



DETERMINANTS OF HOUSEHOLDS' INVESTMENT IN ENERGY EFFICIENCY AND RENEWABLES

EVIDENCE FROM THE OECD SURVEY

Nadia Ameli and Nicola Brandt



Outline

- Data
- Methodology
- Results
- Policy conclusions





Motivation

“The Efficiency Gap” and households’
technology adoption

- Credit constraints
- Principal-agent problems (owner effect)
- Information problems
- Bounded rationality





The HH survey data

- Survey on Household Environmental Behaviour and Attitudes (2011) from the Environment Directorate
- 12'000 households
- Australia, Canada, Chile, France, Israel, Japan, Korea, Netherlands, Spain, Sweden, Switzerland





The HH survey data: Technologies

- Energy-efficient appliances (62%)
- Light bulbs (82%)
- Heat pumps (4%)
- Solar panels (11%)
- Thermal insulation (34%)
- Heat thermostat (33%)
- Energy-efficient windows (38%)





The HH survey data: variables

- **Socioeconomic** (age, education, income, HH size, no cope, gender)
- **Dwellings** (house, tenure, owner, rural)
- **Attitudes, beliefs and behaviour** (green growthers/altruist/sceptics, NGO, cost bias)
- **Household's knowledge about energy use, spending and exposure to price** (metered, energy bill known, kWh known, energy behaviour index)





Econometric Model: Logit

- The probability of household's investing in good i is modelled as:

$$P(y_i = 1|x_i) = \frac{\exp(\beta X_i)}{1+\exp(\beta X_i)} = \Lambda(\beta X_i)$$

where Λ denotes the logistic cumulative distribution function

- Bayesian Model Averaging method





Some results: owner effect

Technologies	Explanatory variable: Owner	
	Marginal effects	Obser.
Energy-efficient appliances	0.0785*** (0.0122)	8 605
Heat thermostats	0.0714*** (0.0134)	7 334
Thermal insulation	0.141*** (0.0136)	6 807
Light bulbs	0.0186*** (0.00789)	10 951
Heat pumps	0.00884*** (0.00302)	7 645
Energy-efficient windows	0.131*** (0.0143)	7 269





Some results: capital constraints the influence of income on the ability to invest

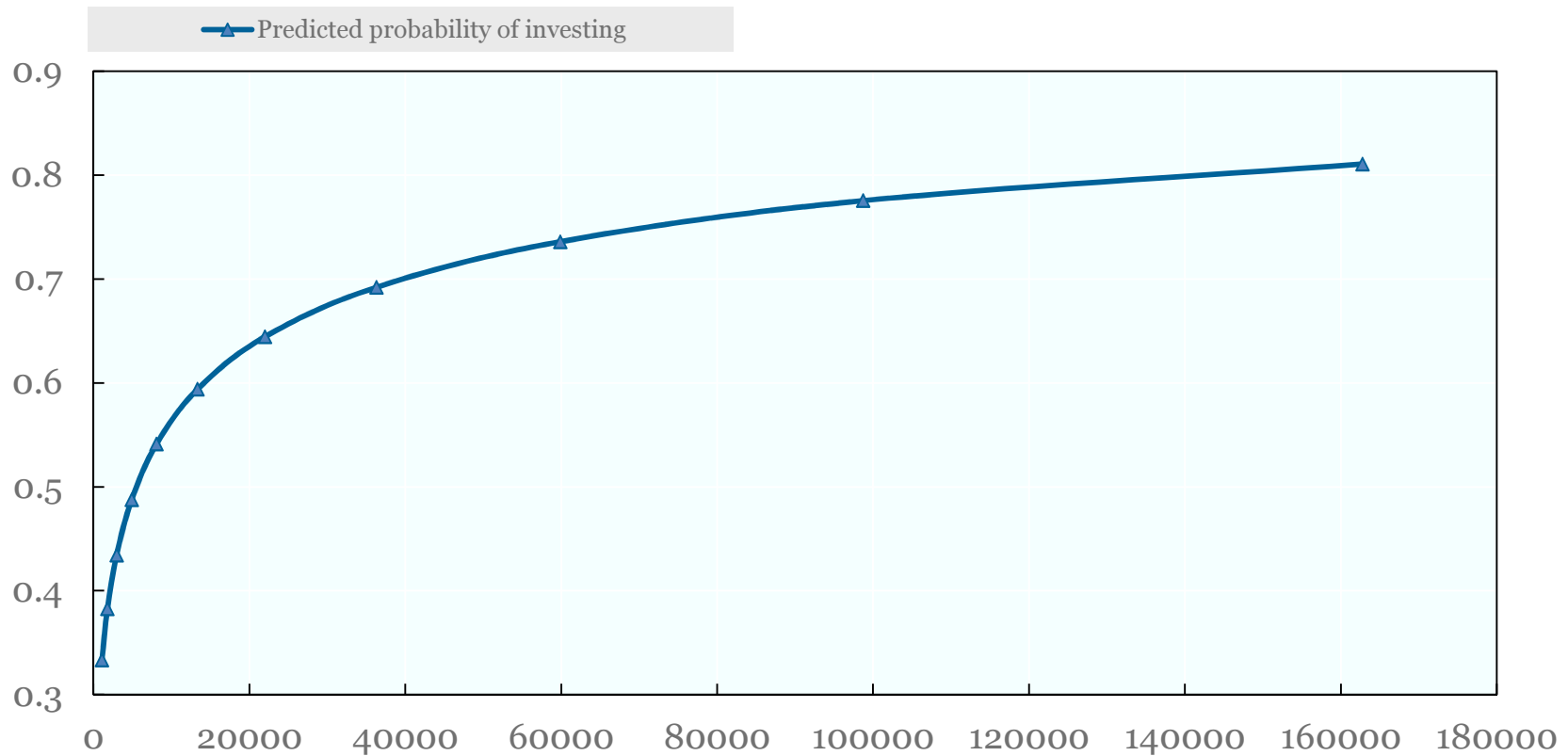
Technologies	Explanatory variable: Income	
	Marginal effects	Obser.
Energy-efficient appliances	0.0833*** (0.00978)	8 605
Thermal insulation	0.0508*** (0.0107)	6 807
Heat thermostats	0.00306*** (0.00053)	7 334
Energy-efficient windows	0.0474*** (0.0115)	7 269





Some results: capital constraints

Predicted probability of investing in energy-efficient appliances depending on changes in income





Some results: attitudes, beliefs and behaviour

Technologies	Explanatory variable: NGO	
	Marginal effects	Obser.
Energy-efficient appliances	0.0797*** (0.0112)	8 605
Light bulbs	0.0511*** (0.00696)	10 951
Thermal insulation	0.0638*** (0.0123)	6 807
*Solar panels	0.0536*** (0.0121)	6 485
*Heat pumps	0.0209*** (0.00659)	7 645
Heat thermostats	0.0535*** (0.0115)	7 334
Energy-efficient windows	0.0546*** (0.0126)	7 269

*Variable: environmental NGO





Some results: Attitudes, beliefs and behaviours

Technologies	Explanatory variable: Energy behaviour index	
	Marginal effects	Obser.
Energy-efficient appliances	0.0322*** (0.00319)	8 605
Light bulbs	0.0196*** (0.00186)	10 951
Heat thermostats	0.0182*** (0.00332)	7 334
Solar panels	0.00634*** (0.00167)	6 485
Thermal insulation	0.0309*** (0.00358)	6 807
Energy-efficient windows	0.0232*** (0.00364)	7 269





Some conclusions

- Evidence for credit constraints
- Evidence for the owner effect
- Attitudes and beliefs are important





Targeted policies are required

Capital constraints

- Financing/Loan (PACE, Green Deal, KfW)
- Direct subsidies, tax credit, rebates





Policy recommendations

Principal-agent problem

- Energy labels/product standards
- Explicitly allowing owners to increase the rent after implementing EE and RE





Policy recommendations

Promoting energy conservation actions and pro-environmental behaviour

- Information programs (peer comparison feedback)
- “Nudge” (loft clearance scheme, UK)

