RESEARCH SUMMARY

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The Impact of Rising Energy Prices on Rural Alaska

by William E. Nebesky and Oliver S. Goldsmith

Alarmed by the possible effects of rapidly rising energy costs on households in rural Alaska, Governor Hammond in mid-1980 asked the Alaska Growth Policy Council (AGPC) to explore the need for, and resulting impacts from, state subsidization of rural energy costs and possible statewide equalization of electricity rates. The AGPC, in response to the Governor’s request, asked the University of Alaska’s Institute of Social and Economic Research to study and project the effects of rising energy costs on the incomes of rural Alaska households and to compare these costs with those paid by households in an urban Alaska area—Fairbanks. AGPC also asked the researchers to identify and determine to what extent such factors as transportation and home weatherization affect energy costs. In this summary the researchers briefly present their findings, projections, and conclusions.

Introduction

Our analysis of rising energy costs and their impact on rural Alaska residents centered mainly on two questions: what proportion of rural household income was spent on heating oil and electricity,1 and how is this expected to change in the future?

Study results indicated that between 1974 and 1978, rising energy costs sharply increased household expenditures on heating oil and electricity in rural Alaska. During this time, the proportion of income spent on heating oil and electricity increased from 18 to 29 percent for Native households and from 10 to 16 percent for all households (Native plus non-Native) in rural Alaska.

Research also showed that if fuel prices continue to rise as expected and household income and energy consumption continue to follow recent historical trends, by 1988 the proportion of cash income spent on energy will rise from 29 to 43 percent for rural Native households and from 16 to 25 percent for all rural households.

The final report, summarized here, first examines variations in energy prices, consumption, and household income. It next looks at trends in energy prices and household energy consumption in rural Alaska and the reasons for them. It also projects the growth in household income, consumer prices of heating oil and electricity, and household energy consumption in order to estimate the proportion of rural household income that will be spent on heating oil and electricity in 1988.

Variations Within and Among Regions

Although this report presents trends in energy costs, energy consumption, and incomes for rural households, it is important to note that all three items vary widely both among and within regions, between rural and urban areas, and between Native and non-Native households. Some of the reasons for these variations are outlined below:

Energy Costs. The following variables determine a large part of the costs of not only fuel oil but also electricity in rural areas, since rural electrical power is generally provided by diesel generators:

- Type of shipping container used. Shipping in barrels costs on the average over twice as much as shipping fuel in bulk lots.
- The type and amount of storage capacity in each village, i.e., bulk containers vs. barrels or drums. To a large extent, the type of storage determines the type of shipping containers used.
- Mode of shipment, surface or air, with air being significantly more expensive.
- Distance of village from main distribution terminal at Dutch Harbor. The greater the distance, the higher the transport cost.
- Village size (the amount of fuel oil transported affects tariff rates). Smaller villages have higher costs.

1In performing this analysis, we focused on two main types of energy expenditures: (1) fuel oil imported into rural areas for space heating and (2) electricity, usually from diesel generators, used to power heavy and light kitchen appliances, water pumps, and other machines and tools.
Energy Consumption. Variations in consumption depend, among other things, on the availability of fuel oil substitutes, mainly wood, for space heating. Other important factors are the structural design, integrity, and the amount of insulation used in constructing a house. These directly affect a house's heat-retaining efficiency. The overall insulative efficiency of rural housing is generally below that found in urban areas, such as Fairbanks. Thus, even though the average rural house is only half the size of its urban counterpart, its heating requirements are not necessarily cut in half.

Household Income. Because of a lack of employment opportunities, the rural Native's preference for a mixed cash/subsistence lifestyle, and other factors, both the level and growth rate of rural household income is far below that of such urban areas as Fairbanks or Anchorage. In fact, the annual income growth rate—an average 5.2 percent for all rural census divisions under consideration from 1974-78—was lower than the cost-of-living increase during the same period (8.8 percent in Anchorage). Thus, it appears that on average the real household income in rural areas declined about 3.6 percent annually over this period.

Income also varied considerably between rural Native and non-Native households. Rural Native household income averaged less than two-thirds that of non-Native rural households over 1974-78.

Historic Trends

Fuel Prices. Between 1974 and 1978, the price of diesel fuel delivered to Alaska Village Electric Cooperative (AVEC) communities increased at nearly four times the rate of residential heating oil prices in Fairbanks. Assuming an average growth of 6 percent per year to be representative of fuel price increases in rural Alaska, we estimated the average 1978 consumer price per gallon of fuel oil to be $1.18, up from roughly $0.94 per gallon in 1974.

In addition, 1974-78 electricity prices charged AVEC consumers increased by an average rate of 17 percent per year, compared to an annual increase of only 4 percent in Fairbanks. We estimate that the 1978 costs in all rural communities averaged 17.7 cents per kilowatt hour (kwh). This compares to 6.3 cents per kwh in Fairbanks during the same year.

Consumption. Despite recent increases in the price of fuel oil, there is little evidence of a decline in average household consumption of heating oil during the mid-1970s. Although individual use varied from 15 to 290 gallons per month, depending on the season and region, our research data suggests that an average rural household consumed roughly 110 gallons of heating oil and 219 kwh of electricity per month (1300 gallons and 2600 kwh annually), requiring an average household energy expenditure of $2,000 annually for 1978. Limited data prevented an accurate estimate of differences between Native and non-Native household energy expenditures. However, as a proportion of median household income, the $2,000 expenditures in 1978 represents 29 percent of the total income for a Native rural household and 16 percent for all rural households. These energy expenditures, as a percentage of the average rural household budget, range from two to five times higher than in Fairbanks.

Projections

Prices. The growth in consumer prices of heating oil and electricity in rural Alaska to 1988 will depend mainly on the future path of world petroleum prices, the long-term impact of decontrolling prices of U.S. domestic crude oil, and the growth of transportation and distribution costs in rural Alaska. Pending large unforeseen cutbacks in world petroleum production, we assume that the OPEC cartel will develop a long-run policy of unified prices, which will tie OPEC prices to the average rate of inflation in western countries. The presence of excess capacity in the U.S. domestic refining sector during 1980, coupled with a gradual decline in domestic consumer demand since 1978, suggests that in order to prevent a further drop in consumer demand, U.S. refiners may be forced to absorb some of the extra price increases induced by decontrol, instead of passing them on to consumers. At this time, however, it is impossible to estimate just what the long-range effects of decontrol will have on fuel oil and diesel oil prices in rural Alaska.

The remaining principal factor that could influence heating oil prices in rural Alaska is the rising costs of transporting and distributing heating oil. While nominal crude oil prices in the world market increased at an average annual rate of 9 percent between 1974 and 1978, heating oil prices in rural Alaska grew at about 11 percent per year over the same period. It is probable that this 2-percentage point difference represents ongoing increases in the

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2 Surprisingly, climate seems to have less effect on fuel oil consumption than such other factors as availability of fuel oil substitutes, storage capacity, or distance from the Dutch Harbor distribution terminal.

3 Because of the difficulty in obtaining rural heating oil prices, we used the growth rate of AVEC's diesel fuel prices, a reasonable proxy for fuel oil prices throughout rural Alaska; cost per gallon and transportation costs are virtually the same.

4 Note that all prices are expressed in 1978 dollars.
cost of transporting heating oil into rural areas. If these transportation cost increases continue, as we expect they will, then despite our assumptions of constant (real) world crude oil prices and the effects of price decontrol in the U.S., the inflation-adjusted price of heating oil in rural Alaska will continue to increase 2 percent per year over the foreseeable future. Based on this assumption, the price of fuel oil (expressed in 1978 dollars) delivered to rural areas in Alaska will reach $1.78 per gallon in 1988.

Consumption. Little is known about the responsiveness of household heating oil and electricity consumption in rural Alaska to changes in consumer prices or household income. At one extreme, no matter how much the energy price or household income increases or decreases, energy consumption would remain the same. At the other extreme, marginal changes in energy prices or household income would induce proportionately greater changes in household energy consumption. In this study, therefore, we have assumed that household energy consumption remains constant under conditions of changing prices. On the other hand, we assume that a given change in real household income will induce a roughly proportional change in energy consumption.

Income. Historical trends in nominal, per capita income growth compared to the rising cost of living suggest that in general, real household income in rural Alaska decreased rather than increased between 1974 and 1978. For forecasting purposes, we have assumed real household income will remain constant from 1978 to 1988, an admitted overstatement of the historic trend.

Conclusions

Based on our assumptions on the growth of heating oil and electricity prices and the growth in household energy demand, we forecast that median household energy expenditures in rural Alaska will increase 50 percent, from $2,000 in 1978 to $3,022 in 1988 (expressed in 1978 dollars). As a proportion of Native household income (assumed constant at 1978 levels), this represents an increase from 29 to 43 percent between 1978 and 1988. Similarly, energy expenditures as a proportion of all Native and non-Native rural household incomes, will rise from 16 to 25 percent over the same projection period.

Comparisons of the lower Native household income with the median income in all rural households consistently show that Natives spend a larger proportion of household income on energy than do non-Native rural households, provided energy expenditures are roughly the same for both groups.

Because household income remains constant in real terms over the projection period, the rising household energy costs do not result from income-induced consumption increases. Therefore, it is real price increases that are responsible for changes in the energy budget-to-income ratios.

As discussed above, many rural communities experienced an actual decline in average real household income between 1974 and 1978. Our assumptions about the responsiveness of household energy expenditures to changes in household income indicate that energy consumption and expenditures would fall in response to a reduction in real household income. As before, if we assume that energy prices grow moderately, then a 2-percent average annual decline in real household income from 1978 to 1988 would raise energy expenditures as a proportion of income to nearly 47 percent for Native households and 27 percent for all rural households. Clearly, any decline in household energy consumption induced by this 2-percent annual decline in household income would not be sufficient to offset the decline in household income. The household energy expenditure, as a proportion of household income, would increase about 62 percent from 1978 to 1988.

We emphasize that these results depend on the assumption that government programs aimed at reducing the impact of rising energy prices will not be functioning during 1978-88. Should fuel assistance or weatherization programs be carried out over this period, our research indicates that they could reduce the energy portion of the household budget by as much as 27 percent of our projected 1988 levels.

Of the two types of programs, however, a fuel assistance program would require that the state provide continuous and increasing financial assistance to help residents pay rising costs of fuel and electricity. On the other hand, a weatherization improvements program—one that would help residents caulk and insulate their homes—could permanently reduce the proportion of per capita household income required for future energy expenditures.

William E. Nebesky is a research associate and Oliver S. Goldsmith is an associate professor of economics. Both are staff members of the Institute of Social and Economic Research in Anchorage.
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