

Client Consumption Patterns Within An Income-Based Energy Assistance Program

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An increasing number of states and utilities are exploring and implementing income-based energy assistance programs for their low-income clients and customers [Hill, Gonzales and Colton 1990]. Such programs include not only programs involving federal fuel assistance funds,¹ but programs involving utility rate discounts as well.

The Public Utilities Commission of Ohio initiated this approach to low-income problems in 1983 when it ordered that state's utilities to implement a Percentage of Income Plan (PIP).² Since then, a number of generations of programs have arisen. The Low-Income Home Energy Assistance Program (LIHEAP)-based PIP³ was first implemented in Rhode Island in 1986.⁴ In Pennsylvania, the Philadelphia Electric Company (PECO) implemented its Customer Assistance Program (CAP), an income-based payment plan program,⁵ while Wisconsin and Minnesota undertook programs similar to the LIHEAP-based PIP.⁶ Just recently, the Philadelphia Gas Commission approved an income-based rate design for the Philadelphia Gas Works⁷ and the Vermont Department of Public Service proposed an income-based Basic Energy

waste of energy. They reason that programs tying energy bills to a percentage of income reduce the marginal cost of all use above the income-based payment to zero. This result eliminates any incentive for households to ration their energy consumption.

The reliance of these analysts on blackboard economics is misplaced for a variety of reasons, and the conclusions they reach are demonstrably in error.

The Empirical Results

The conclusion that income-based programs will lead to the indiscriminate waste of energy is not supported by the experience in states that have implemented such projects. A number of those states have expressly considered the consumption impacts of income-based programs in after-the-fact evaluations. The evaluations of programs in Rhode Island, Minnesota, Ohio, Montana, Illinois and Philadelphia are discussed below.

Rhode Island

The Rhode Island Percentage of Income Payment Plan (PIPP) involves two basic components: (1) a co-payment mechanism; and (2) an arrearage forgiveness mechanism. The first component is oriented toward current bills. Under the program, so long as a household makes regular monthly payments toward its home energy bill, based on a predetermined and reasonable percentage of its income, LIHEAP will pay the difference between the household payment and the actual bill. The second component is oriented toward pre-program arrears. So long as the household continues to make complete and timely payments toward its current bills, any pre-program arrears it might have had will be forgiven over a three-year period.

An evaluation of natural gas consumption under the Rhode Island program concluded that the "presence of PIPP does not appear to be a factor affecting the energy consumption by PIPP participants." [Colton

1986-1987 Program Year.⁹ Some households, however, did increase their consumption under the Rhode Island PIPP, with 11 percent increasing their consumption by more than 20 percent. However, a roughly equal number, 8 percent, experienced a consumption decrease of more than 20 percent.

No systematic increase in household consumption occurred *as a result of* the Rhode Island PIPP. The conclusion to be drawn from the Rhode Island data is that, whatever factors influenced consumption decisions by low-income households, the presence or absence of PIPP was not one. Household energy consumption under a PIPP was just as likely to go down as up.

Minnesota

During fiscal year 1985, two community action agencies in Minnesota operated two different programs for the distribution of federal LIHEAP benefits. At the core of the programs was the premise that a low-income household should be asked to pay only a reasonable percentage of its income for its home energy or heating fuel. The LIHEAP program would pay the difference between the household income-based payments and the actual bills of program participants.

Results similar to Rhode Island were found in an evaluation of total household energy consumption under the Minnesota Fair Share programs [Fox 1986]. Of the clients served in Anoka County, 57 percent of all participating households fell within the range of a 10 percent increase to a 10 percent decrease (37 percent increased consumption; 20 percent decreased). Ten percent experienced "significant" increases, using at least 25 percent more and an equal number, 11 percent, experienced significant decreases, using at least 25 percent less.

The second Minnesota pilot program involved the BICAP community action agency. With BICAP, the data was almost identical. There, 67 percent of all participating households fell within the plus or minus ten percent range (21 percent increased; 46 percent decreased). Similarly, while 8 percent of participating households increased con-

to pocket part of the savings. Moreover, there was an absolute cap placed on consumption, over which LIHEAP would not pay. In contrast, the BICAP program had an open-ended design: all consumption above the household income-based payments was covered by public assistance benefits. The program involved neither incentives for conservation nor penalties for waste. Despite this difference in conservation designs, results for the two programs were virtually identical.

Ohio

The Ohio Percentage of Income Plan (PIP) was the first income-based program in the nation. Under the Ohio PIP, households are required to make payments equal to a predetermined portion of their income. So long as such payments are made, while the household remains "responsible" for the shortfall, the utility may not use the disconnection of service as a collection device.¹⁰ The Ohio PIP does not involve any redistribution of LIHEAP benefits. Indeed, participating households often do not even apply for and receive LIHEAP assistance.

In an evaluation of the Ohio program, significant differences were found in consumption impacts between natural gas and electric PIP versus non-PIP customers as well as between customers of different utilities.¹¹ [Tractell 1985]. The Ohio PIP participant was found to have consumed significantly more natural gas than the non-PIP customer. While the magnitude of the difference varied widely among the various utility companies, the direction of the difference was uniform. In its evaluation, however, Ohio looked only at aggregate data; the consumption for the PIP class as a whole, it found, exceeded the consumption for the non-PIP class as a whole. Ohio found further that the difference between the two populations could be attributed to a "relatively small customer population." A small number of extremely high use customers, in other words, was found to have skewed the aggregate analysis.

Moreover, the Ohio conclusion as to aggregate use by PIP customers did not address the *change* in consumption resulting from the implementation of the PIP. Ohio found that patterns of use consumption by

wide, differences" between companies. The Ohio analysis, for example, looked at consumption by year, by season, and by month. Ohio found that all PIP minus non-PIP differences were positive for Cincinnati Gas and Electric; all differences were negative for Ohio Edison; and the difference pattern for Dayton Power and Light varied with consumption month. Ohio did not address why there might be increases in gas consumption but no changes in electric consumption.

Montana

The Montana PIP was modelled closely on the Rhode Island PIPP. Montana implemented a LIHEAP-based program. Bills beyond the income-based payments by households were paid by federal fuel assistance benefits. Montana represents an interesting situation in that the participating utility was Montana Power Company, a combination utility. A combination utility provides *both* the natural gas and electric service to customers. In addition, Montana Power uses a unitary billing process, whereby the natural gas and electric bills are aggregated into one "amount due" on the monthly bill.

While the Montana PIP was evaluated for impacts of the PIP on participating client consumption, as with Ohio, because of data collection problems, the consultant warned that "a comprehensive analysis of the energy consumption data and correlation to the PIP files . . . was not possible" [Schneider 1989]. Nevertheless, the study looked at both electric and natural gas consumption.¹³

The Montana electric analysis looked at thirteen accounts that had the same customer in the year before the PIP and in the year of the PIP.¹⁴ The study used a methodology similar to that of Ohio in that it aggregated consumption for the entire sample PIP population and compared that aggregate figure to the aggregate figure for the pre-PIP year.¹⁵ The study concluded that the total PIP population increased its electric use by 12 percent from the 1986-1987 program year to the 1987-1988 program year. The January consumption in particular, the report noted for these thirteen accounts, increased by 18 percent between these two

only 4 percent from 1986-1987 to 1987-1988. The consultant concluded that "it does not appear that there was a significant increase in gas use between 1986-1987 (LIHEAP) and 1987-1988 (PIP) on an essentially weather-normalized basis for the same accounts (addresses)."

Illinois

In 1985, Illinois implemented a utility-based Percentage of Income Plan (PIP) largely based on the Ohio model: the Illinois Residential Affordable Payment Program (IRAPP). Participation in IRAPP is limited to individuals who are otherwise eligible for the Illinois LIHEAP program. Under IRAPP, a household is required to make an income-based payment during the winter season (December 1 through April 30). For each month during the summer season (May 1 through November 30), participants must pay either the percentage of income payment or the current month's bill, whichever is greater.

Illinois implemented a strict consumption cap. In the absence of medical excuse, participants are required to pay for any monthly heating season consumption that exceeds an officially designated average residential use. Responsibility for above-average usage becomes due and payable only when a household leaves the program.

Illinois found that in five of seven utilities measured, participants increased their winter gas consumption. [Griffin and Reddy 1988]. For only three of these companies was the consumption increase statistically significant. Moreover, in all of the utilities providing natural gas, there was increased summer consumption. However, for only one was the difference statistically significant.

The impact of IRAPP on electricity consumption varied from one utility service area to another. Winter electricity consumption increased for three of the six utilities. For each of these utilities, the difference was statistically significant. For the remaining three utilities, winter electricity consumption by participants decreased. For each of these utilities, however, the difference was not statistically significant.

are available under two sets of circumstances. First, households who live at or below 75 percent of the poverty level are conclusively presumed to be incapable of paying their full electric bill. Second, households who are above 75 percent of poverty, but below 150 percent of poverty, have the right to demonstrate their inability to pay. In both instances, however, the customer must have experienced prior payment difficulties as manifested by nonpayment of bills.¹⁷ Under PECO's CAP, households in the first category must pay 3 percent of their income to PECO if they use electricity for non-heating; they must pay 8 percent if they use electricity for heating. In contrast, households in the second category must make either the percentage of income payments, or what PECO finds to be their available discretionary income, whichever is greater. PECO reports that roughly two of three households make percentage-of-income payments.

In addition to the payment plan, customers who participate in the PECO CAP receive extensive counselling on energy saving measures. Low-cost/no-cost conservation measures are also provided for installation in the homes of such participating households. As a result, PECO's program evaluation found that, despite the limitations on payment responsibility, because of these aggressive conservation efforts, households participating in the CAP actually experienced an aggregate decrease in consumption of nearly 7 percent.¹⁸

Consumption Concerns Within an Income-Based Program

There are competing considerations when one evaluates the consumption patterns of participants in a program providing income-based fuel assistance benefits.¹⁹ On the one hand, it is possible that such a program would lead to some increased usage, and that such a result, in most cases, would be both understandable and reasonable. Rapidly rising energy bills have forced many low-income customers to make enormous sacrifices to maintain heat or to stay within their budgets during the cold winter months [Barnes 1987]. For some, these sacrifices

an income-based assistance program to make possible an increase in energy consumption to a level consistent with a healthful and moderately comfortable environment.

Nevertheless, there are sound reasons to place prudent limits on any open-ended coverage of energy consumption. First, the risk of abuse, or even the elimination of incentives to conserve, runs counter to a clear public policy promoting energy conservation. While greater sensitivity is needed when one discusses energy conservation and the poor, energy conservation values are clearly still valid.

Second, conservation incentives are not aimed strictly at the customer. LIHEAP recipients most frequently tend to be renters rather than home owners. To totally underwrite the usage of such recipients would thus relieve landlords of any incentive, or market pressure, to maintain or improve the quality of these dwellings.

Finally there are political considerations. If, for example, even a handful of households actually abuse the system, the resulting bad publicity could cause the widespread loss of public support for income-based programs. Moreover, open-ended usage coverage by an income-based program would stand in sharp contrast to other federal or state benefit programs. No other program exists where the beneficiary herself, unchecked by an outside party (such as a doctor, under Medicare), has the ability through word or action to establish the level of need and, therefore, of benefit. This may not necessarily argue for placing limits on coverage, but it does point to the uniqueness of the total coverage concept.

In sum, whether or not consumption can reasonably be expected to increase under an income-based program, there may well be reason to implement consumption caps to promote conservation. It is likely, however, that a cap for any income-based program is mandated more by political considerations than by any substantive need.

The Theoretical Shortcomings

Price theory has little real world applicability to low-income energy rates. Low-income households do not respond to "price signals" tied to rates. For price signals to be effective, the household must be responsible for paying its entire home energy bill. That, however, is not the case. The mere receipt of LIHEAP assistance, for example, effectively distorts the price signal for consumption paid for by the benefit. Moreover, price signals assume that households pay their entire home energy bills. With low-income households, that most often is not the case. If, in other words, a household can afford to pay only \$60 toward its home utility bill in the first place, rendering a bill of \$120 rather than \$100 provides no price signal to that consumer. [Alexander 1990]. Third, winter payment plans tend to render price signals irrelevant. Through a winter payment plan, households in many states are allowed to pay less than their full monthly bill during the winter months so long as the accrued shortfall is retired before the start of the subsequent heating season. During neither the winter nor the summer months, therefore, is there a price signal provided to the low-income household. In the winter, consumption is "under-priced"; in the summer, consumption is "over-priced". Finally, equal budget payment plans render price signals irrelevant. Substantial effort is made to solicit low-income participation in budget billing (often known as level billing) plans. In this fashion, the household pays an equal monthly bill throughout the year. At the end of the year, there is a true-up, with the difference rolled into the next year's budget. These plans are promoted as a mechanism to take the peak off winter heating bills. In so doing, however, the efficacy of any price signal incorporated into monthly rates is destroyed.

The Practical Shortcomings

The blackboard theory used in opposition to income-based energy assistance programs faces practical shortcomings also. The theoretical arguments ignore the practical implementation of such programs that

servation efforts are then directed to these households on a priority basis. Indeed, because high usage means high benefit payments income-based programs effectively create incentives for the government to target conservation programs, in order to increase the efficiency of the distribution of benefits.

Even without such affirmative conservation efforts, it is unreasonable to expect that households will indiscriminately waste energy merely because the energy usage above the income-based payment is being paid for by someone other than the household. Instead, what happens is that households seek out a zone of comfort within which to live. When that zone has been reached, additional consumption will not occur regardless of the "price signals" provided through a marginal cost of zero [Barnes 1987].

This result is particularly true for heating consumption. There is no reason to believe that people want to live in a home with a temperature of 80 degrees rather than 72 degrees, for example, merely because the financial responsibility of the household is limited to a percentage of income. Nor is there reason to believe that people will open windows while heating a home as a result of the placement of financial responsibility on other parties. If energy waste does occur because of a lack of weatherization, because of broken windows, or similar reasons, that usage is not tied to inappropriate price signals but rather to income insufficient to provide repairs. Moreover, this type of excess consumption can be identified, as discussed above, and the program can offer affirmative measures to address these problems.

Non-heating consumption results in a different analysis. With non-heating consumption, an income-based program does not necessarily lower the "marginal cost" of additional consumption to zero. In order to increase non-heating consumption, households would likely need to make a capital investment in new appliances. Despite the benefits provided through the income-based fuel assistance program, the availability of discretionary income for such investments is limited [Sheehan 1987].

ergy. The Department concluded that fuel-switching is not likely to be a major problem.

The argument that fuel-switching will occur is based on the assumption that only non-heating benefits exist and that households will switch to electricity in order to gain additional benefits. In fact, the best way to attack the potential for fuel-switching is to eliminate the incentive to fuel-switch, by ensuring that heating benefits are adequate and that fuel-switching will result in no gain.

Even assuming there is a mismatch of heating and non-heating benefits, there will not likely be substantial fuel-switching in an income-based assistance program. For a household to wish to engage in fuel-switching, it would have to calculate the costs and benefits of different levels of consumption of different fuels. Research indicates, however, that a large portion of the adult population is unable to perform basic consumer math. In one study, only 39 percent of the adults tested were able to compare different-sized containers to determine the best price. In the same study, only 32 percent of the adults were able to determine the square foot unit cost of housing space. Only 35 percent of adults were able to determine the unit cost of a utility bill [National Educational Assessment 1975].

The argument that consumers will engage in fuel-switching also attributes a rationality to their behavior that does not exist in reality. Instead, consumers tend to engage in habit buying [Katona 1960]. Certain characteristics *do* lead consumers to make "genuine decisions" about the purchase of products or services. [Katona 1964]. These include expenditures that are subjectively thought to be major and that are fairly rare, and the purchase of new products (or the first purchase of a particular product). Monthly energy bills do not represent the type of either "major" or "rare" expenditures that generally underlie genuine decisionmaking. As a result, consumers will likely engage in habit buying, marked by a strong inertia. Consumers will tend to do in the future what they have done in the past.

Even if one assumes genuine decisionmaking, the purchase of equip-

Moreover, the finances of fuel-switching may well limit the extent of fuel-switching. Low-income households do not always have the resources to make even economically rational capital investments. Whether or not a switch to electric water heating or to electric heating would yield \$100 in benefits, for example, makes no difference if the household lacks the funds to make the investment in the new electric system.

Finally, low-income households most often do not include the person who is in the position to make a decision about which fuels should be used. The majority of poor households are tenants. As a result, just as a low-income tenant often does not have the ability to decide to install weatherization measures, even if economically justified, that tenant does not have the ability to decide to switch fuels for heating or water heating or other purposes, even if economically justified. Only the property owner has that ability, and, again like weatherization and conservation measures, the incentive does not exist for the property owner to make such a switch.

In sum, while the presence of an income-based program may in theory tend to promote fuel-switching, in fact, such switching will not likely occur. Consumers generally will have neither the incentive nor the ability to make the calculations and the capital investment necessary for fuel-switching to become a major phenomenon.

Conclusion

As income-based energy assistance programs become more common, it is important to gain an understanding of what impact such programs will have on important conservation principles. The conclusion flowing from this review of past studies is that an income-based program, unto itself, has no discernible impact on consumption. Whatever factors might influence household consumption decisions, the presence of an income-based assistance program is not such a factor. Consider that

consumption after program implementation. No difference was found for electric consumption.

- In Minnesota, results similar to Rhode Island were found. On an individual household basis, consumption was just as likely to go up as to go down. In addition, no differences were found in Minnesota between the agency that implemented a consumption cap and the agency that did not implement a cap.
- In Montana, natural gas consumption was found to have increased for PIP participants while no change was found for electricity consumption. This result is puzzling in that the same company provides both natural gas and electric service and the bills for both services are aggregated into one "amount due."
- In Illinois, natural gas consumption was found to have increased for some utilities and to have decreased for others. Similar results were found for electric consumption. For those Illinois utilities that did have increases, the increases, came despite a strict cap on the provision of benefits.

Notes

1. The Low-Income Home Energy Assistance Program (LIHEAP) provides cash grants to income eligible households to help pay winter home energy bills.
2. In Ohio, a household pays a designated portion of its income toward its home energy bill. While the household remains "responsible" for the difference between that payment and the full bill, a utility may not disconnect the household's service for nonpayment of that difference.
3. In a LIHEAP-based PIP, a household pays a percentage of its income toward its home energy bill. Federal fuel assistance benefits, provided through the Low-Income Home Energy Assistance Program (LIHEAP), are then used to pay the difference between that household payment and the full bill.
4. The Rhode Island model was also tested on a pilot basis in Montana during the 1987-1988 and the 1988-1989 heating seasons.
5. While PECO operated its CAP as a "pilot" for a number of years, it has

11. Ohio placed significant restrictions on the validity of its analysis. The consultant, for example, expressly stated that the sample it studied was insufficient to draw sound conclusions without further study.
12. Again, aggregate analysis was used.
13. The Montana evaluation reported that it had insufficient data to reach statistically significant conclusions. Its conclusions, the report said, were "qualitative" in nature.
14. Montana, too, limited the analysis to households with twelve full months of data.
15. Unlike Ohio, the Montana evaluation did not comment on whether a limited number of customers with abnormal consumption characteristics skewed the aggregate results.
16. While weather conditions were not normalized, the consultant found that the number of degree days was virtually identical. Based upon that observation, without considering the patterns or stretches of cold versus warm weather, the consultant concluded that weather in the two years was effectively the same.
17. This program requirement has been challenged before the state public utilities commission by Philadelphia Community Legal Services representing income-eligible clients. The PUC was told that such a requirement provides an unreasonable incentive for customers to not pay their electric bill so as to become eligible for the CAP program.
18. Conservation Company, Philadelphia Electric Co, 1987.
19. Again, fuel assistance is intended to be broader than LIHEAP. It can include, for example, income-based rate programs.

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