Energy efficiency investment drivers depend on the technology: implications for policy design and modelling choice

ECEEE Summer Study 2017

Panel 9: Consumption and Behaviour-

Thursday 1 June 2017

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Paper 9-200-17

Outline

- Research questions
- Data
- Method
- Results
- Discussion

Research questions

- How the investment drivers in retrofitting vary with the type of retrofit :
  - single-measure vs multiple-measures retrofit
  - insulation vs heating system
  - “conventional” vs “innovative” systems.

- In case of driver heterogeneity, what are the implications in terms of :
  - public policy design
  - modelling works

Data

« Energy Management » Survey

- French annual household survey
- Produced by Ademe over 1986-2013 (focus on 2007-2012)
- Large set of information dedicated to :
  - residential energy consumption (equipment, behavior),
  - investments in energy retrofits

1st questionnaire:

Around 10000 households / households and housing information

2nd questionnaire:

Detailing energy renovations for the +/- 10% of households declaring works carried out over the past year:

- technical characteristics
- costs, economics incentives and other public policy
- **drivers**
- Ex-post satisfaction/behavior, etc.

Data

Main questions on « drivers »:

- **What was the main reason why you invested in retrofitting?"**

-> One answer among : the reduction of the energy bill, comfort improvement, thermal insulation, acoustic insulation, ventilation, the replacement of deteriorated (broken) equipment/material, the green value, other.

- **"In addition to this first motivation, what were the two main supplementary incentives among the second list below?"**

-> Two answers among : access to ownership, recent move-in, other non-energy renovations, income tax credit, reduced VAT, subsidy, zero rate loan, classical loan, another financial support (family, inheritance), energy performance diagnosis, advertisement, institutional information (Energy Info Office), personal advices, external decision (co-ownership).

Method - objectives

Modelling households investment choice between all the following retrofitting types:

- Glazed surface insulation (windows)
- Opaque surface insulation (wall, roof, floor)
- « Conventionnal » system (boiler, radiator)
- « Innovative » system (heat-pumps or renewable energy such as solar water heater, wood heating system)
- Multiple-measures retrofit

Estimate a **discrete choice model** (multinomial logit)

-> to assess, other things being equal, the impact of a given exogenous variable on the probability of chosing a specific retrofitting type.

Method - choice driver variables

Housing characteristics
Building type
Building completion date
Heating degree days
Category of city.

Household characteristics
Annual income of the dwelling
Family size
Age of household's head
Socio-professional category

Observed characteristics

Future economic benefits
Savings on the Energy Bill
Green Value

Future non-economic benefits
Comfort

Economic incentives decreasing up-front costs
Tax Credit
Reduced Value Added Tax (VAT)
Other financial support

Information provision
Public (Energy Info Office, Energy Performance Diagnosis)
Private (Advertisement)
Informal (Advices)

Contextual factors
Recent ownership
Recent move-in
Wear and tear
Non-energy renovation
Co-ownership decision

General preferences
Energy savings
Unemployement
Climate change

Subjective answers

Results

	Gazed surf. Insul.	Opaque surf. Insul.	"Conv." syst.	"Innov." syst.	Multiple measures
Building characteristics					
Collective flats compared to individual house	++	--	++	-	--
Relatively recent building	--		+	+	--
Relatively high Heating Degree Days (HDD)		+			-
Relatively small city category				+	
Households characteristics					
Relatively high income household		-		+	
Relatively large family size	-		-	+	+
Socio-professional category:					
Inactive compared to Entrepreneur	+	+			--
Employees compared to Entrepreneur		+		+	--

Results

	Gazed surf. Insul.	Opaque surf. Insul.	"Conv." syst.	"Innov." syst.	Multiple measures
Future economic benefits :					
Savings on the energy bill	--			+	+
Green value		+	--		+
Future non economic benefits : Comfort	+	-	-		+
Economic incentives decreasing up-front costs					
Tax credit, reduced VAT	++	--	-	+	+
Other financial support (e.g. loan, inheritance)		--			++
Information provision					
Public sector (EPD and EIE)	--	+		+	++
Private sector (Advertisement)	+				-
Interpersonal (Advice)	-		+		
Contextual factors					
Recent ownership or move-in	-	-	-	-	++
Wear and tear		--	++		+
Other non-energy renovation	--	++			+
Co-ownership decision	--	++			++

Discussion

Highlight 1 : An heterogeneous influence of « wear and tear » (product lifetime)

- Insulation vs systems
- Conventionnal systems vs innovative systems

Policy implications :

Policy impact on the investment: extensive / intensive margin?

How to improve the policy response?

Modelling implications:

Product lifetime : main driver for investment dynamics?

Highlight 2 : Focus on specific drivers for multiple-measures retrofits.

Policy implications :

Pay more attention to :

- financial support able to solve liquidity constraints,
- the promotion of a perceived and effective green value on the housing market,
- the implementation of a widely available public information provision.

Modelling implications:

Important driver : occupancy switch and property transfer.

Thank you for your attention

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