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Energy efficiency investments in the context of split incentives among French households

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HIGHLIGHTS

- I provide empirical evidence of underinvestment due to split incentives.
- I investigate the influence of tax credit and energy burden on EE expenditures.
- Results show that tax credits are ineffective in a context of split incentives.
- Mandatory measures such as minimum standards seem to be appropriate.
- Financial support from a third party financer can be also a solution.

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ABSTRACT

The residential sector offers considerable potential for reducing energy use and greenhouse gas (GHG) emissions, particularly through energy-efficient renovations. The objective of this study is twofold. First, I aim to provide initial empirical evidence of the extent to which split incentives between landlords and tenants may lead to underinvestment. Second, I investigate the influence of tax credits and energy burdens on energy efficiency expenditures. Given the complexity of studying the decision to invest in energy-saving renovations, I use a bivariate Tobit model to compare decisions about energy-efficient works and repair works, even when the renovation expenditures seem quite similar. The analysis shows that tenants are doubly penalized: they have high energy expenditures due to energy-inefficient building characteristics, and because they are poorer than homeowners, they are unable to invest in energy-saving systems. The results also confirm that tax credits are ineffective in the split incentives context. In terms of public policy, the government should focus on low-income tenants, and mandatory measures such as minimum standards seem appropriate. Financial support from a third-party financer also might be a solution.

1. Introduction

The residential sector offers considerable potential for reducing energy use and greenhouse gas (GHG) emissions, particularly through energy-efficient renovations. Research has often claimed that differing incentives between tenants and landlords of residential housing units lead to inefficient uses of energy (Blumstein, 1980; Brown, 2001; Fisher and Rothkopf, 1989; Jaffe and Stavins, 1994a, 1994b; Sutherland, 1991). Split incentives[1] are an important barrier to reducing energy consumption in the residential sector (International Energy Agency, 2007). In 2012, residential buildings made up just over 26.65%[2] of final energy consumption in the European Union (29%[3] in France). Considering that 70.3%[4] of all occupied housing units are rental units (36.3% in France), the amount of energy consumption affected by these misaligned incentives might be substantial. However, empirical evidence of the extent of the split incentive issue remains rather limited.

Elucidating the split incentives problem has been a challenge for economists. Several studies address the magnitude of the problem and energy efficiency issues more broadly (Hassett and

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[1] Split incentives arise when participants in an economic exchange do not share the same goal. When the owner and the occupier of a housing unit are different people, a split in incentives occurs. Whereas landlords want to minimize the purchase cost of energy systems (heating and hot water) and have no return on this investment, tenants want to minimize their energy bill. Therefore, neither party wants to invest in energy-efficient systems. Landlords are not inclined to make investments in energy efficiency because tenants are the ones receiving the dividends.

[2] Bertoldi et al. (2012).

[3] Ministère de l'Ecologie du Développement Durable et de l'Energie (2012).

[4] Eurostat (2012).

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Metcalf, 1995; Murtishaw and Sathaye, 2006; van Soest and Bulte, 2001). In general, researchers agree that tenants are reluctant to invest (Arnott et al., 1983; Davis, 2010; Levinson and Niemann, 2004; Rehdanz, 2007). However, empirical literature on the role of split incentives in the decision to invest in energy efficiency is sparse. Davis (2010) compares energy-saving system patterns between owner-occupiers and tenants using household-level data. Controlling for household characteristics such as income, tenants are significantly less likely to use energy-saving systems. A landlord, free of a dwelling's energy bill charges, is less likely to invest in energy-saving systems. Gillingham et al. (2012) find evidence of split incentives when the occupant does not pay for heating or cooling; households paying for heating are 16% more likely to change their heating system. Gillingham et al. (2012) also show that owner-occupied dwellings are 20% more likely to have insulated attics or ceilings and 13% more likely to have insulated exterior walls. However, these findings are not directly applicable to France, where all tenants have to pay their energy bills, yet 92% of energy-saving renovations are done in owner-occupied housing units (Sofres-ADEME, 2009). In their analysis, Gillingham et al. neither consider energy burdens (or energy-to-income ratios) as a possible determinant of underinvestment nor measure the impact of public policy on energy efficiency expenditures according to occupancy status.

This study aims to offer some of the first empirical evidence of the extent to which split incentives between landlords and tenants may lead to underinvestment. The emphasis is on analyzing the influence of tax credits on energy efficiency expenditures. I also provide evidence that underinvestment could be related to income (or fuel-poverty[5]) issues and occupancy status, by investigating whether low-income households with high energy expenditures (i.e., fuel-poor households) invest in energy efficiency systems. Shedding light on these determinants can contribute to the improvement of public policies.

Many research fields have addressed occupancy status and housing tenure. Occupancy status is a factor in many household decisions. For example, some authors investigate the effects of housing occupancy on employment and unemployment durations (Battu et al., 2008). Others show that the tenure choice and mobility decisions are correlated (Ioannides, 1987). Home ownership is viewed as one of the crowning achievements in a person's life cycle. Moreover, home ownership and the capital gains it generates are the primary means of wealth creation for households.[6] Many governments encourage and try to facilitate home ownership through public policies. Occupancy status can also provide insights into a household's investment decisions. Tenants and landlords have specific determinants (e.g., income, age, capital access) that explain why their investment decisions may be different. Thus, in terms of energy efficiency, it seems pertinent to explore the link between occupancy status and energy efficiency investments. Incentives for agents differ depending on whether the housing unit is occupied by a tenant or a homeowner. Consequently, the split incentive issue is particularly relevant to the issue of energy efficiency.

According to the 2006 Enquête Logement database, 62% of homeowners reporting cold problems in their housing units replaced their equipment, whereas only 32% of tenants experiencing such problems did so. On average, 75% of households that decided to make energy-savings investments were homeowners. Renters are often poorer than homeowners, so the former therefore devote a larger share of their income to energy expenditures, which constitutes the so-called energy burden. According to Boardman (2010), a "household is in fuel poverty if it needs to spend more than 10% of its income on fuel to maintain a satisfactory heating regime and all other energy services." This definition also applies to the energy-to-income ratio (De Quero and Lapostolet, 2009) and provides the indicator used by the European Union to measure energy burdens. Moreover, it is often said that low-income households are obliged to "choose" low-cost housing units with many energy efficiency problems (e.g., bad insulation, dampness, poor heating systems). These households live in the least energy-efficient dwellings and emit more GHG emissions. Such poor quality housing affects social health, incurs cumulative costs, and accelerates housing degradation because of the lack of renovations. Unfortunately, economists have not studied the split incentive issue from an energy burden viewpoint. In addition, the hypothesis that tenants produce more GHG emissions than landlords has yet to be confirmed. To verify these hypotheses, I sought to obtain information about GHG emissions and energy consumption. Data on energy consumption (in kW h/m^2/year), energy savings (in euros), and GHG emissions savings (in kg.CO_2) were obtained through the PROMODUL software. Thus, PROMODUL served as a tool to provide the data used to feed the model. This approach is one of the original features of this study and constitutes a value added to the literature. The recent rise in energy prices and further expected rises will make it increasingly difficult for tenants to pay their bills (Baxter, 1998).

Between 2005 and 2008, 4.2 million principal residences in France received tax credits, equivalent to a total public cost of €7.8 billion. The corresponding cost between 2009 and 2010 was €4.2 billion. Considering the €10 billion devoted to the French Energy Transition bill (June 18, 2014) and the maintaining of tax credits, evaluating the effect of the tax credit scheme on energyefficiency investment decisions in the residential sector should be a topmost priority. Not only have few studies examined the effect of tax credits, but the results that exist diverge (Hasset and Metcalf, 1995; Mauroux, 2012; Nauleau, 2014; Pon and Alberini, 2012). Moreover, previous analyses have mainly focused on homeowners and have not considered the split incentive context. Thus, the second objective of my investigation is to determine the effectiveness of tax credits, especially in the context of split incentives.

This article presents an empirical analysis of expenditures on different types of energy-saving investments (energy efficiency and repair works) according to occupancy status. I found the

[5] In this article, I assess fuel poverty by measuring the energy burden. The energy burden can be broadly defined as the burden put on a household's welfare due to the cost of energy expenditures. It is commonly measured as the ratio of energy expenditures to household income (Hills, 2011, 2012; Palmer, 2008). A household bears an energy burden when this energy–income ratio is greater than 10%; that is, the household devotes more than 10% of its income to energy expenditures.

[6] Five factors explain how home ownership is a means of wealth creation (see Herbert et al. (2012)). First, the widespread use of amortizing mortgages to finance the acquisition of the dwelling results in forced savings because a portion of the financing cost each month goes toward principal reduction. Second, dwellings are generally assumed to experience some degree of real appreciation over time, reflecting increased overall demand for housing due to growth in both population and incomes against a backdrop of a fixed supply of land located near centers of economic activity. Third, a homebuyer with a modest down payment gets the benefit of increases in the overall asset value despite his or her small equity stake. Although a situation of negative leverage can result if the increase in home values is lower than the cost of financing (so that the financing costs exceed the increase in the asset value), this risk diminishes over time as the value of the home compounds while the debt payment is fixed. However, the latter two arguments are no longer valid in view of the current financial crisis. Fourth, income tax benefits from ownership can also be substantial. The ability to deduct mortgage interest and property taxes is the most apparent of these benefits. Fifth, ownership provides a hedge against inflation in rents over time (Todd and Souleles, 2005). However, all these arguments are suspended on the time perspective. Indeed, a very long time horizon is required to produce beneficial effects of home ownership as a means of wealth creation.