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INTRODUCTION

Residential building energy rating (BER) labels indicate a theoretical energy use based on standardised assumptions about occupancy and energy service demand and are a market signal about the energy performance of a property. BER labels explicitly state the energy demand required for heating, lighting and ventilation within a property, for example, a 'B2' BER rating is associated an annual primary energy demand of 100-125 kWh/m^2 year. Movements along the BER rating scale are associated with changes in energy demand and implicit changes in energy costs. This paper uses household energy expenditure data and quantifies the level of energy expenditure associated with properties by BER scale. As expected we find that families living in properties with better BER ratings spend less on energy, *ceteris paribus*, but proportionate cost savings are substantially less than the energy use savings implicit in the BER scale.

The paper examines the relationship between BER ratings and household energy expenditure. The extent of this relationship, i.e. the size of the elasticity parameter, is of relevance to households and policy makers. When evaluating new home choices, households can use the elasticity to compare future energy costs across properties. In the context of evaluating investments to improve the energy performance of existing properties (i.e. improving the BER rating) the elasticity is useful for evaluating the financial return. In the energy policy arena it illustrates how families in energy in-efficient homes spend relatively more on energy.

The analysis is based on data from the Central Statistics Office's (CSO) Household Budget Survey and Sustainable Energy Authority of Ireland's (SEAI) BER database. We examine expenditure data of over 5,800 households on gas, oil, electricity, and solid fuels finding that improvements in energy efficiency, as calculated by BER ratings, is associated with reductions in household energy expenditure. For expenditure on all fuels combined (e.g. gas, electricity, solid fuels, oil) the estimated BER elasticity is 0.016, indicating a 1.6% change in total fuel expenditure is associated with each move along the BER scale (e.g. C2 to C1). In the case of gas expenditures the estimated elasticity value is 3.1% and for

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electricity it is 2.1%. By contrast the proportionate change in energy use inherent in the BER scale exceeds 10% for a one point move along the BER scale. But the BER scale excludes energy for non-heating/lighting/ventilation purposes (e.g. cooking, laundry, entertainment) and therefore the comparison is not like-for-like.

While these elasticity estimates appear nominally small, in practice they can represent quite substantial savings. Discounting expenditure savings over a reasonable time period would for many households be sufficient to cover the capital cost of some of the more popular energy efficiency improvements such as roof insulation, heating controls, or high efficiency boilers.

Other notable results from the analysis show how fuel expenditure differs by household composition and type. Expenditure on fuels increases with the number of people in a family but not proportionately so. Heating can be shared but larger families require more hot water or heat more rooms. On average a couple spends 22% more on fuel compared to a single occupancy property. A couple with one child spend 28% more compared to a single person, which rises to 36% with two children and to 37% with three or more children. Families living in semi-detached or terrace houses on average spend 24% more on energy than families living in apartments, whereas families living in detached houses spend the most on energy, on average 42% more than apartment dwellers.

To summarise, the paper estimates on average how much actual household fuel expenditures vary across properties with different BER ratings and found that each point move along the BER scale is associated with a 1.6% change in energy expenditure controlling for other relevant factors.