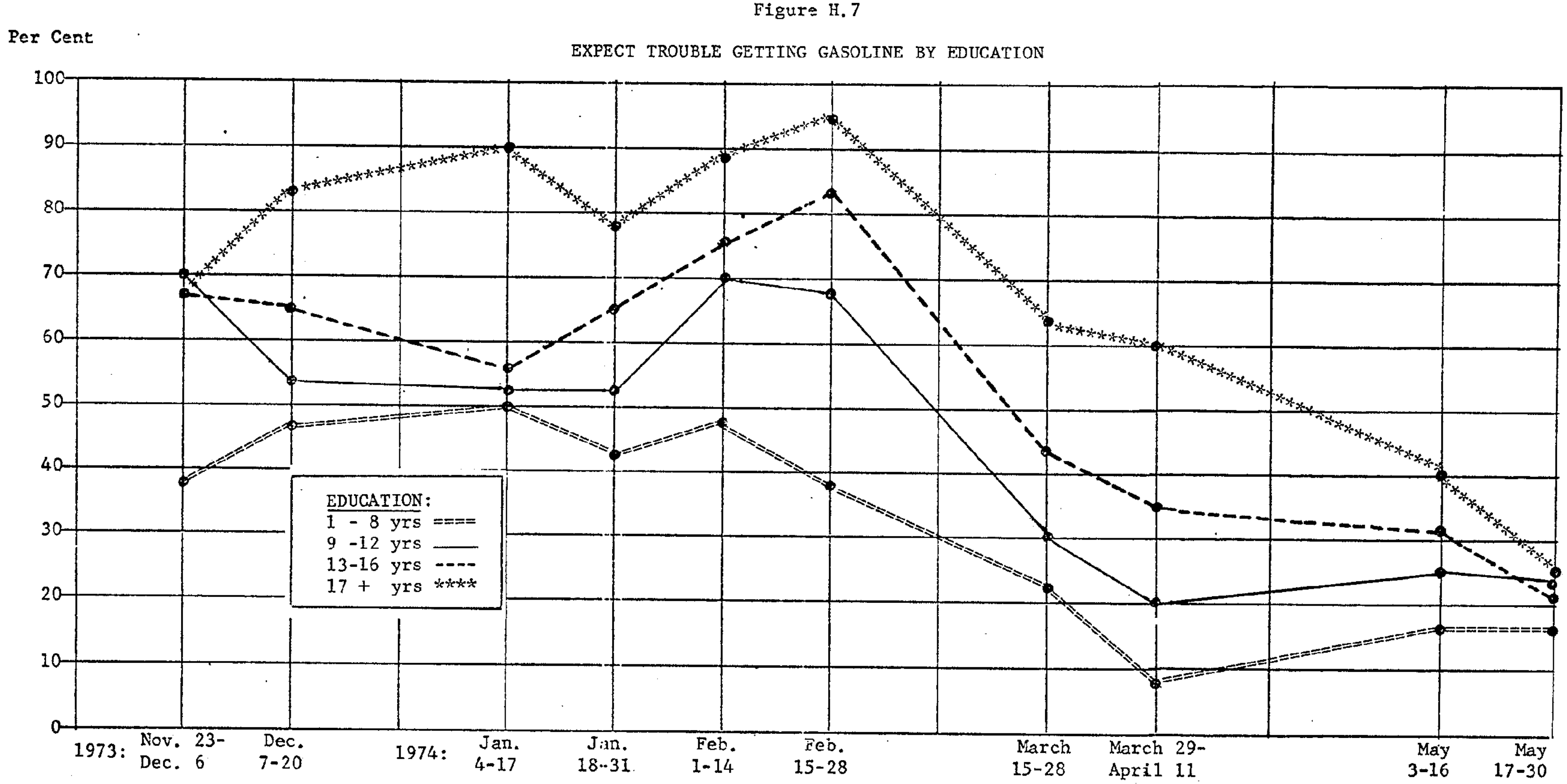


Figure H.8

ENERGY SHORTAGE IS THE MOST IMPORTANT PROBLEM IN THIS COUNTRY BY EDUCATION

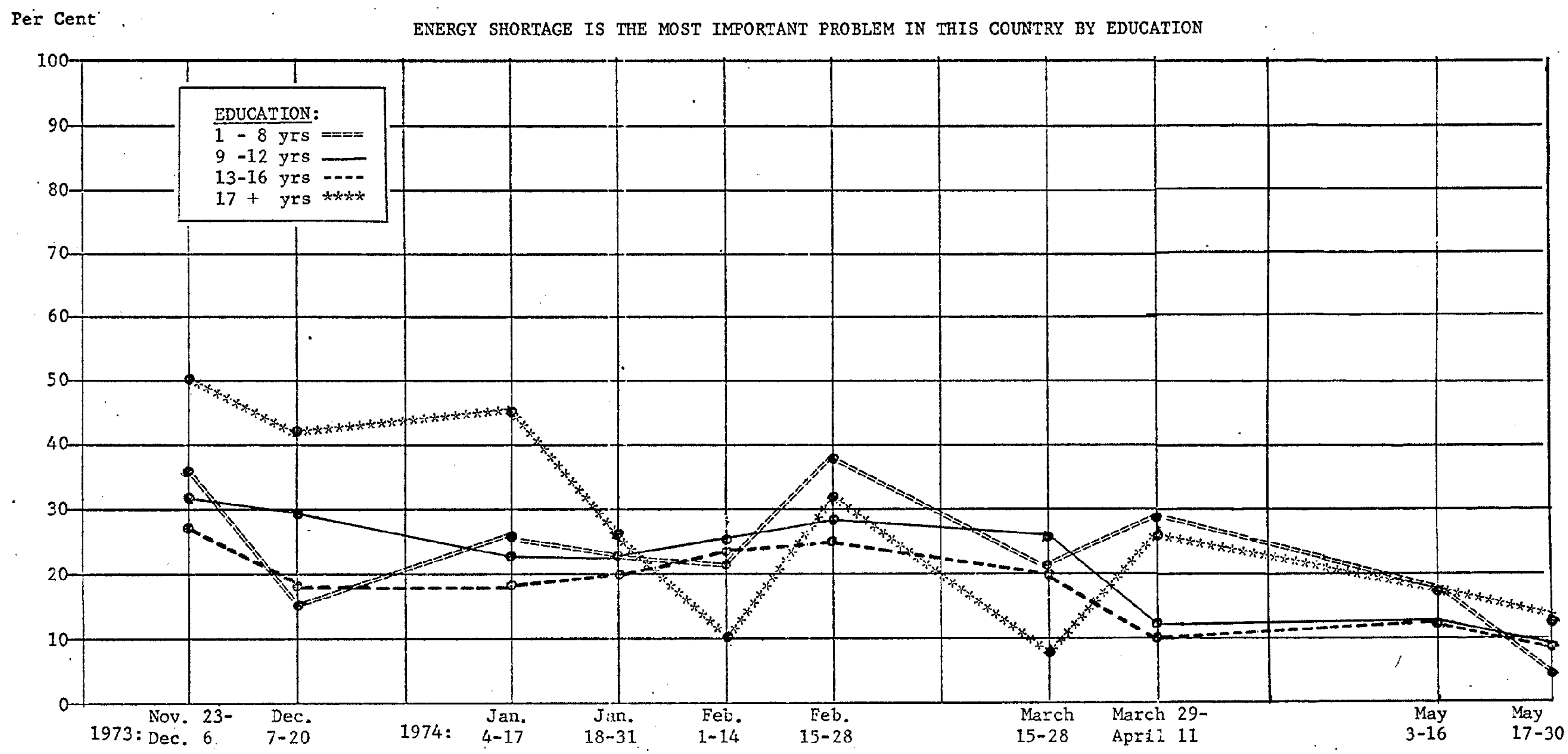


Figure H.9

TURNED DOWN THERMOSTAT SINCE WINTER OF 1972-73 BY EDUCATION

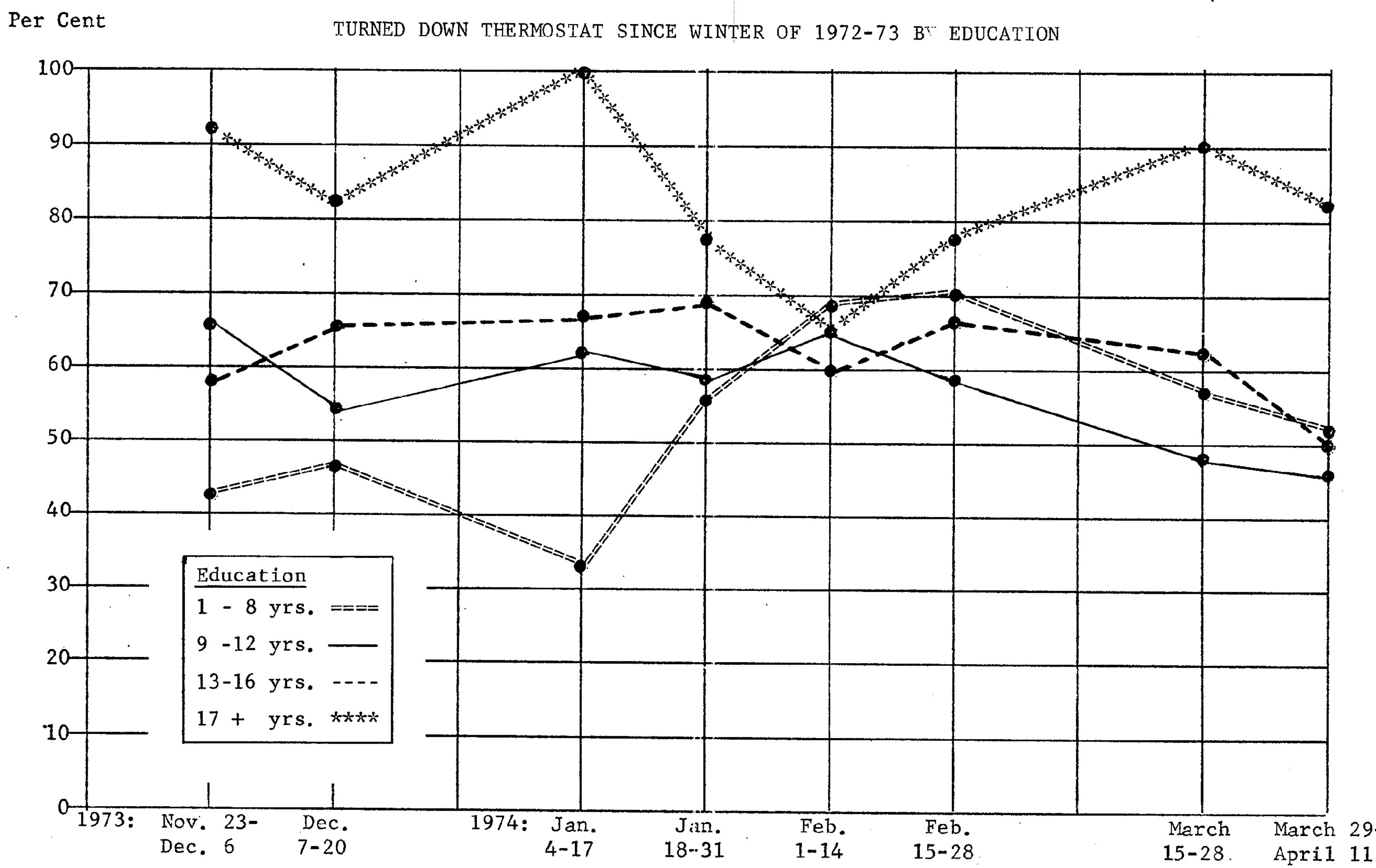


Figure H.10

RUN MAJOR APPLIANCES LESS BY EDUCATION

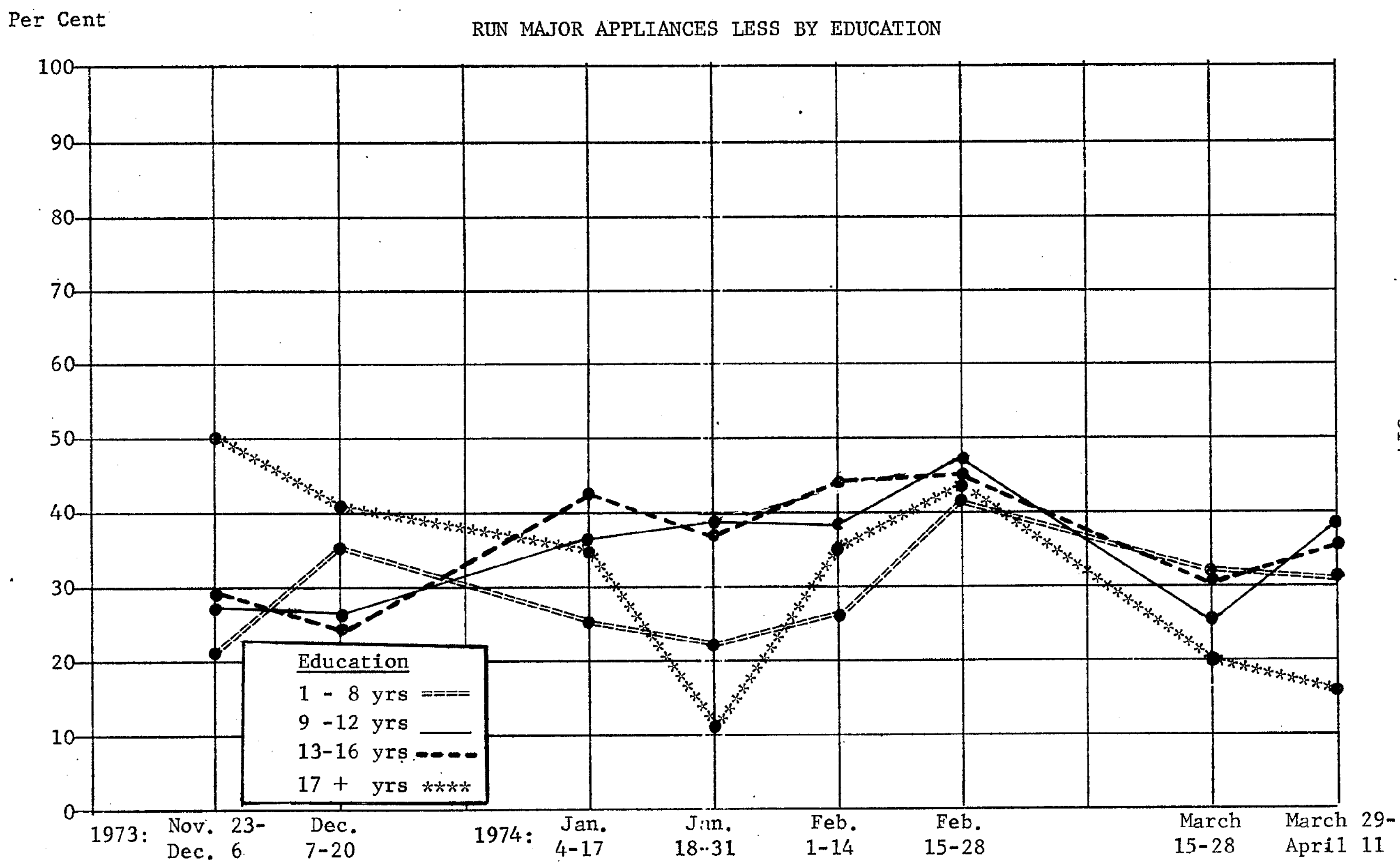


Figure H.11

SHUT OFF LIGHTS TO SAVE ENERGY BY EDUCATION

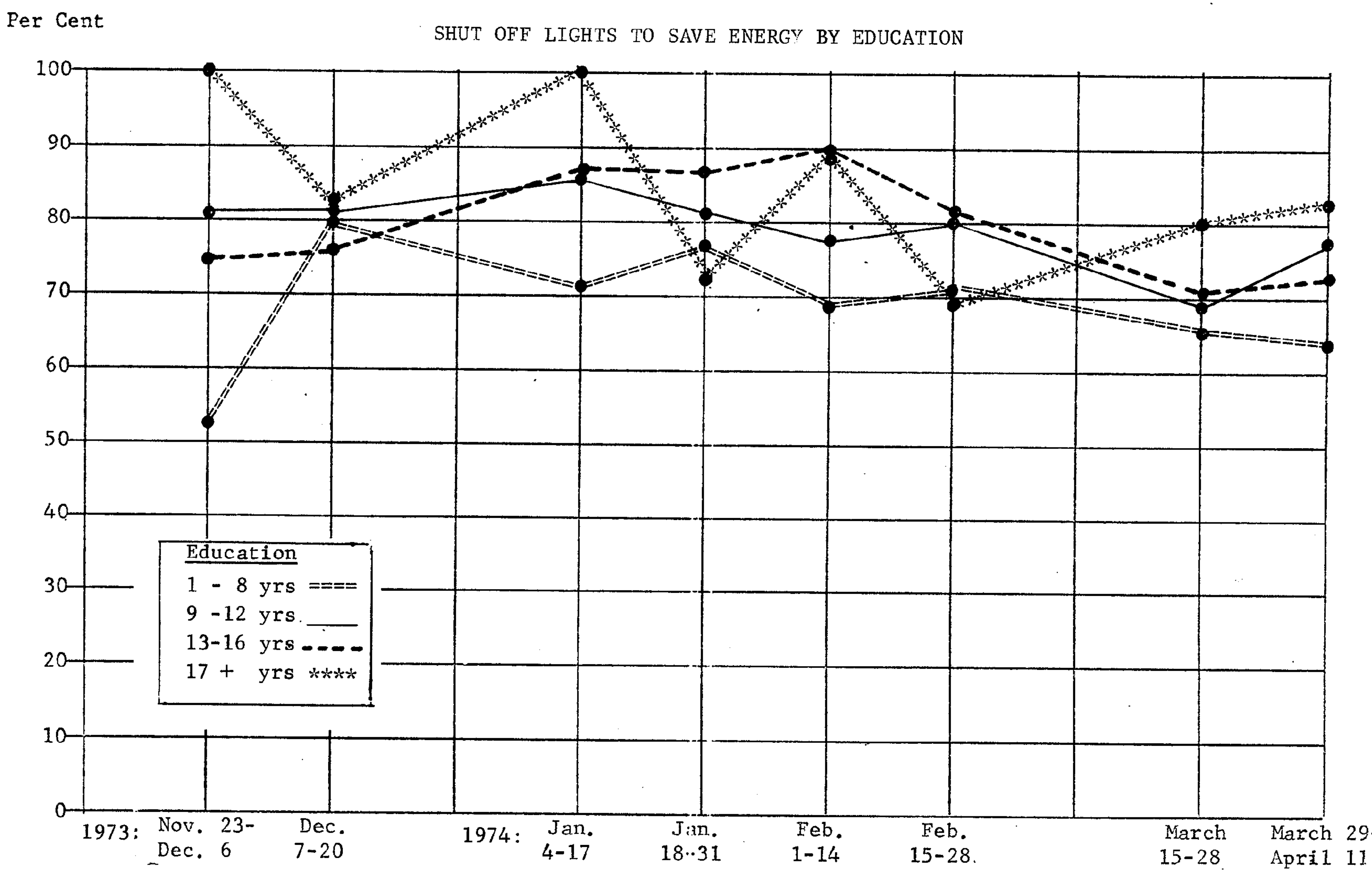


Figure H.12

CUT AMOUNT OF DRIVING BY EDUCATION

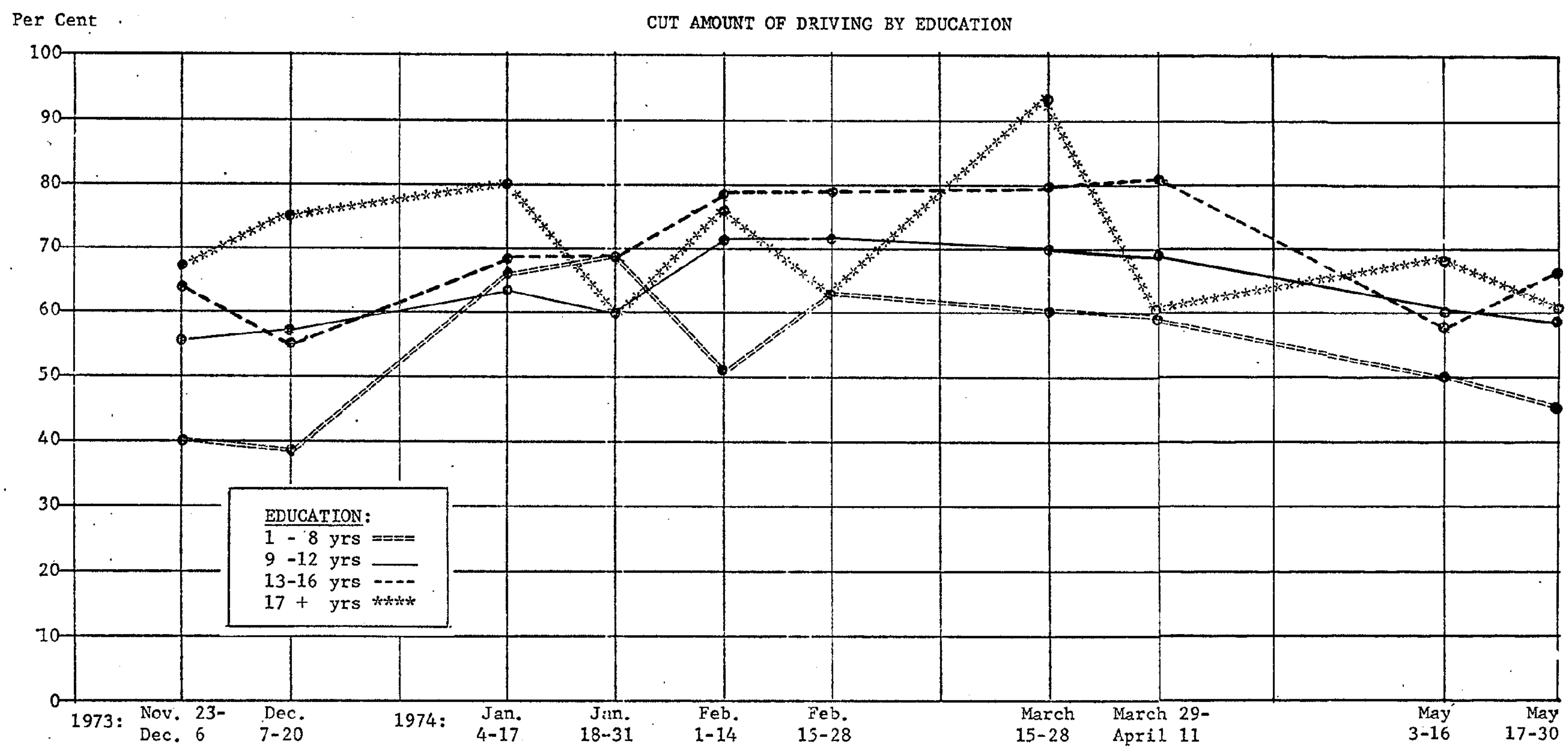


Figure H.13

EXPECT TROUBLE GETTING GASOLINE BY INCOME

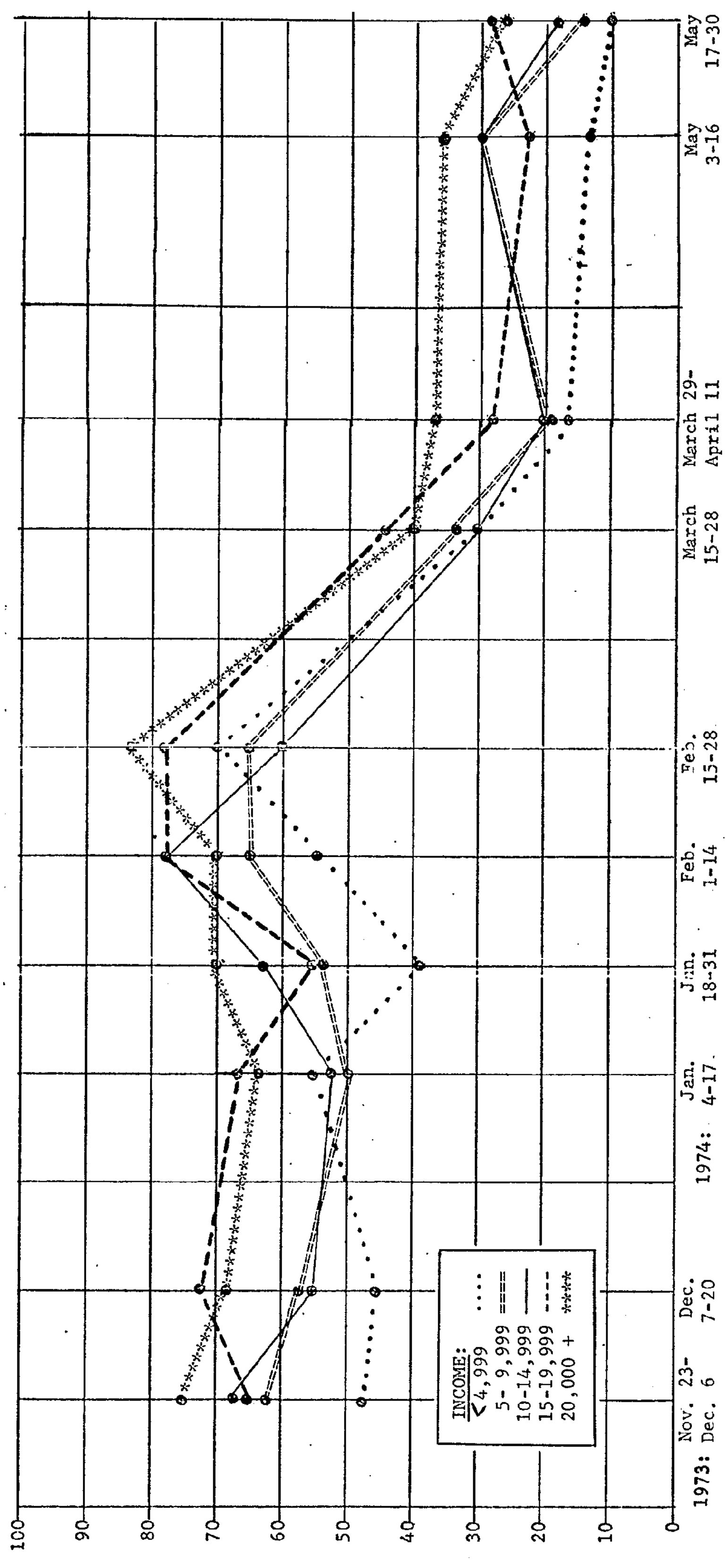


Figure H.14

ENERGY SHORTAGE IS THE MOST IMPORTANT PROBLEM IN THIS COUNTRY BY INCOME

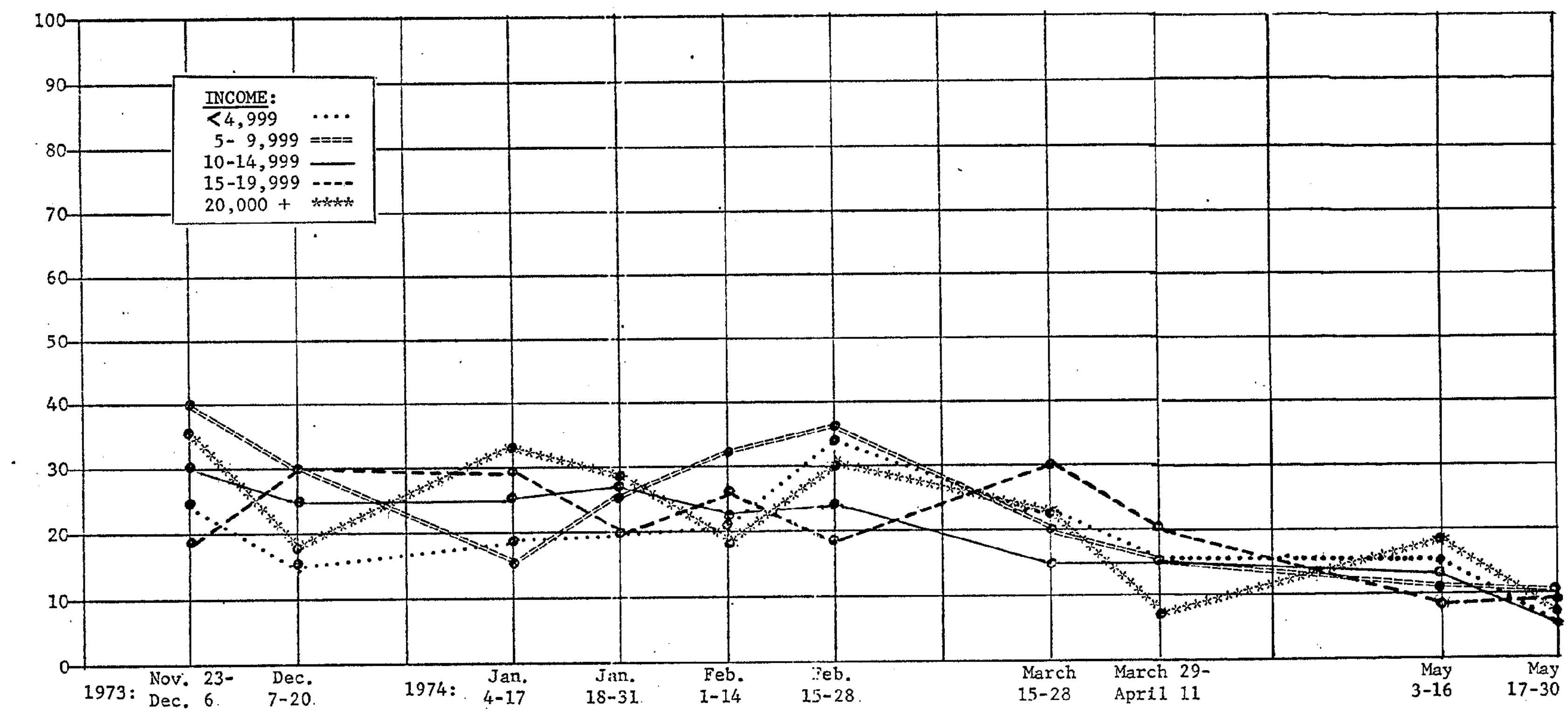


Figure H.15

TURNED DOWN THERMOSTAT SINCE WINTER OF 1972-73 BY INCOME

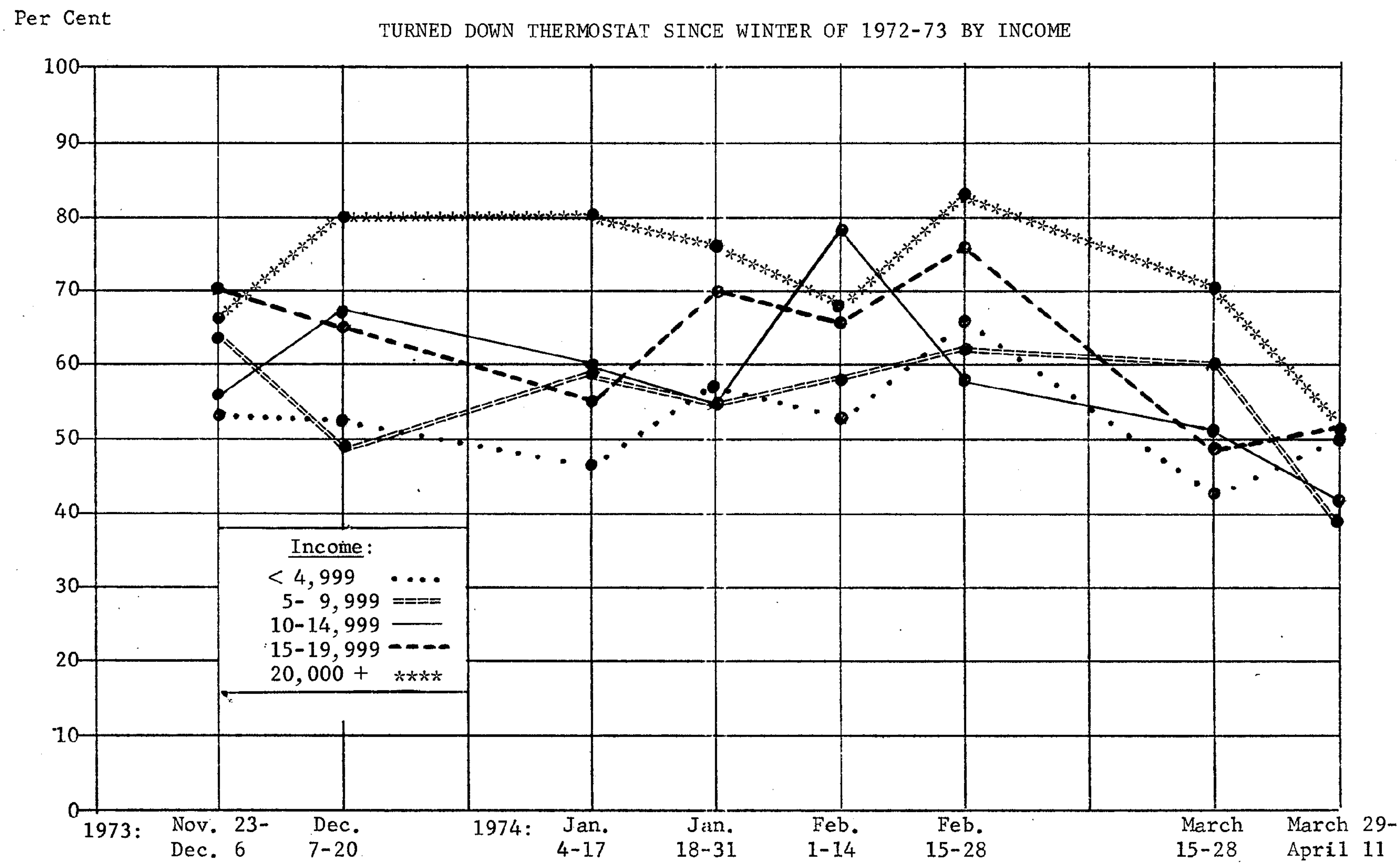


Figure H.16

RUN MAJOR APPLIANCES LESS BY INCOME

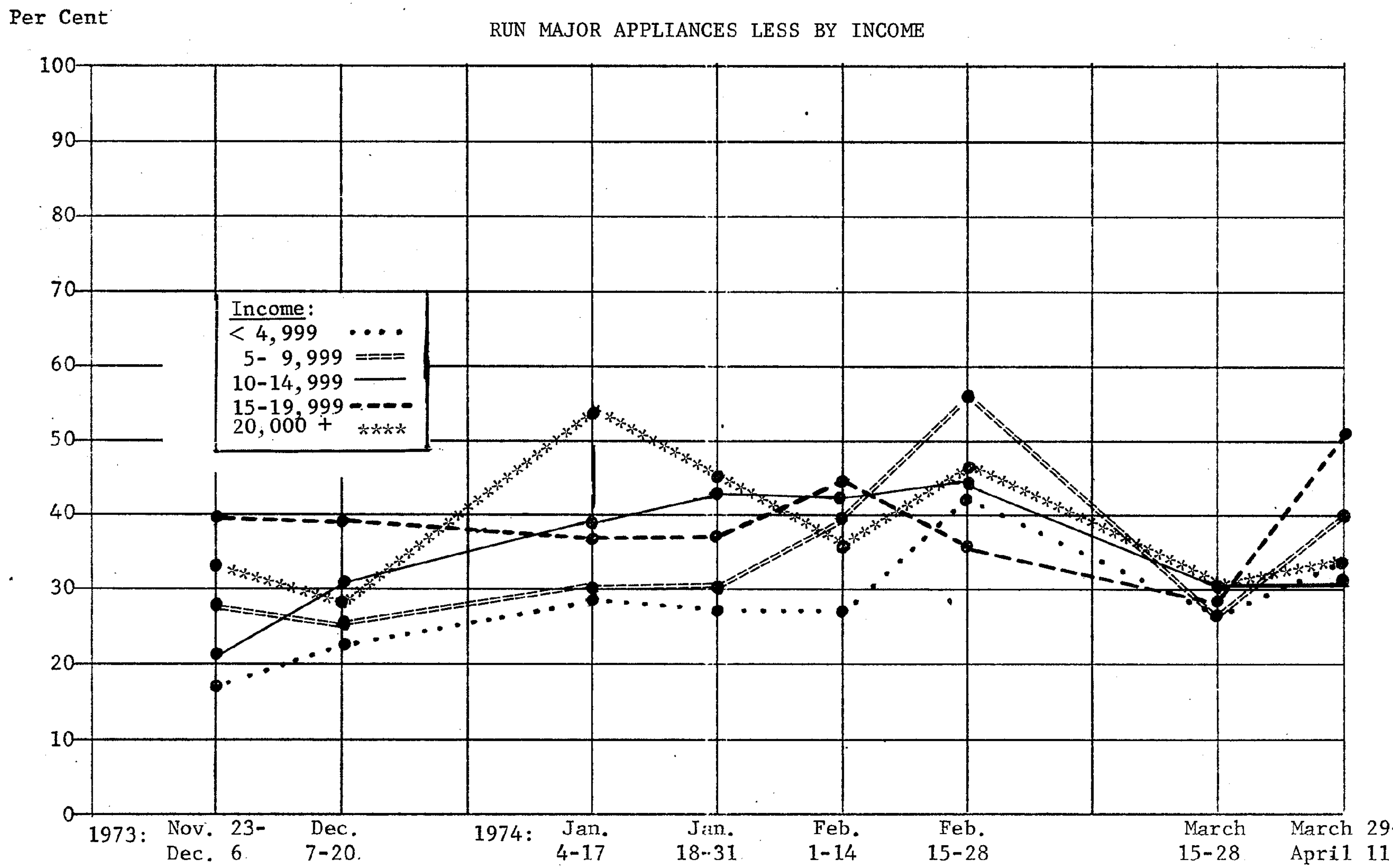


Figure H.17

SHUT OFF LIGHTS TO SAVE ENERGY BY INCOME

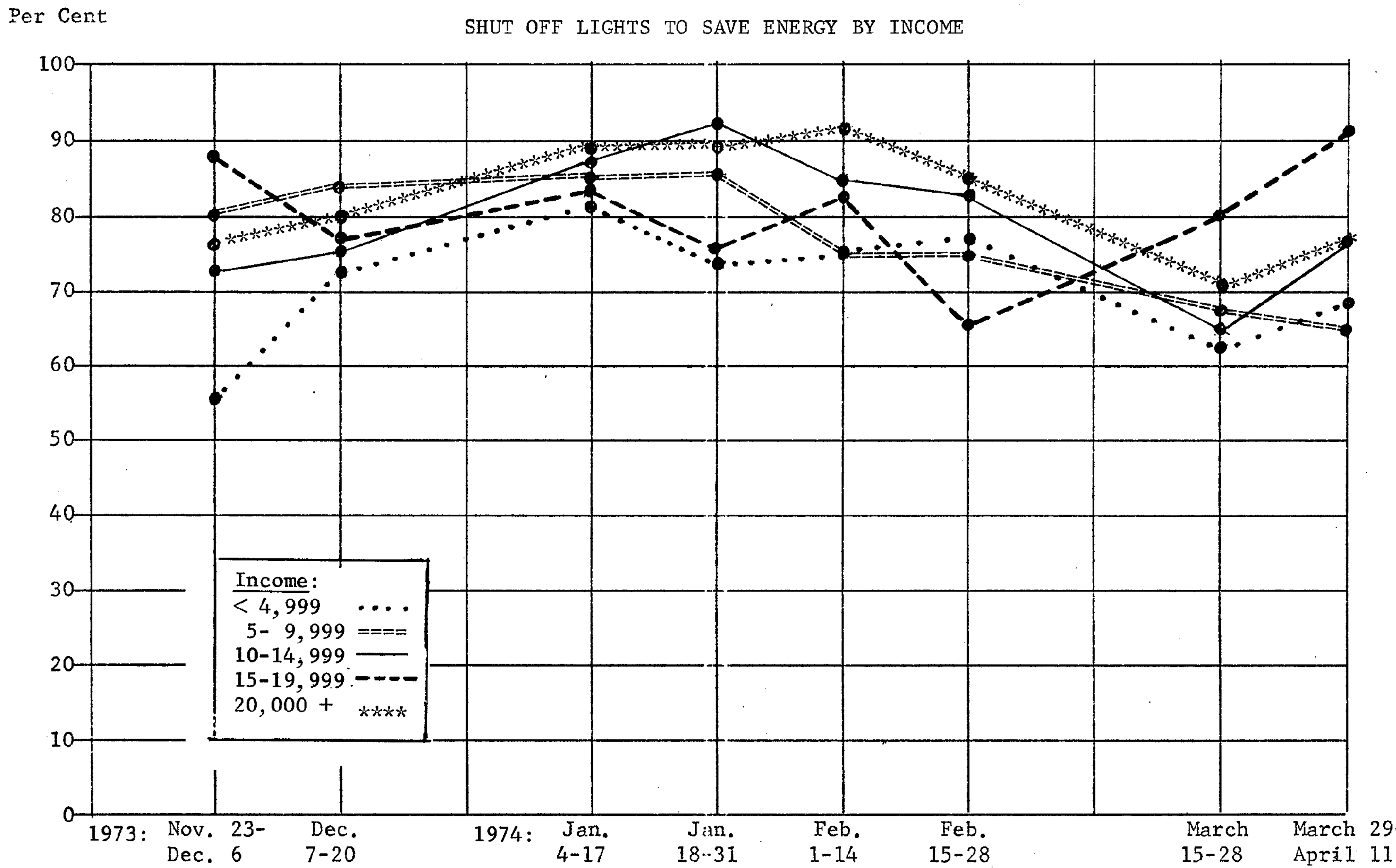
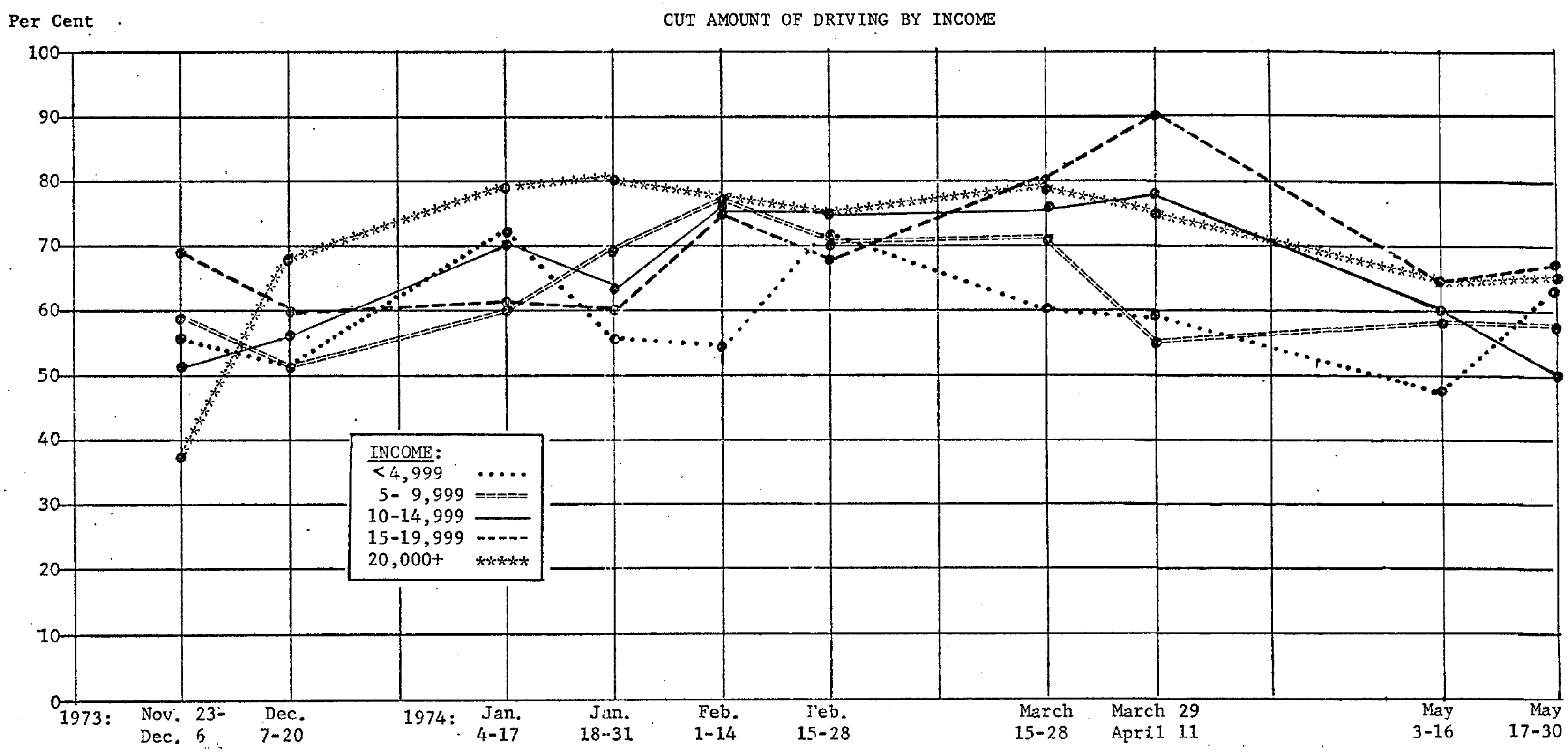


Figure H.18

CUT AMOUNT OF DRIVING BY INCOME



APPENDIX I: ALTERNATIVE ENERGY SOURCES

Table I.1

TROUBLE OBTAINING ELECTRICITY

(May 10-30, 1974)

Question	Response Category	Per Cent Answering
In some parts of the country, electric companies have not always been able to supply all of the electricity that people want. Have you had any problems in getting all of the electricity that you want in the last year--from May, 1973 to May, 1974?	Yes	2
	No	98
	N	(484)
IF YES:		
What has been the problem?	The electric company has had to cut voltage, causing brownouts	46
	There have been power failures	36
	We have been asked to cut down on our use of electricity	9
	N	(11)

Table I.2

NATIONAL USE OF ENERGY SOURCES

(May 10-30, 1974)

Question	Response Category	Median Per Cent
As you know, the recent energy shortage has brought new interest in the variety of possible sources of energy. Listed below are a number of different possible sources of energy. As you read this list, please tell me approximately what per cent of the energy that will be used in this country in 1974 will come from each of these possible energy sources.	Nuclear energy	11
	Solar energy (energy from the sun)	2
	Oil	35
	Coal	22
	Gas	30
	Heat from ground	0
	Other	0
	N	(424)
And how about in 1984? Approximately what per cent of all the energy that will be used in this country in 1984 will come from each of these possible energy sources?	Nuclear energy	33
	Solar energy (energy from the sun)	17
	Oil	21
	Coal	12
	Gas	17
	Heat from the ground . .	0
	Other	0
	N	(420)

Table I.3

LOCAL USE OF ENERGY SOURCES

(May 10-30, 1974)

Question	Response Category	Per Cent
Is there a facility for producing electricity in this community?	Yes	39
	No	61
	N	(457)
IF YES:		
By what type of fuel is the nearest facility run? Is it run by nuclear energy, oil, coal, gas, or water power?	Nuclear energy	7
	Oil	16
	Coal	28
	Gas	18
	Water power	30
	Other	2
	N	(165)

Table I.4

DEGREE OF CONCERN ABOUT POWER FOR LOCAL ELECTRIC PLANTS

(May 10-30, 1974)

Question	Response Category	Per Cent
There are many different fuels that can be used to run electric power plants. For example, nuclear energy, coal, oil, and gas can all be used to run such plants. How much do you care about what type of fuel is used to run the electric power plants in your area?	A great deal	28
	A moderate amount	31
	A little	17
	Not at all	24
	N	(483)

Table I.5

USE OF NUCLEAR ENERGY

(May 10-30, 1974)

Question	Response Category	Per Cent
Do you agree or disagree with this statement: Nuclear power should be used to produce electricity.	Agree	80
	Disagree	20
	N	(422)
IF AGREE: Listed below are some reasons people often give for believing that nuclear power <u>should</u> be used to produce electricity. Please tell me which of the <u>reasons</u> listed describe well why <u>you</u> believe that nuclear power should be used to produce electricity.	Provides electricity more cheaply.	50
	Enables the United States to conserve its natural resources	75
	Provides an opportunity to develop atomic energy for peaceful purposes	42
	Provides electricity in places where other fuels are not readily available	64
	Represents an increase in scientific and technological know-how	36
	N	(352)
IF DISAGREE: Listed below are some reasons people often give for believing that nuclear power should <u>not</u> be used to produce electricity. Please tell me which of the <u>reasons</u> listed describe well why <u>you</u> believe that nuclear power should <u>not</u> be used to produce electricity.	It is dangerous to health and environment	70
	Other methods of producing electricity are satisfactory	41
	It is too costly	26
	It creates unemployment . .	17
	Other	7
	N	(95)

(Table I.5 continued)

Table I.5--Continued

Question	Response Category	Per Cent
I am going to read you some statements about electric plants fueled by nuclear energy. As I read each statement, please tell me whether you agree or disagree with what the statement says.		
A. Working in an electric plant fueled by nuclear energy is as safe as working in any other plant.	Agree	60
	Disagree	40
	N	(434)
B. In places where nuclear power is being used to produce electricity, people's electric bills are lower.	Agree	55
	Disagree	45
	N	(376)
Of the reasons listed below, which, in your opinion, best describes the main reason why there aren't more electric plants fueled by nuclear energy being built now?	There are many technical problems in building such electric plants	14
	The public has many concerns about the possible dangers to health and safety such plants may bring	55
	The huge amount of gov't regulations surrounding the building of such plants makes building such plants difficult . .	12
	It is hard to find safe locations for building such plants	13
	There are shortages of workers with the skills necessary to build and operate such plants . . .	6
	N	(429)

(Table I.5 continued)

Table I.5--Continued

Question	Response Category	Per Cent
What (is/would be) your reaction to having an electric plant fueled by nuclear energy located here in your (city/town/county)--that is, here in (NAME OF CITY/TOWN/COUNTY)? (Are you/Would you be) favorable or unfavorable toward having such a plant located here?	Favorable	67
	Unfavorable	33
	N	(456)
IF UNFAVORABLE: Why are you unfavorable toward having an electric plant fueled by nuclear energy located here?	Bad for our health	26
	Bad for our environment . .	13
	Causes air pollution . . .	8
	Causes water/thermal pollution	4
	Causes pollution (unspecified)	9
	Danger of radiation	40
	Unsightly	2
	Lowers property values . .	2
	Other	19
	Afraid	11
	Noisy	1
	Dangerous	27
	Not economical, too expensive	1
	People (would/could) not live nearby	9
	N	(149)

Table I.6

USE OF COAL

(May 10-30, 1974)

Question	Response Category	Per Cent
And what (is/would be) your reaction to having an electric plant fueled by the burning of coal located here? (Are you/Would you be) favorable or unfavorable toward having such a plant located here?	Favorable	36
	Unfavorable	64
	N	(472)
IF UNFAVORABLE: Why are you unfavorable toward having an electric plant fueled by the burning of coal located here?	Bad for our health	22
	Bad for our environment . .	12
	Causes air pollution . . .	50
	Causes pollution (unspecified)	38
	Unsightly	5
	Lowers property values . .	2
	Other	11
	Not economical, very expensive	5
	N	(302)

Table I.7

BROWNOUTS VS. ALTERNATIVE ENERGY SOURCES

(May 10-30, 1974)

Question	Response Category	Per Cent
If respondent answered "unfavorable" to having an electric plant fueled by the burning of coal or nuclear energy located in this area, he was asked: Sometimes electric companies cannot provide all of the electricity the public wants on a given day. When this happens, there is not enough electricity to run people's electric lights and appliances at full capacity. This is known as a "brownout." Would you prefer to have frequent brownouts in this community rather than have electric plants fueled by nuclear energy or coal located here?		
	Yes	56
	No	44
	N	(101)

Table I.8

USE OF SOLAR ENERGY

(May 10-30, 1974)

Question	Response Category	Per Cent
There has been talk recently about plans to use solar energy--that is, energy from the heat of the sun--to heat buildings. How much have you heard about such plans?	A great deal	7
	Some but not much	36
	Only a little	22
	Hardly any	18
	None at all	17
	N	(482)
How about plans to use energy from the heat of the sun to cool buildings. Would you say you have heard ...	A great deal	7
	Some but not much	35
	Only a little	16
	Hardly any	18
	None at all	25
	N	(206)
IF ONLY A LITTLE, HARDLY ANY, OR NONE AT ALL: Does the idea of using energy from the heat of the sun to cool buildings sound reasonable to you, or do you think that it sounds pretty far-fetched?	It sounds reasonable . . .	54
	It sounds pretty far-fetched	46
	N	(117)
To your knowledge, have you seen--either in person or in a picture--a building with a unit that transformed heat from the sun into energy?	Yes	59
	No	41
	N	(206)
IF YES: A. Did you see such a building in person, in a picture, on T.V., or somewhere else?	In person	14
	In a picture	69
	On T.V.	36
	Other	3
	N	(125)
B. Did you think that the unit that transformed the sun's heat into energy . . .	Improved the overall look of the building	9
	Detracted from the overall look of the building . .	29
	Did not affect the overall look of the building . .	62
	N	(121)

(Table I.8 continued)

Table I.8--Continued

Question	Response Category	Per Cent
There has been some talk recently about the use of such units to transform the sun's heat into energy for heating and cooling individual homes as well as public buildings. About how much do you think it would cost to equip an average home with a unit that could transform the heat from the sun into energy for heating and cooling?	$ 150 or less	0
	$ 151 - $ 1,500	25
	$1,501 - $ 3,500	27
	$3,501 - $10,000	33
	Over $10,000	15
	N	(166)
How much would you be willing to pay to (equip your house/help equip your apartment building) with a unit that could transform the heat from the sun into energy for heating and cooling?	Less than $20	21
	$ 20 - $50	1
	$ 51 - $900	14
	$900 - $2,000	40
	Over $2,000	24
	N	(166)
Let's suppose that your heating bill doubled in the next year. Then how much would you be willing to pay to (equip your house/help equip your apartment building) with a unit that could transform the heat from the sun into energy for heating and cooling?	Less than $35	13
	$36 - $1,000	28
	$1,001 - $4,000	43
	Over $4,000	16
	N	(120)
Do you think that it would be a good or bad idea for us to start equipping public buildings such as schools with units that could transform the heat from the sun into energy for heating and cooling?	A good idea	86
	A bad idea	14
	N	(199)

Table I.9

EFFECTS OF POLLUTION UPON THE ENVIRONMENT AND PERSONAL HEALTH

Question: I am going to read a list of things people have mentioned as damaging our environment. Using the words below, I would like you to tell me your opinion of how much damage each one causes to the environment in this part of the country.

Response Category	Per Cent				
	A lot	Some but not much	Only a little	None at all	Not sure
Untreated sewage from cities and towns	48	20	12	11	10
The heating of rivers by electric plants fueled by nuclear energy . .	16	15	12	30	27
Burning of trash at farms, homes, apt. and town incinerators or dumps . . .	5	17	28	26	23
Strip mining	24	13	7	36	21
Septic tanks from private homes . . .	11	20	23	34	11
Smoke and gases from electric plants fueled by burning of coal	34	19	13	26	9
Exhaust from private automobiles . . .	44	29	16	8	4
Radiation from electric plants fueled by nuclear energy	11	11	10	43	28
Untreated liquid waste from factories .	47	14	9	18	12

Question: Now I'm going to read a list of things that are said to affect people's health. For each one I read, I'd like you to tell me to what extent you believe people's health is affected by each one of these things. (N=481)

Response Category	A lot	Some but not much	Only a little	None at all	Not sure
Untreated sewage from cities and towns	49	27	11	5	8
Burning of trash at farms, homes, apts., and town incinerators or dumps	20	31	30	15	5
Septic tanks from private homes . . .	13	21	25	30	11
Smoke and gases from electric plants fueled by the burning of coal . . .	36	30	15	9	10
Exhaust from private automobiles . . .	40	32	18	6	5
Radiation from electric plants fueled by nuclear energy	19	13	12	25	31
Untreated liquid waste from factories .	43	24	11	8	13