Les déterminants des investissements économiseurs d'énergie dans le secteur résidentiel en France

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The Determinants of Energy-saving Investments in the Residential Sector in France

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Abstract

In France, studies on energy-saving investments for residential buildings are still relatively rare even if this sector exhibits a high potential for energy-savings. In my PhD dissertation, the aim is to isolate the determinants of energy efficient investments in the residential sector in France in order to provide some policy recommendations. We also want to study the effect of current and potential public policies designed to trigger retrofit investments. The dissertation consists of four body essays.

In the first essay, our main objective is to analyze household's expenditures in renovation works by distinguishing energy efficiency works and reparation works. In this case, we use an econometric approach based on the 2006 Enquête Logement, a disaggregate household level survey data set by INSEE. Renovation expenditures are examined by taking into account two important characteristics: expenditures are censored to zero and may be interdependent across expenditure types. Censoring and interdependence are analyzed through a multivariate tobit model. We obtain as a main result that the expenditures in owner-occupied housing are significantly higher than in rented occupied ones.

In the second essay, we wish to understand the home renovation decision of households in a theoretical model in which there exist split incentives. We also want to test the impact of existing and potential public policies. We consider a homeowner who makes an irreversible energy-saving investment. In particular, we explicitly take into account that such a decision takes place in an uncertain environment, in which there exist arbitrages between consumption and investment in home renovation. We obtain that tenants are not willing to invest. The problem of split incentives seems to be confirmed. Results also show that expecting high energy cost triggers investment even without policy support. Note however that in such a context, public policies lead to a rebound in demand.

In the third essay, we want to study the decision to invest in energy efficiency in a more general case, by taking into account irreversibility and uncertainties on energy prices and on income return. We consider a homeowner who makes an irreversible energy-saving investment in an uncertain environment. He has the choice between saving or consuming energy goods and non-energy goods. Resolution is analytical in a zero discounting case and numerical for the general case, based on collocation and Chebyshev polynomials. As a main result, we show that the usual explanation of the energy paradox based on the existence of an option value in partial equilibrium is no longer valid when the analysis is extended to a general equilibrium framework.

The fourth essay assesses in an empirical approach the effect of public policy on the decision to invest. We construct a simulation model and we evaluate the impact of environmental public policy measures. We model energy consumption and GHG emissions, the decision to invest in energy-saving renovations and the dynamics of the housing stock. Particular attention is paid to household investment decisions regarding home renovation. The results show that while current policies are effective, they are not sufficient to reach the objectives.

List of Abbreviations

ADEME	Agence de l'Environnement et de la Maitrise de l'Energie
ANAH	Agence Nationale de l'Habitat
APE	Agir Pour l'Environnement
DGEMP	Direction Générale de l'Energie et des Matières Premières
EE	Energy Efficiency
EEW	Energy Efficient works
ERW	Equipement replacement works
EU	European Union
GHG	Greenhouse gas
HDD	Heating Degree Days
kWh	Kilowatt hour
kg.CO_2	Kilograms carbon dioxide (CO2)
IEA	International Energy Agency
INSEE	Institut National de la Statistique et des Etudes Economiques
IIW	Insulation Improvement works
MEESDS	Ministry of Ecology, Energy, Sustainable Development and the Sea
MV	Mechanical ventilation
NPV	Net Present Value
OPAH	Opération programmée d'amélioration de l'habitat
OPEN	Observatoire Permanent de l'amélioration Energétique du logement
PALULOS	Prime à l'amélioration des logements à usage locatif
NPEEE	National Program on Energy Efficiency Enhancement
PREBAT	Programme régional de Recherche et d'Expérimentation sur l'Energie dans le Bâtiment
RW	Repair Works