



An examination of the abandonment of applications for energy efficiency retrofit grants in Ireland



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ARTICLE INFO

Keywords:

Energy efficiency
Abandonment
Energy retrofits

ABSTRACT

The Sustainable Energy Authority of Ireland (SEAI) operates the Better Energy Homes (BEH) grant scheme to incentivise residential energy efficiency retrofits, an ongoing scheme which was implemented in 2009. This scheme provides a financial incentive for home owners to engage in energy efficiency retrofits, provided the upgrades meet appropriate energy efficiency standards. This study analyses the BEH data, which is comprised of all applications from March 2009 to October 2015, in order to examine the extent to which applications are abandoned and the determinants thereof. We find that more complicated retrofits are more likely to be abandoned, with variation across certain combinations of retrofit measure. We find lower probabilities of abandonment among certain obligated parties, who are energy retailers obliged by the State to reduce energy consumption in Ireland, while others possess greater likelihoods of abandonment, relative to private retrofits. We find that newer homes are less likely to abandon an application than older homes, as are applications made for apartments, relative to houses. Regional variations exist in abandonment, with rural households more likely to abandon than urban households. A seasonal trend in abandonment is also present, with higher likelihoods of abandonment among applications made during winter.

1. Introduction

Under the European Union's Energy Efficiency Directives, Ireland is obliged to promote energy efficiency and achieve a targeted reduction in energy consumption of 20% by 2020 (European Parliament and the Council of the European Union, 2012). Improving the energy efficiency of the nation's building stock is one policy aim of the Irish government (DCENR, 2014). Nearly 40% of final energy consumption in the EU occurs in buildings, with two thirds of residential consumption used for space heating (European Commission, 2011), providing a significant opportunity for policy to improve residential energy efficiency. Many European governments offer financial incentives for residential retrofit measures. Examples include the UK's recently concluded green deal, providing up-front finance for retrofit measures, to be paid back through savings on energy bills, and France's *crédit d'impôt développement durable*, a tax credit available for heating and energy conservation works on the home. Grant aid is offered by the Sustainable Energy Authority of Ireland (SEAI) to homeowners who wish to undertake retrofit measures to improve the energy efficiency of their home. This scheme has been successful in aiding the completion of over 160,000 retrofit installations since the introduction of the

scheme in 2009, but achieving the national target of energy savings equivalent to a 20% reduction on historic energy demand is ambitious and ultimately will require either more homes to improve or for homes to engage in more comprehensive retrofits. With a view to engaging more homes in energy efficiency retrofits, of all households applying to the Better Energy Homes (BEH) scheme to date, 15% abandon their application. To help drive residential retrofitting activity, it is therefore important to gain a greater understanding of why some homes are disengaging from the BEH scheme subsequent to submitting their applications.

This research aims to gain an understanding of the characteristics of households who make a decision to engage in an energy efficiency retrofit but, after applying for grant aid, abandon their application. This abandonment could be either through cancellation or by allowing an application to expire and not making any subsequent applications. This research also explores the role of obligated parties in engaging households via the BEH scheme. Obligated parties are energy distributors and retailers who are obliged by the Irish government to achieve energy savings of 1.5% each year through energy efficient measures, and contribute to Energy Efficiency Directive targets (DCENR, 2014). This process is described in more detail in Section 2. Given the hetero-

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generality in household characteristics and behaviours, it is unclear which households are less likely to follow through with the installation of energy efficiency measures (EEMs). By gaining such an insight, it may be possible to identify households which may require greater support following application to the scheme, thus helping to achieve more energy efficiency savings.

There exist many benefits to engaging in retrofit measures in the home, most notably the reduction in energy costs, increased comfort, environmental benefits (Clinch and Healy, 2000; Gillingham et al., 2009), health benefits (Howden-Chapman et al., 2012) and in many cases, an increased sale value of the property (Hyland et al., 2013). Previous literature has explored the drivers of energy efficiency retrofit behaviour. These include socio-economic conditions and specific household characteristics (Cameron, 1985), the cost and profitability of the home retrofit investments (Amstalden et al., 2007; Sadler, 2003) and the availability of financial subsidies (Neuhoff et al., 2012). Specifically in the Irish context, it has been found that the decision to invest in an EEM is determined mainly by the cost of investment and gains in energy savings, followed by comfort gains. Moreover, environmental benefits were found to be of little concern (Aravena et al., 2016).

While a wider range of literature exists on the decision by households to engage in energy efficient retrofits, less exists with regard to those who are interested in retrofitting, but ultimately do not implement the desired measures. Many barriers to investing in energy efficient technology exist, both for households and organisations. Sorrell et al. (2000) discuss barriers to energy efficiency in public and private organisations, the findings of which may also be applied to households, dividing these barriers into three categories, being economic, behavioural and organisational barriers. Economic barriers include the neo-classical barriers to trade, such as imperfect information, access to capital and hidden costs. Organisational barriers include power-related and culture-related barriers. Power-related barriers, in the case of residential retrofits may be that those who would like to engage in retrofitting may not be the key household decision maker, or could be tenants in a rental property where the landlord or owner prevents investment. Culture also has a large effect. For example, if energy efficiency or environmental concerns are not seen as priorities, individuals will be less likely to invest. Behaviourally, bounded rationality and cognitive limitations may prevent a thorough understanding of the benefits of retrofit investments, leading to excessive discounting of future benefits. Inertia, lack of environmental awareness and lack of trust for a source of information may also inhibit energy efficiency investments.

In the residential literature, survey analysis has provided details of the most commonly cited barriers to retrofitting for home owners (Achtnicht and Madlener, 2014; Jakob et al., 2007). Jakob et al. (2007), as part of a survey of Swiss home owners, found the most commonly cited barrier to be home owners not seeing energy efficiency retrofits as necessary, followed by economic reasons and financial barriers. Other barriers included other renovations being of greater priority or technical difficulties in carrying out the works. Achtnicht and Madlener (2014) surveyed German households, finding absence of need, lack of financial resources and uncertainty with regard to whether the works will pay off to be the greatest barriers to energy efficiency retrofitting, in that order. Other barriers included lack of adequate credits, complex funding systems, apprehensiveness with regard to dirt and stress from engaging in works and lack of information. Analysis of the responses to this survey also found costs to be a significant factor in reducing the likelihood of investment, particularly for East Germans. Much research has also underlined the importance of the lack of information and incentives as barriers to investment in residential energy efficiency (Henryson et al., 2000; Clinch and Healy, 2000; Caird et al., 2008; Jaffe and Stavins, 1994; Mills and Schleich, 2012). In the context of this research, however, we see these barriers as having already been wholly or partially overcome as home owners have

become engaged with the BEH scheme. Subsequent factors therefore lead to abandonment.

A narrow range of abandonment literature exists, spanning various domains, although common methods of analysis are used. Phillips and Zhao (1993) examine the abandonment of assistive technology for people with disabilities, using a logistic regression to investigate the determinants of abandonment. Volden (2007) also uses a logistic regression model to analyse the likelihood that a state will abandon a policy action depending on inherent state characteristics and the success or failure of similar policies in neighbouring states. In terms of application abandonment, Lemley and Sampat (2008) descriptively analyse the abandonment of patent applications, looking at the proportion of applications which were abandoned in the US across various applicant characteristics. Looking specifically at abandonment of energy efficient retrofit applications, Aravena et al. (2016) analysed survey data collected from participants in the BEH scheme in 2009. This research found that the main barriers to retrofit implementation were a lack of own funds, other priorities and the perception that a retrofit investment would not provide value for money. It was also shown, using a probit regression model, that those who noted environmental benefits as a reason for pursuing a retrofit were slightly more likely to abandon. One key difference between this work and Aravena et al. (2016) is that we examine the actual behaviour of the population of BEH applications, as opposed to a stated preferences approach which examined a subset of BEH applicant households.

The remainder of the paper is organised as follows: Section 2 provides a description of the BEH data. Section 3 contains a discussion of modelling and estimation issues. This is followed by the presentation and discussion of the estimation results in Section 4, while Section 5 concludes.

2. Data and descriptive analysis

2.1. The better energy homes scheme

The Better Energy Homes (BEH) scheme, originally known as the Home Energy Savings scheme, was developed by the Sustainable Energy Authority of Ireland (SEAI) and began in March 2009. It is a grant aid scheme for households to engage in energy efficiency improvements, with grants available for various EEMs. Grants are available for roof/attic insulation, one of three types of wall insulation (cavity insulation, external wall insulation or internal dry-lining), three types of heating system upgrade (oil or gas boiler with heating controls upgrade or heating controls upgrade only) and solar collector (panel or tube) installation. This means that a household may adopt up to a maximum of four EEMs as only one type of wall insulation or heating system upgrade may be awarded grant aid. Upgrades must meet SEAI standards for grant applications to be successful. For the purposes of our analysis, we view both types of solid wall insulation (external insulation and internal dry-lining) and both types of boiler upgrade (oil or gas boiler) as one measure, referred to in future as solid wall insulation and boiler upgrades. The level of grant aid available has changed over time, with information on the dates of these amendments and the changes made detailed in Table 1. As part of the application process, certain information on the household is required, which provides a detailed dataset, including information on the EEMs adopted, certain characteristics of the household and the contracting arrangement in place for EEM adoption, as will be discussed in Section 2.2.

2.2. Data

SEAI provide an administrative dataset of all applications to the BEH scheme, including household specific identifiers. We use this dataset to identify all first-time applications from March 2009 to March 2015, inclusive. Additional data available to October 2015 were

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