

MONEY, COMFORT OR ENVIRONMENT? PRIORITIES AND DETERMINANTS OF ENERGY EFFICIENCY INVESTMENTS IN IRISH HOUSEHOLDS

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Overview

Energy efficiency is among the most sustainable methods of reducing household energy usage with investment in Energy Efficient Measures (EEMs) resulting in reduced energy bills and increased comfort for households, while also contributing to national environmental targets. This article examines the factors that determine investments in EEMs and the motivations of Irish households to participate in energy saving programs and adopt EEMs. We study the implementation of seven energy efficiency measures: i) external wall insulation; ii) internal wall insulation; iii) upgraded oil boilers; iv) upgraded gas boilers; v) improved heating controls; vi) cavity walls insulation and vii) attic insulation in residential houses throughout Ireland.

It is recognized that investments in EEMs are driven not only by economic factors, but also by non-economic motives and goals such as comfort and convenience. Barr et al., (2005) identify a number of factors which are important to energy savers such as: personal comfort; environmental and energy concerns; electricity price concerns; and energy-saving responsibility. In this context, the question that arises is to what extent economics, comfort or environmental aspects are considered by individuals when contemplating investment in EEMs. Does one factor dominate the others? Does the relationship between these three aspects remain constant across different stages of investment or different EEMs? These are some of the questions we address in this research. Previous research has shown that predicted energy saving is the main motivation for homeowners to invest in EEMs. However, little has been explored regarding the importance of other motivations that could drive the adoption of these measures at the household level.

In this paper, we study determinants and motivations at three different stages of the decision making process towards investment in EEMs, considering the actual (ex-antes) factors for application of grants and adoption and factors governing further (ex-post) investments. In addition, this study also aims to identify other determinants of implementation of EEMs such as financial factors, availability of information, socio-economic and property characteristics. We also study the role of experience with initial adoption as a determinant of further investments in EEMs, where factors such as satisfaction, experience, information, perceived non-economic and economic benefits obtained in first investments are evaluated.

We contribute to the energy efficiency literature by implementing a complete analysis of both attitudes and real investment behaviour during the whole investment process, from the application stage to the consideration of further investments. We also analyze the magnitude of the effects, the sign and whether they are constant across different type of measures.

Methodology

This study is based on a large national survey conducted by the Sustainable Energy Authority of Ireland (SEAI) on individuals who had participated in a national energy efficiency scheme. Around 26,000 individuals were invited to participate in a survey regarding the EEMs they implemented, their actions, experience and satisfaction with the scheme, contractors and other items.

Investments in EEMs are described by a three-stage process covering the complete decision making framework. The first stage corresponds to the household's decision to apply for a grant to implement the measure. The second stage corresponds to the decision of fully adopting the measure (ex-ante decision). The third stage corresponds to the decision to consider further investments after the implementation of one measure (ex-post decision). We use statistical methods to analyse the reasons motivating the grant application in Stage 1. The study considers several motivations and performs a standard test of comparison of means to determine whether the differences between these two groups are statistically significant. In Stage 2 we estimate econometrically the probability of adopting each measure separately by using a probit model. We use as covariates a set of economic variables, funding sources, property and household characteristics and informational and motivational variables. In a similar way, in Stage 3 we model the decision of individuals to adopt further measures, after completing the original one. Our aim is to explain whether these variables play a relevant role in the intention to perform further investments, their magnitudes and signs. We present the marginal effects of probit estimations to identify the magnitude of each covariate.

Results

The most commonly applied measures were Attic Insulation (70.4%) and Cavity Wall Insulation (61%), followed by upgrades in Gas (19%) and Oil (17.4%) boilers respectively. The least adopted measures were Heating Controls (7.55%), Internal Wall Insulation (7.5%) and External Wall Insulation (3.2%).

Results also show that in all stages of the decision-making process, money or economic factors, especially energy savings, are the main drivers motivating householders to apply for grants, adopt and consider further investments in EEMs. In the first stage of the decision making process both energy savings and the level of the grant were found to be the main factors motivating householders to apply for the grants. Results of the second stage (ex-ante decision) reinforce this outcome by showing that the private cost of the measure and the expected energy savings were significant determinants of the implementation. Similar results are found for the final stage of the decision-making process (further investments); households that experienced energy savings after retrofitting their houses are more likely to undertake further investments. Information was found to be a key variable explaining the success of EEMs adoption.

The second main driver of investments in EEMs was consistently found to be the comfort gains. Comfort gains are a significant determinant of adoption of EEMs especially in the case of cavity walls and attic insulation.

Finally, environmental awareness was shown to be a weak determinant of application and investments in EEMs in Irish households. Results of the ex-ante analysis show that households motivated by the environmental benefits were less likely to implement the measures.

A high level of satisfaction with contractors was found to be the main driver for considering further investments by households in all measures, increasing the probability of adoption by 11%. Households' *experience* with the overall adoption process is found to be positive and significant for only some measures.

Conclusions

The decision to ultimately apply and invest in EEMs is mainly driven by monetary or economic factors such as gains in energy savings and the private cost of the measure. Comfort gains are found to be a secondary factor but environmental benefits of EEMs are found to be of little concern when making investment decisions. Motivations play an important role in the decision-making process of applying and adopting EEMs in the residential sector. Surprisingly, technical factors such as the ease of installations or technological feasibility seems to be not considered when applying for grants. Background characteristics, except for the household composition, have no significant effects on investments in EEMs. In general, our results highlight the importance of focusing policies mainly on the economic benefits resulting from the implementation of EEMs in households. It is also important to inform householders about the potential comfort gains resulting from adoption of these measures. Information regarding both the benefits that households could achieve with the adoption of EEMs, the availability of grants and the application process plays an important role, especially when it is provided by the authority. This can be achieved through national information campaigns. It is also important to ensure that households implementing EEMs are satisfied with the contractors and have a positive experience with the overall process of application and implementation because it was found that these are key aspects to guarantee the adoption of further EEMs. We suggest focusing on providing information about the benefits of the EEMs on energy savings and comfort improvements together with monetary incentives such as subsidies in order to increase the adoption of EEMs by households in Ireland.

Regarding funding options, we found that savings are the most important source of funding for investments in EEMs, while the availability of loans does not determine adoption.

Finally, determinants of EEMs investments vary considerably across measures and therefore policies would be more effective if they are idiosyncratic and differentiated. However, this may be complex to implement and further research is needed to identify policy instruments that could be most efficient.

References

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