IDENTIFYING KEY DETERMINANTS OF ENERGY-EFFICIENT RENOVATIONS: EVIDENCE FROM SLOVENIAN HOMEOWNERS

Nevenka Hrovatin, Facutly of Economics, University of Ljubljana, Tel: +386 1 5892 557, E-mail: nevenka.hrovatin@ef.uni-lj.si
Jelena Zorić, Facutly of Economics, University of Ljubljana, Tel: +386 1 5892 785, E-mail: jelena.zoric@ef.uni-lj.si

Overview

In 2010, the EU adopted a new energy strategy Energy 2020 – a strategy for competitive, sustainable and secure energy, where the increase in the level of energy efficiency is listed among five priorities (EC, 2010). Also, preceding Directive 2006/32/EC on energy end-use efficiency and energy services requires EU member states to achieve a 9% saving in final energy consumption in the period from 2008 to 2016. Residential sector in Slovenia is regarded as one of the areas holding the greatest potential for energy savings, in particular in the area of energy use for space heating which represents more than half of the total energy consumed by households. However, the implementation of cost-effective energy-saving measures is typically hindered by various barriers such as a lack of investment funds and available information about the possibilities and benefits of efficient energy use. As building renovations are seen as one of the key factors in fostering the energy efficiency of the residential sector, one of the adopted instruments by National Energy Efficiency Action Plan 2008–2016 (NEEAP, 2008) aims at promoting and granting subsidies for energy-efficient renovation since most residential buildings in Slovenia do not have the appropriate insulation and are in urgent need of renovation.

In order to identify effective policy measures to induce investment in buildings' energy efficiency, it is important to have detailed information about the factors that influence the decision-making process of homeowners when planning a retrofit. Therefore, the objective of this paper is to identify which determinants have the most important influence on decisions for energy-saving renovations made by Slovenian homeowners with a special focus on the role of energy consultation.

Literature review reveals a growing interest in investigating factors that influence energy-efficient renovations, see for example, Banfi et al. (2008), Nair et al. (2010), Alberini et al. (2013), Gamtessa (2013), and Achtnicht and Madlener (2014). More specifically, some most recent studies address the free riding behaviour related to incentives for home renovation programs (Grösche et al., 2013; Alberini et al., 2014) and investigate the role of energy audits and energy performance certificates (Frondel and Vance, 2013; Palmer et al., 2013; Christensen et al., 2014; Murphy, 2014).

Methods

The empirical analysis of relevant determinants affecting the energy-efficient renovation decisions of single-family house owners is based on the random utility theory (Louviere et al., 2000) and is performed using revealed preferences. In order to gather the data, a survey on renovations undertaken by single-house owners in Slovenia was conducted in spring 2010. The collected data set consists of 1,022 homeowners of single-family houses built before 1991. In this way we obtained information on the renovation activity of homeowners in the last 15 years as well as dwelling characteristics and socio-economic characteristics of households. Since renovation decisions by homeowners in multi-dwelling buildings require a majority of the owners' votes and are therefore not autonomous, only decisions by single-house owners are investigated. In particular, we focus on renovations of the façade, roof, basement and windows, where a distinction is made between energy-efficient renovations (e.g., insulation) and maintenance or repairment activities. To model energy-efficient renovation decisions, discrete choice models are employed, namely the logit and count data (Poisson) models (Maddala, 1983; Greene, 2000). Several location and dwelling characteristics as well as the socio-economic characteristics of households are considered in order to explain decisions related to energy-saving measures adopted. Since the inclusion of energy consultation in the model may lead to endogeneity problem, we also estimate 2SLS model where suitable instruments are considered for energy consultation variable.

Results

The results show that 68% of homeowners decided to renovate building envelope during the last 15 years. The most frequent elements of building envelope being renovated are roof (47%) and windows (45%), followed by façade

(30%) and basement (11%). Energy-efficiency was highly pronounced in the case of window renovations (93% of all window renovations), quite high shares of energy-efficient renovations can also be observed for roof (68%) and façade (60%), while only minority of basement renovations (32%) took into account energy-efficiency aspect. Among those households that performed at least one renovation, energy-efficiency was completely disregarded by 16.8% of households. One, two and three elements of building envelope were renovated in energy-efficient way by 40.1%, 29.5% and 13.2% of households, respectively. On the other hand, energy-efficient renovation of all four elements was only done by 0.3% of homeowners that decided to renovate.

Preliminary results reveal that the likelihood to perform energy-efficient renovation is negatively affected by the age of homeowner and house loan, while homeowner's decision to seek energy consultation prior to renovation makes it more likely to undergo energy-efficient renovation. Similarly, the number of energy-efficient renovations decreases with the age of homeowner, while the household income, living area space and energy consultation increase the number of energy-efficient renovations.

Conclusions

Results of the econometric analysis indicate that introduction of financial incentives in combination with informing and educating the public may have important impact on future improvements in energy-efficiency of homes. This supports findings in Energy Efficiency in Europe (2013), where the lack of funding for energy efficiency is identified as an important challenge for Slovenia. Analysis therefore provides a better insight into relevant determinants affecting the renovation decisions and may prove valuable for policymaking in the area of promoting energy-efficient residential renovations.

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