



Do renters skimp on energy efficiency during economic recessions? Evidence from Northeast Scotland

Nan Liu ^{a, *}, Yuan Zhao ^b, Jiaqi Ge ^c

^a Center for Real Estate Research, University of Aberdeen Business School, Dunbar Street, Aberdeen AB24 3QY, United Kingdom

^b University of Aberdeen Business School, Dunbar Street, Aberdeen AB24 3QY, United Kingdom

^c The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, United Kingdom

ARTICLE INFO

Article history:

Received 17 November 2017

Received in revised form

6 August 2018

Accepted 11 September 2018

Available online 15 September 2018

Keywords:

Energy efficiency

Split-incentives

Private rented housing sector

Rent premium

Tenants willingness to pay

Economic recess

ABSTRACT

This paper investigates tenants' willingness to pay (WTP) for energy efficiency in the private rented housing sector. Using data from Aberdeen city and Shire in Scotland between the third quarter of 2013 and the second quarter of 2017, rent premiums of 2–11% associated with more energy efficient dwellings are found, and the magnitudes of these premiums are considerable compared to those of other physical attributes. Such premiums however, are significantly reduced during economic recession, suggesting that tenants' WTP for energy efficiency varies under different economic conditions. From a methodological perspective, the study uses a multilevel model, where the unobservable neighbourhood and age effects are approximated. Our results implicate that although tenants' WTP for more energy efficient is present, there still might be a need for public strategy to facilitate the improvement of energy performance in the private rented sector.

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1. Background

Targets were set by the Climate Change (Scotland) Act 2009 to reduce greenhouse gas emissions substantially.¹ As greenhouse gas emissions from the housing sector account for around a quarter of Scotland's total emissions [1], making homes more energy efficient has been a key focus of the government policy. While new housing constructions are subject to building standards, older buildings in the private sector have no regulatory requirement on their energy efficiency performance. Particularly, the private rented sector (PRS) is often perceived to be the least energy efficient among all tenures in many markets in Europe and North America [2–5], despite its rapid growth in size and importance [4].

One of the main hurdles to energy efficiency improvement in the PRS is the landlord-tenant split-incentive problem [4–9]: landlords have the incentive to supply accommodation at the lowest possible cost, but not necessarily the highest efficiency, as tenants tend to be responsible for energy associated costs. Tenants

have the incentive to make their accommodation more energy efficient, however the upfront cost of improvement may be too high and/or the payback period may be too long if renting is only intended for a short term [7]. It has been argued that landlords often are not able to recoup investments from tenants [10], and tenants' lack of willingness to pay (WTP) is usually a result of market failures due to information asymmetry and uncertainty [10–13].

It was generally assumed that tenants were unable to fully assess dwellings' energy efficiency levels due to information asymmetry, thus they were unlikely to offer a rent premium that would fully compensate the landlords' investment in energy improvement. In the last decade however, many European housing markets saw improved information transparency on dwellings' energy performance as a result of the requirement of Energy Performance Certificate (EPC).² Wood et al. [9] suggest that with well-informed tenants and sufficient awareness among them, landlords with more energy efficient buildings should capture a rent premium, which should offset any split-incentive effect. Another factor

* Corresponding author.

E-mail address: nan.liu@abdn.ac.uk (N. Liu).

¹ Targets are set to reduce Scotland's greenhouse gas emission by at least 42% by 2020 and 80% by 2050.

² In Scotland, since January 2009 all private landlords are required to provide EPC when lease to a new tenant under the Under the Energy Performance of Building (Scotland) Regulations 2008.

that influences households' WTP for energy efficiency is uncertainty. Hassett and Metcalf [14] find that households may apply a high discount rate to future energy savings if there is uncertainty over future conservation savings. Uncertainty could also be related to potential changes in energy prices; or/and it could be a result of the relatively short rental relationship [3].

Empirically, a number of studies [15–23] find significant rent premiums associated with energy efficiency, suggesting that there is a degree of WTP for energy efficient buildings in a number of commercial real estate markets. Gabe and Rehm [24] and Fuerst and McAllister [25] on the other hand, show no rent premiums in the commercial real estate sector. Empirical evidence on the PRS is scarce. Kholodilin et al. [3] find statistically significant WTP in the Berlin PRS, the magnitude of such WTP however is very small. Hyland et al. [26] also show that energy efficiency has a positive effect on rental prices of properties in the Irish housing markets. However, arguably the study has little control over dwelling quality and location specifics. Using a Discrete Choice Experiment, Carroll et al. [2] suggest that renters value energy efficiency. Particularly, the WTP for efficiency improvements is considerably higher at the lower end of the efficiency scale.

Notably, most of these studies use data with a relatively short time frame, and those that cover a longer time period do not consider the potential effects of market conditions, with the exception of Hyland et al. [26]; where the authors find stronger effect of energy rating in the rental market when market conditions are worse. The authors however do not provide further explanation to the findings, and it is unclear whether these differences in WTP are statistically significant. On the contrary, Wilkinson and Goodacre [5] argue that market conditions are unlikely to play an important role: if the demand for rented properties is high, landlords are likely to obtain high rental income regardless whether or not they spend on improvement. If the demand is low, landlords may lose out by charging higher rent related to the more energy efficient improvements. The split-incentive problem is therefore likely to be present regardless market conditions. These studies raise further questions regarding the split-incentive issue in the PRS, thus more evidence is needed to analyse tenants' WTP for energy efficient buildings in the private sector.

Studies in psychology, cognitive science and experimental economics have shown that when feeling stressed, distracted and under pressure or scarcity (financial, emotional, time, etc.), people make decisions differently [27,28]. For example, low-income households are more likely to take out short-term loans with prohibitively high interest rate to pay off immediate daily expenses [29]; people facing immediate deadlines tend to only think of the task at hand [30]; in economic recession, people from a low socioeconomic background tend to be more short-term minded and prefer to spend now than to invest in the future [31]. Overall, research has shown that scarcity impairs people's cognitive capacity to make calculated rational decisions, but frames their mind in the context where the source of stress or distraction is salient. Thus, they tend to focus on the pressing issues while ignoring others [32,33]. Studies also find that during recent economic recession, consumers bypass expensive eco-products such as hybrid cars³ or trade down to cheaper alternatives [34]; and economic issues replace environmental issue as more immediate concerns for consumers [35–38].

In the light of above, we argue that during stressful times, tenants are likely to focus on the immediate needs and ignore the potential payoffs in the future, thus their demand for energy

efficient buildings is likely to decrease relative to other more immediate requirements of housing, such as the necessary space needed.⁴ Instead of paying a premium for energy efficiency, they may save energy costs through other channels (such as heating one room rather than the whole property; or wearing more layers of clothing). In addition, the higher level of uncertainty during economic downturn would result a higher discount rate applied to the future energy savings. Renters also have the advantage to change their residences relatively easily, therefore can respond more quickly to changes in economic and employment conditions.

Based on this, this paper first examines whether a rent premium for energy efficient dwelling is present. We then test the hypothesis that renters' WTP for energy efficient dwellings reduces during economic recession. The paper also highlights whether the WTP for other housing attributes differs during economic downturns to demonstrate the potential differences between energy efficiency and other housing attributes. Transaction data in the PRS of Aberdeen city and Shire in Scotland is applied to test the hypotheses. The region provides an appropriate case study area, as its housing market performance fluctuated dramatically in the last five years as a result of the peak of oil price in 2013 and the subsequent fall in 2014.

2. Case study area

Located in the northeast of Scotland, Aberdeen city and Shire are the home to more than 400,000 residents. Due to its proximity to the North Sea oil fields, the region is also a hub for many large oil and gas companies and their supporting services, thus earns its name as the "Europe's oil capital". The local economy is heavily reliant on the oil and gas sector: it accounts for more than 20% of the employment and more than half of the total turnover [39]. As a result of the recent turmoil in oil prices, Aberdeen has suffered substantial job losses from the energy sector [40]. For those fortunate enough to keep their jobs, the level of pay and benefit is no comparison to the pre-crises level [41]. The downturn in the gas and oil sector has inevitably affected other sectors in the region, especially the private housing market. Mortgage arrears doubled the national level in 2016 [40], and as illustrated in Fig. 1, both rental and price level saw a significant decline from 2014Q3, a few months lagging behind the start of the oil price slump. Notably, the CPI index of electricity, gas and misc only shows a slight decrease since 2014Q3, suggesting that there has been little change in energy price for consumers. Thus any change in tenants' WTP for energy efficient buildings is unlikely to be a direct result of the small changes in energy price.

3. Data

Transaction data of private residential property leases from the Aberdeen Solicitors Property Centre (ASPC) was obtained on the basis of a non-disclosure agreement between the University of Aberdeen and the ASPC. The datasets record properties marketed as "to let" in the housing market area defined by the local authorities in Aberdeen and Aberdeenshire (see Fig. 2) from 1985Q3 to date (2017Q3).

Due to the availability of EPC ratings (details see Section 3.2), lease data includes 13,197 properties advertised through the centre between the second quarter of 2013 and the third quarter of 2017. The dataset includes information on the listing date and leased date of each property and achieved rent. Physical attributes such as

³ Hybrid cars draw a close parallel to more energy efficient properties: they seem to cost a premium, but will save users on fuel/energy bill in the long run.

⁴ For example, the need for (minimum) space needs to be addressed regardless if the household is in stressful condition.

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