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Measuring the Impacts of Weather and Energy Prices on the Bill Payment Coverage Capacity of LIHEAP

NOTE TO READERS

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LIHEAP Provides Valuable Fuel Assistance, but Ability to React to Prices and Weather Varies by Region

The Low-Income Home Energy Assistance Program (LIHEAP)¹ is one of the critical sources of direct federal fuel assistance in the nation today. LIHEAP supplies basic funding for heating and cooling needs² for low-income households.³ In addition, the LIHEAP statute allows the President to "release" emergency or "contingency" funds⁴ if the President finds that any one of several statutorily-prescribed conditions exists.⁵

¹ 42 U.S.C. §§ 8621 et seq. (2012).

² The LIHEAP statute refers to "home energy needs," but defines that term to encompass only home heating and cooling consumption. 42 U.S.C. § 8622(6) (2012) ("The term 'home energy' means a source of heating or cooling in residential dwellings.")

³ Income eligibility for LIHEAP is within the discretion of the state, so long as minimum income eligibility is not set below 110% of the Federal Poverty Level and maximum income eligibility is not set above 150% of Federal Poverty Level or 60% of state median income, whichever is greater. 42 U.S.C. §8624(b)(2)(B) (2012).

⁴The LIHEAP statute provides that: "There is authorized to be appropriated in each fiscal year for payments under this title, in addition to amounts appropriated for distribution to all the States in accordance with section 2604 (other than subsection (e) of such section), \$600,000,000 to meet the additional home energy assistance needs of one or more States arising from a natural disaster or other emergency." 42 U.S.C. §8621(e) (2012).

⁵ Under the statute (42 U.S.C. §8622(1) (2012)), "The term "emergency" means--

(A) a natural disaster;

(B) a significant home energy supply shortage or disruption;

(C) a significant increase in the cost of home energy,

The amount of LIHEAP contingency funds available to be released each year is set in the LIHEAP appropriation. Once the available contingency funding amount is established by Congress in any given year, the President is authorized to release none, some or all of it.⁶ In making contingency releases, the President may authorize releases to a limited number of states, depending upon the underlying findings giving rise to the release.⁷

In a very minor way, the LIHEAP contingency fund is somewhat of a buffer against LIHEAP's

as determined by the Secretary;

(D) a significant increase in home energy disconnections reported by a utility, a State regulatory agency, or another agency with necessary data;

(E) a significant increase in participation in a public benefit program such as the food stamp program carried out under the Food Stamp Act of 1977 (7 U.S.C. 2011 et seq.), the national program to provide supplemental security income carried out under title XVI of the Social Security Act (42 U.S.C. 1381 et seq.) or the State temporary assistance for needy families program carried out under part A of title IV of the Social Security Act (42 U.S.C. 601 et seq.), as determined by the head of the appropriate Federal agency;

(F) a significant increase in unemployment, layoffs, or the number of households with an individual applying for unemployment benefits, as determined by the Secretary of Labor; or

(G) an event meeting such criteria as the Secretary, in the discretion of the Secretary, may determine to be appropriate.”

⁶ See, 42 U.S.C. §8621(e) (2012). (“Such funds shall be made available only after the submission to Congress of a formal budget request by the President (for all or a part of the appropriation pursuant to this subsection) that includes a designation of the amount requested as an emergency requirement as defined in such Act.”)

⁷ See, for example, the contingency releases for February 22, 2008, September 17, 2008, and October 16, 2008 (releases specific to states facing substantial fuel oil price increases).

status as a “block grant” program. As a block grant program, Congress allocates a fixed sum of LIHEAP funding to each state each year. When funding from that allocation is exhausted,⁸ the distribution of benefits ceases, unrelated to the number of current or pending applicants or to the date during the Program Year at which the funding is exhausted. Funding for a block grant program, in other words, does not increase merely because the “need” goes up, either in terms of the number of applicants or the level of the underlying home energy bills to be addressed by the program.

A Fuel Assistance Tracking Mechanism

Fisher, Sheehan & Colton recently prepared a mechanism to track the compounded impact of fuel prices and weather on the adequacy of LIHEAP in any given year. This Fuel Assistance Tracking Mechanism (FATM) is presented as a useful tool in deciding whether and to what extent the release and distribution of LIHEAP contingency funds is merited.

Based upon an examination of the level of regional home heating and cooling bills,⁹ as affected by fuel prices and weather,¹⁰ the FATM assesses the extent to which states might have experienced a need for the release of LIHEAP contingency funds on a “hold-harmless” basis. To the extent that the confluence of changes (colder or warmer) in regional prices and/or temperatures would dilute the ability of LIHEAP

⁸ States may, by design, carry-forward funding to a future year. 42 U.S.C. §8626(b)(2)(A) (2012). Any carry-forward is limited to 10% of the State's LIHEAP allocation. Id.

⁹ “Regions” for purpose of this paper are based on “Census divisions.” The United States is divided into four “Census Regions” and nine “Census divisions.” For a map of the Census Regions and Census Divisions by state, see, https://www.census.gov/geo/www/us_regdiv.pdf (last accessed September 26, 2012).

¹⁰ For purposes of this paper, “weather” is measured in terms of Heating Degree Days (HDDs) and Cooling Degree Days (CDDs).

to serve households on an average-bill basis,¹¹ in other words, LIHEAP contingency funds would be released and distributed on a pro rata basis so as to allow states to serve the same number of households as would be served under a base case.

The Purpose of the FATM

The purpose of the Fuel Assistance Tracking Mechanism (FATM) is to assess the impact of changes in heating and cooling prices, in combination with changes in weather, on the “bill payment coverage capacity” of federal LIHEAP dollars. For purposes of the FATM, the “bill payment coverage capacity” of LIHEAP is measured by the number of average annual heating and cooling bills¹² “covered” by a region’s LIHEAP allocation.¹³ The FATM coverage capacity is measured in “number of bills.”¹⁴ It is calculated by dividing a region’s annual basic LIHEAP allocation¹⁵ by the annual combined heating/cooling bills,¹⁶ set forth in dollars.

Methodology

¹¹ Frequently, but not always, the combination of price and weather changes would result in a dilution of the ability of LIHEAP to meet home energy needs.

However, the factors of price and weather might alternatively offset each other. In a year of extreme temperatures, prices could be somewhat lower. More likely, however, in a year of price spikes, temperatures might be colder-than-normal in the winter or warmer-than-normal in the summer.

¹² The FATM does not consider total residential bills, but simply heating and cooling bills.

¹³ The number of heating and cooling bills is determined on a state-by-state basis and then aggregated into a regional number.

¹⁴ If a region’s LIHEAP allocation was \$1,000, and the average annual heating/cooling bill were \$200, the bill payment coverage capacity would be five (5) bills ($\$1,000 / \$200/\text{bill} = 5$).

¹⁵ The “basic” LIHEAP allocation excludes any contingency funds as well as all supplemental appropriations.

¹⁶ The analysis excludes bills for domestic hot water usage as well as electric appliance consumption (including refrigerators and lights).

The purpose of FSC’s inquiry was to assess the extent to which, if at all, changes in monthly temperatures and fuel prices affect the ability of LIHEAP to serve the same number of customers as served by a base appropriation at “normal” temperatures in a Base Year. For purposes of this paper, Program Year 2008 (2007 – 2008) was used as the Base Year.¹⁷ The “Comparison Scenarios” used in this inquiry involve price and temperature data from the following program years: 2005/2006, 2006/2007, 2008/2009, 2009/2010 and 2010/2011.

After calculating the number of “average bills” which the allocation of LIHEAP¹⁸ would cover in each Census Division for the Base Year, each State’s bill was recalculated using actual fuel prices, HDDs and CDDs for the five Comparison Scenarios. The number of these adjusted bills that the base LIHEAP allocation would “cover” was then calculated to determine whether that base LIHEAP allocation would cover a greater or lesser number of bills under the Comparison Scenarios.

In those instances where LIHEAP would cover fewer bills, the amount of additional LIHEAP that would have been required to maintain the same number of bills covered (referred to as the “bill payment coverage capacity”) was determined. Reallocation of LIHEAP funding between Census Divisions did not occur.

Temperature and price data was obtained on a state-by-state basis. The number of bills calculated using that data were aggregated into Census Divisions and divided into the total LIHEAP allocation to all states in each Census Division.

The inquiry does not consider the number of actual applications for LIHEAP assistance. Instead, the inquiry examines only the average bills (in dollars) in each Comparison Scenario as driven by the temperatures and fuel prices that

¹⁷ The importance of the “Base Year” is that base fuel prices were set at Base Year levels.

¹⁸ LIHEAP per region was determined by summing the states within each Census Division.

existed in the Program Years comprising that Scenario. The fact that higher or lower prices, as well as warmer or colder temperatures, might affect the actual number of applications was not a relevant factor. The inquiry instead is to assess the *ability* of LIHEAP to cover average heating and cooling bills year given changes in bills reflecting fluctuations in fuel prices and temperatures.

Nor were actual annual LIHEAP appropriations examined in any given year. The point of the year-by-year analysis is not to assess the extent to which LIHEAP met some level of “need” in any given year. Rather, the point of the analysis is to consider the extent to which, if at all, changes in fuel prices and temperatures would affect the distribution of LIHEAP in a Base Year.

The Program Years reflected in the various Comparison Scenarios, in other words, are used only for the purpose of providing alternative temperature and fuel price scenarios grounded in real world, rather than hypothetical or assumed, data. The Comparison Scenarios are then applied to the Base Year appropriation to determine the impact on how many low-income “bills” could have been covered using the prices and temperatures reflected in those scenarios.¹⁹

The Bill Payment Coverage Capacity of LIHEAP

¹⁹ To illustrate, consider that the Base Year was set as Program Year 2008. This analysis calculated the bill payment coverage capacity of the 2008 LIHEAP appropriation using the prices and temperatures that existed in PY2008. The analysis then alternatively recalculates the bill payment coverage capacity of the 2008 LIHEAP appropriation by looking at what that capacity would have been had prices and temperatures instead been at PY2009 levels (Comparison Scenario 3). It alternatively examines what the 2008 LIHEAP bill payment coverage capacity would have been had the prices and temperatures instead been at PY2010 levels (Comparison Scenario 4). By looking at various Comparison Scenarios, it is possible to determine the sensitivity of the LIHEAP appropriations to changes in prices and/or temperatures.

The bill payment coverage capacity of LIHEAP for purposes of this analysis is calculated using Program Year 2008 as the “Base Year.” The Base Year is used to set fuel prices. Heating fuel prices are those prices that existed in the months of October through March of the Base Year. Cooling prices are the electricity prices for June through August of the Base Year. Heating and cooling bills were calculated using state-specific “normal” temperatures in each heating and cooling month as reported by the National Climate Prediction Center.

Given these billing inputs, the Base Year LIHEAP appropriation was sufficient to cover 5.8 million heating and cooling bills nationwide. The number of bills covered varied widely by Census Division, from a high of 1.084 million bills in the East North Central Census Division to a low of 325,000 bills in the East South Central Division. The South Atlantic (993,288), Pacific (908,846) and Mid-Atlantic (834,247) Divisions were the regions with the next largest LIHEAP bill payment coverage capacity.²⁰

The relative LIHEAP bill payment coverage capacity by region does not necessarily follow the absolute dollar amount of LIHEAP allocated to any given geographic region. For example:

- While the Mid-Atlantic Division had the highest LIHEAP allocation, because it also had somewhat higher heating and cooling bills, it had only the fourth highest bill payment coverage capacity.
- While the Pacific Division had only the sixth highest LIHEAP allocation, because it had somewhat lower heating and cooling bills, it had the third highest bill payment coverage capacity.

²⁰ The LIHEAP bill payment coverage capacity calculated is the ability of LIHEAP to cover the average combined heating and cooling bills. It may or may not reflect actual LIHEAP participation levels.

Bill Payment Coverage Capacity as Affected by Changes in Temperature and Prices

The combined influence of temperatures and prices might generate one of three alternative impacts on LIHEAP's bill payment coverage capacity:

- To the extent that more extreme temperatures correspond with increases in prices, the combined impact would be to compound the dilution of LIHEAP's capacity to serve households. Either more extreme temperatures²¹ or increases in prices standing alone would drive bills higher, thus making a constant appropriation unable to serve the same number of households. The two factors occurring coincidentally would compound the effects of each other.
- The converse is true as well. To the extent that less extreme temperatures²² correspond with decreases in prices, the compounded effect would be to drive bills down, thus allowing LIHEAP to increase its average bill payment coverage capacity.
- Finally, changes in prices and temperatures might well cancel the impact of each other out in whole or part. High winter heating fuel prices might correspond with warmer-than-normal winter temperatures, thus mitigating the bill escalation impact that would otherwise be expected to occur. Similarly, a hot summer coupled with lower-than-normal electricity prices might result in mitigated bill impacts, with the temperature-induced bill increases offset by the price-induced bill decreases.

²¹ The term "more extreme temperatures" refers to colder-than-normal winters or hotter-than-normal summers.

²² The term "less extreme temperatures" refers to warmer-than-normal winters or cooler-than-normal summers.

There appears to be a clear demarcation of geographic areas in the United States that have been subject to the vagaries of changes in fuel prices and temperatures on a seasonal basis. The nine Census Divisions demonstrated noticeably different sensitivity to changes in temperatures and fuel prices as measured by the FATM.

- The *East North Central Division* shows significant sensitivity for the compounded impacts of price and temperature. Overall, using prices and temperatures from five Comparison Scenarios, the East North Central Division experienced a bill payment coverage capacity shortfall in two of the five Comparison Scenarios (when compared to the Base Year of 2007/2008).
- The *West North Central Division* would not have experienced a bill payment coverage shortfall under any of the five Comparison Scenarios relative to the home energy needs in the Base Year.
- The *Mountain Census Division* would have experienced a LIHEAP bill payment coverage capacity shortfall under price and temperature scenarios actually experienced in two of the five Comparison Scenarios. Because of population differences, however, the magnitude of the financial shortfall, as well as the number of bills that the Base Year's fuel assistance appropriation could not cover under the Comparison Scenarios, was much smaller in absolute terms than in the East North Central Division.
- The *Pacific Census Division* would have experienced a bill payment coverage capacity shortfall only in Comparison Scenario 1 (PY2006) (relative to the 2008 Base Year). While the Pacific Division demonstrates a bill payment coverage capacity shortfall somewhat similar to the Mountain Division, the Pacific Division shortfall of 14,864 bills is on a base coverage of nearly 910,000 bills,

while the Mountain Division shortfall of 9,456 bills is on a base coverage of only 363,000 bills.

- The *New England Census Division* did not show substantial exposure to changes in prices and temperatures using the 2008 program year as the Base Year and a five year period preceding and succeeding that base period as the Comparison Scenarios. Holding the LIHEAP appropriation constant, and varying prices and temperatures as actually experienced in the five Comparison Scenarios, that appropriation would have covered no fewer bills using price and temperature data from any of the comparison Program Years.

New England's lack of any bill payment coverage capacity shortfall appears to be largely driven by a spike in fuel oil prices during the PY2008 Base Year. The New England data demonstrates how important it is to choose a representative Base Year.

- Changes in prices and temperatures in the *Mid-Atlantic Census Division* did not generate bill payment coverage capacity shortfalls. Using price and temperature data from the five Comparison Scenarios in the Mid-Atlantic Division would have resulted in the ability to cover a greater number of bills than in the Base Year (PY2008) in each instance.
- The *South Atlantic Census Division* showed the greatest sensitivity to changes in prices and temperatures of any of the nation's nine Census Divisions. Compared to the Base Year (PY2008), the South Atlantic Census Division would have experienced a bill payment coverage capacity shortfall under each of three Comparison Scenarios (PY2009, PY2010, PY2011). On a base bill payment coverage of 993,288 bills,

the South Atlantic Division would have experienced a shortfall of more than 117,000 bills using price and temperature data from PY2010, and of nearly 100,000 bills using price and temperature data from PY2011.

- The *East South Central Division* also demonstrated amongst the greatest sensitivity of any region in the country to changes in prices and temperatures. The East South Central Division joined the South Atlantic Division as the only two Divisions with a bill payment coverage capacity shortfall in three of the five Comparison Scenarios.
- The *West South Central Census Division* did not demonstrate the same sensitivity to price and temperatures as did the other two southern Census Divisions. The West South Central Division would have experienced a substantial shortfall given prices and temperatures only in the PY2010 Comparison Scenario.

Fuel-Specific Bill Changes and Over-all Bill Payment Capacity

The Fuel Assistance Tracking Mechanism provides insights into how changes in prices of individual heating fuels, as well as changes in the price of electricity for cooling, might affect the overall bill payment coverage capacity of LIHEAP in individual regions of the country. Not only does the FATM capture the interplay in changing prices and fluctuations in weather, it also captures the interaction between bill changes for different fuels.

New England had no Comparison Scenario where it exhibited a bill payment coverage capacity shortfall relative to the PY2008 Base Year. This largely resulted from the substantial decrease in fuel oil bills in the Comparison Scenarios. The PY2008 fuel oil bill was not matched again except under the PY2011 Com-

parison Scenario. In that year, however, the fuel oil price increases occurred at a time of lower natural gas prices, thus keeping total average heating bills close to, but nonetheless below, total average heating bills in the Base Year.

The Mid-Atlantic Division exhibited no Comparison Scenario with a bill payment coverage capacity shortfall. The Mid-Atlantic Division had electric bill increases for both heating and cooling. Nevertheless, when combined with heating bill declines for natural gas and fuel oil, overall bills in each Comparison Scenario were less than in the Base Year.

The South Atlantic Division experienced a moderate bill payment coverage capacity shortfall in Comparison Scenario 3 (PY2009) and substantial shortfalls in Comparison Scenarios 4 (PY2010) and 5 (PY2011). The South Atlantic results largely reflect significant increases in electricity bills, both heating and cooling. Moderate electric bill increases using price and temperature data for PY2009 were somewhat offset by decreases in natural gas and fuel oil bills. In PY2010 and PY2011, however, the electricity bill increases, particularly for cooling bills in each year, were so substantial as to swamp bill changes for other fuels.

In the West South Central Division, increased electricity and LPG heating bills in Comparison Scenario 4 (PY2010) were somewhat (but not completely) offset by reduced natural gas bills. In Comparison Scenario 5 (PY2011), the combined reduction in home heating bills was completely offset by an increase in cooling bills.

Indeed, Comparison Scenario 5 (PY2011) for the West South Central Division is the only Comparison Scenario in the nation in which the total annual combined heating and cooling bill increased even though *both* natural gas *and* electric heating bills decreased.

The presence of a LIHEAP bill payment coverage capacity shortfall in the East North Central Division is largely driven by natural gas and fuel oil bills. In the two Comparison Scenarios with

shortfalls (PY2006, PY2009), each experienced an increase in both natural gas and fuel oil bills. Indeed, the East North Central Division was the only region of the country to experience an increase (albeit slight) in bills for all four heating fuels in a single Comparison Scenario (PY2009).

Summary

The data and analysis presented above supports the reasonableness of establishing a LIHEAP contingency fund to be distributed amongst all or some states in response to circumstances that substantially affect the capacity of LIHEAP funds to fulfill the objective of addressing home energy affordability.²³ Changes in home heating and cooling prices, when coupled with changes in weather (as measured in Degree Days) can limit the capacity of LIHEAP to cover home heating/cooling bills by tens of thousands of households and tens of millions of dollars.

The data and analysis further supports the conclusion that the current structure of the LIHEAP contingency funding is appropriate to the extent that such funding:

- May be, but is not required to be, distributed in each program year. The capacity of LIHEAP to meet its bill payment coverage objectives can be influenced by both weather and fuel prices. On the one hand, these two factors can moderate and mitigate the impact of the other (e.g., with warmer-than-normal winter months moderating the impact of higher-than-normal heating fuel prices). On the other hand, these two factors can compound the impact of the other (e.g., with higher-than-normal summer temperatures com-

²³ The Fuel Assistance Tracking Mechanism does not consider the adequacy of LIHEAP overall. It merely tracks the impact of price and temperature on the ability of LIHEAP to cover bills relative to a base year.

pounding the effect of higher-than-normal electric prices).

- May be distributed on a region-specific basis. Under no Comparison Scenario studied in the FSC analysis was a uniform nationwide impact found (or were shortfalls in LIHEAP bill payment coverage capacity found in every Census Division) in any individual Comparison Scenario. Each significant impact on LIHEAP bill payment coverage capacity instead occurred on a Division-specific basis.

The data and analysis presented above supports the conclusion that the distribution of LIHEAP contingency funding should take into account both price and weather.²⁴ In some instances, where weather-related impacts are positive (i.e., a Degree-Day multiplier greater than 1.0), the fuel price impacts are negative (i.e., a price multiplier of less than 1.0), resulting in either a moderated bill increase or in a bill decrease. The converse can occur as well (a fuel price multiplier greater than 1.0 with a Degree-Day multiplier less than 1.0).

The interaction between prices and weather would seem to counsel that LIHEAP contingency funds be distributed on an after-the-fact basis (rather than on projections). It is not possible to know before-the-fact the extent to which, if at all, changes in fuel prices or weather will be mitigated or compounded by changes in the other variable.

The data and analysis presented above supports the conclusion that the distribution of LIHEAP contingency funds should not take into account changes in the bills for one fuel to the exclusion of changes in the bills for other fuels in the same

²⁴ Other factors mentioned in the LIHEAP statute as potentially meriting the distribution of LIHEAP “emergency” funds are set aside in this paper not because they are unimportant, but rather simply because they are beyond the purview of a Fuel Assistance Tracking Mechanism.

jurisdiction in the same time period. The overall capacity of LIHEAP to meet its bill payment coverage objectives does not revolve on the bill changes for one fuel. Increases in natural gas bills, for example, are often offset by decreases in the bills for other fuels (or vice versa). While on an individual household basis these offsetting bill impacts do not make a difference, on a programmatic basis they do.²⁵

The data and analysis presented above supports the conclusion that the distribution of LIHEAP contingency funds should be separately determined for heating and cooling months. Numerous examples were evident when home heating bills were substantially “down” in a region in a Comparison Scenario in which home cooling bills were substantially “up.” To the extent that LIHEAP contingency funds are “exhausted” (through a complete distribution) by directing those funds to states in response to home heating contingencies, inadequate responses are available for home cooling contingencies. In any given year, a reasonable proportion of LIHEAP contingency funds should be reserved for distribution, if necessary, based on home cooling needs.

The data and analysis presented above supports the conclusion that warm weather states, with primarily cooling needs, often face the greatest fluctuations in bills attributable to fuel prices and/or temperatures. Indeed, the largest and most frequent decreases in LIHEAP bill payment coverage capacity identified above occurred in the warm weather Census Divisions.

For more information regarding the FSC Fuel Assistance Tracking Mechanism, as well as for a copy of the complete report (“A Fuel Assistance Tracking Mechanism: Measuring the Impact of Changes in Weather and Prices on the Bill Payment Coverage Capacity of LIHEAP”), including all data tables, please write:

²⁵ While a decrease in natural gas prices does not help a fuel oil user pay his or her fuel oil bill, it does help a state LIHEAP office adjust benefits to reflect the respective needs within the jurisdiction.

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Fisher, Sheehan and Colton, Public Finance and General Economics (FSC) provides economic, financial and regulatory consulting. The areas in which *FSC* has worked include energy law and economics, fair housing, affordable housing development, local planning and zoning, energy efficiency planning, community economic development, poverty and telecommunications policy, regulatory economics, and public welfare policy.
