



BASQUE CENTRE
FOR CLIMATE CHANGE
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Evaluating the role of energy efficiency labels: the case of Dish Washers

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1. Energy labelling: some background
2. Research idea
3. Case Study: RENOVE subsidy scheme in the BC
4. Methodology and results
5. Concluding remarks

1. Energy Labelling: some background

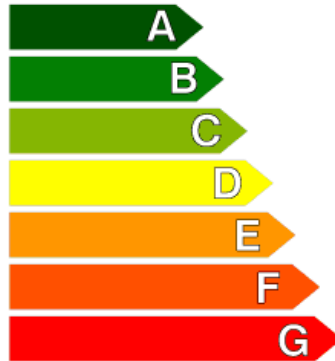
- Energy labelling is acquiring a major importance in the light of the EU Climate and Energy package that sets the target of reducing energy consumption by 20% by 2020.
- The goal of a 27% energy saving in the residential sector (European Council 2006).
- Directive 92/75/ECC regulated information on energy and other resources consumption in household appliances.
- Since 2008 a “Proposal for a Directive of the European Parliament and of the Council on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products SEC (2008) 2862” has been under review.

Energy

Washing
machine

Manufacturer
Model

More efficient



B

Less efficient

Energy consumption
kWh/cycle

1.75

(based on standard test results for 60°C
cotton cycle)

Actual energy consumption will depend
on how the appliance is used

Washing performance

A B C D E F G

A: higher G: lower

Spin drying performance

A **B** C D E F G

A: higher G: lower

Spin speed (rpm)

1400

Capacity (cotton) kg

5.0

Water consumption

5.5

Noise Washing
(dB(A) re 1 pW) Spinning

5.2

7.6

Further information contained in
product brochure



1. Energy Labelling: some background

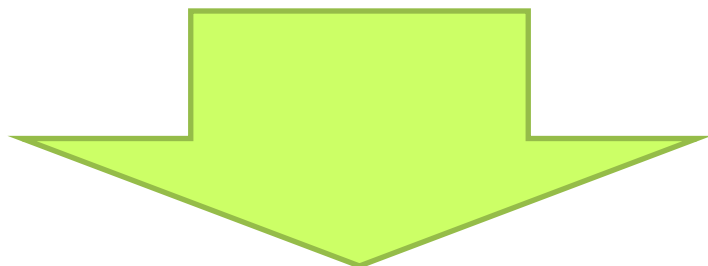
- In many countries subsidies are used to support labelled goods. The RENOVE program is the Spanish policy.
- Regulated by Royal Decree 208/2005, 25 February 2005, on electrical appliances and electronic devices and the management of their wastes.
- Set up by the Institute for Energy Diversification and Saving (IDAE, Instituto para la Diversificación y el Ahorro Energético) www.idae.es
- But run and managed by the Energy Boards of the Autonomous Communities (AC).
- Sets a minimum of €50 as a lump sum subsidy to consumers (both public or private) willing to purchase (exchange) highly efficient durables, i.e. labelled as class A or higher;
- Some AC have increased this premium to €70-90 and more.

1. Energy Labelling: some background

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- Some AC have increased this premium to €70-90 and more. GREAT PROGRAM! 😊

2. Research idea

- How do policy makers estimate how much is the optimum subsidy?
- Do they “fine tune” the program each year according to an evaluation?
- How can we measure the impact of the scheme?



- We need to know how much people are willing to pay for those labels. Economic valuation technique. Question A.
- And we also need price elasticities of demand and supply to properly assess the impact of the policy. How can we estimate them? Question B

2. Research idea

- Straightforward answer A: Use stated preference methods. **PROBLEM:** Lack of data and the **intention-behaviour gap** -- that is the difference between “customer attitude “and” customer behaviour. What they say the do and what they actually do.
- Straightforward answer B: Traditional econometric allow us to estimate elasticities. **PROBLEM:** Lack of data, no long time series data available for labelled goods.
- We also need **cross price elasticities** of demand for close substitutes such as labelled appliance and non-labelled one. That is, how does the demand of labelled good change with the price of the non-labelled one and vice versa.
- We need an answer for the Government very SOON!

3. Case study: RENOVE subsidy scheme in the BC

- Run by the Centro para el Ahorro y Desarrollo Energético y Minero” (CADEM), part of the Ente Vasco de la Energía. AC level.
- Some data for 2008 and 2009 program: €6.000.000

Electrodomestico	Subvención 105	Subvención 85	Total
Frigorífico	4142	17888	22030
Congelador	1517	1009	2526
Lavadora	24865	10061	34926
Lavavajillas	0	8557	8557
Total	30524	37515	68039

Electrodomestico	Clasificación energética	Eficacia de lavado	Ayuda €/equipo
Frigorífico/ Combi	A	-	85
Frigorífico/ Combi	A+ o superior	-	105
Congelador	A	-	85
Congelador	A+ o superior	-	105
Lavadora	A	A	85
Lavadora	A y consumo energético igual ó inferior a 170 Wh/Kg.	A	105
Lavavajillas	A	A	85

3. Case study: RENOVE subsidy scheme in the BC

- Some data for 2009 (sept-dic) program: €4.000.000

Electrodomestico	Subvención 105	Subvención 85	Subvención 75	Total
Frigorífico	4220	9231	---	13451
Congelador	1277	726	---	2003
Lavadora	12929	3925	---	16854
Lavavajillas	0	5041	---	5041
Horno	---	---	5968	5968
Total	18426	18923	5968	43317

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Lavadora	A	A	85
Lavadora	A y consumo energético igual ó inferior a 170 Wh/Kg.	A	105
Lavavajillas	A	A	85
Hornos*	A	-	75

4. Methodology and results: Hedonic

- Hedonic method to estimate price premium. How much is actually paid in the market (demand and supply equilibrium) for each characteristic of the good. We are interested in the “energy efficiency” characteristic, that is, the label. We can estimate **how much is paid for the label, controlling for the rest of the characteristics** of the good.
- Collect market data in December (the RENOVE was not running): 19 retailers in the Basque Country, 183 models of 27 different brands produced by 15 different producers. Dishwashers, Fridges and Washing machines.
- 318 observations, 49 explanatory variables to estimate the price (in euro) of the different dishwashers sold in the market (46 of which are dummies) and hence identify the hedonic price function.

4. Methodology and results: Hedonic

B1-B21: Brand dummy	If this brand=1, otherwise=0		
LAB A+: Energy labelling A ⁺ dummy	If energy labelling A ⁺ =1, otherwise=0	S15: (T6) ARRASATE	If sold in this store=1, otherwise=0
DRY: Drying efficiency dummy	If drying efficiency maximum A=1, otherwise=0	S16: (T6) SS	If sold in this store=1, otherwise=0
S1: (T1) SESTAO	If sold in this store=1, otherwise=0	S17: (T7) EIBAR	If sold in this store=1, otherwise=0
S2: (T1) VITORIA	If sold in this store=1, otherwise=0	S18: (T7) BILBAO	If sold in this store=1, otherwise=0
S4: (T2) SESTAO	If sold in this store=1, otherwise=0	S19: (T8) IRUN	If sold in this store=1, otherwise=0
S5: (T3) ARTEA	If sold in this store=1, otherwise=0	HEI: Height	Measured in millimetres
S6: (T3) MAX CENTER	If sold in this store=1, otherwise=0	WID: Width	Measured in millimetres
S7: (T3) VITORIA	If sold in this store=1, otherwise=0	DEPT: Depth	Measured in millimetres
S8: (T3) SS	If sold in this store=1, otherwise=0	CUT: Cutlery	Number of cutlery that could be washed.
S9: (T3) ARRASATE	If sold in this store=1, otherwise=0	COLOUR: Colour Steel dummy	If steel colour=1, otherwise=0
S10: (T4) BARAKALDO	If sold in this store=1, otherwise=0	AFTIPS: Anti-fingertips dummy	If anti-fingertips=1, otherwise=0
S11: (T4) VITORIA	If sold in this store=1, otherwise=0		
S12: (T4) SS	If sold in this store=1, otherwise=0		
S13: (T5) BARAKALDO	If sold in this store=1, otherwise=0		
S14: (T5) VITORIA	If sold in this store=1, otherwise=0		

$$LY = \alpha + \sum_1^{48} \beta_i X_i + u, \text{ where } LY = \log(Y),$$

4. Methodology and results: Hedonic

Variables	Estimated Coefficients	Standard Error	T-Ratio[Prob]
CONS	63,840	.094447	67.5937[.000]
B1	.20226	.035204	5.7454[.000]
B2	-.47178	.14939	-3.1581[.002]
B3	.32274	.14939	2.1604[.032]
B6	-.47546	.15015	-3.1667[.002]
B8	.22408	.032803	6.8310[.000]
B10	.67062	.077283	8.6775[.000]
B13	.22378	.033472	6.6854[.000]
B14	.11993	.027814	4.3118[.000]
B17	.29494	.035624	8.2790[.000]
B18	.76264	.041488	18.3822[.000]
B19	.18115	.080409	2.2529[.025]
B21	.24395	.039105	6.2384[.000]
LAB	.15600	.091058	1.7132[.088]
DRY	.10122	.026621	3.8021[.000]
S10	-.065733	.033373	-1.9696[.050]
S11	.073527	.027532	2.6706[.008]
S12	.12152	.042786	2.8402[.005]
S18	.18689	.027124	6.8902[.000]
WID	-.0019391	.2432E-3	-7.9738[.000]
CUT	.052204	.0082192	6.3515[.000]
COLOUR	.089869	.030493	2.9472[.003]

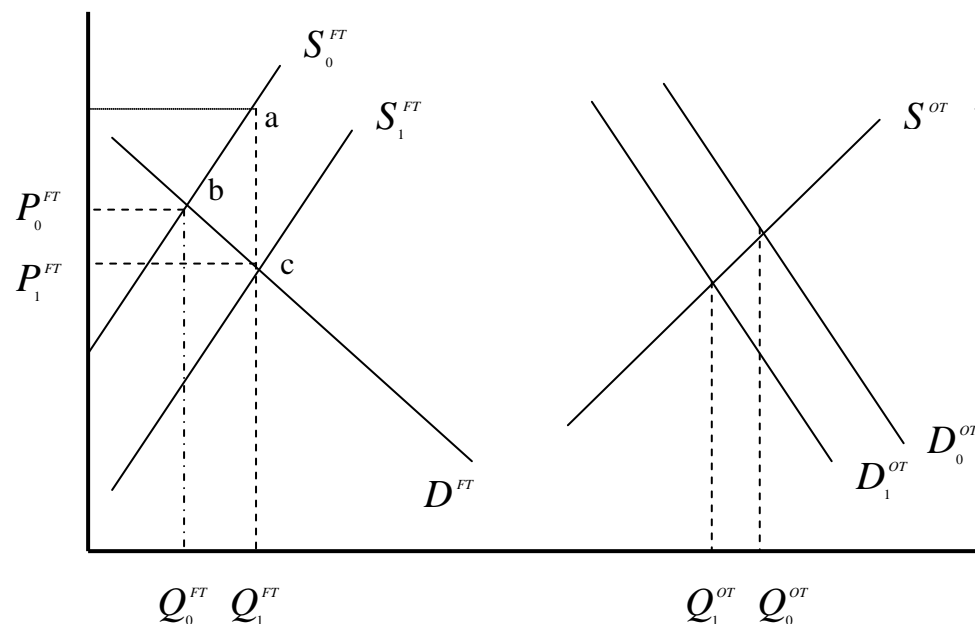
The coefficient for the variable for energy labels (LAB A+) is 0.156 and significant at 91%.

At the market equilibrium price, the **presence of the label will increase the price by 15.6% ceteris paribus.**

For an estimated average price of washing machines of €514, the price will go up around €80 for an energy efficient product with label.

4. Methodology and results: Demand Systems

- The effect of a subsidy in labelled goods: when the price of labelled goods decreases (shift in supply) the demanded quantity increases and the demand for non-labelled ones decreases. We need information on demand (and supply) elasticities!



4. Methodology and results: Demand Systems

- “L” for labelled dishwashers, “O” for the others, “X” the composite good.
- We get data from the market information collected in 2009 and the data from the expenditure surveys from Eustat (2009). We calculate the expenditure share (w) on these three goods, considering that **household durables have a useful life of 10 years.**
- The evidence from the literature (traditional analysis) (Jain and Rao op cit, Revelt op cit, Golder and Tellis op cit) suggests that the price elasticities of demand for normal dishwashers by itself could be anything from -0.5 to -2. In addition, an income elasticity of 0.4 is also within the ranges of other studies.

4. Methodology and results: Demand Systems

■ The Quantity Based Demand System

	QDBS		
Price Elasticity of demand own O/O	cross O/L	own for "L"	cross L/O
-0.5	0.1	-1.2	0.8
-0.75	0.35	-3.2	2.8
-1	0.6	-5.2	4.8
-1.25	0.85	-7.2	6.8
-1.5	1.1	-9.2	8.8
-1.75	1.35	-11.2	10.8
-2	1.6	-13.2	12.8

4. Methodology and results: Demand Systems

- The Almost Ideal Demand System (AIDS)
- Need to assume more values. We use the ones estimated with QBDS to be comparable.

	LA/AIDS $e_O = e_L = 0.4$ $e_{X/X} = -1$						
<i>Price Elasticity of Demand own O/O</i>	cross O/L	own for L	cross L/O	cross O/X	cross L/X	Cross X/L	Cross X/O
-0.5	0.1	-1.2	0.8	-0.000961731	6.66E-16	-0.000120216	9.98E-31
-0.75	0.35	-3.2	2.8	-0.000961731	1.22E-15	-0.000120216	9.98E-31
-1	0.6	-5.2	4.8	-0.000961731	1.78E-15	-0.000120216	-1.11E-16
-1.25	0.85	-7.2	6.8	-0.000961731	2.33E-15	-0.000120216	-2.22E-16
-1.5	1.1	-9.2	8.8	-0.000961731	2.89E-15	-0.000120216	-3.33E-16
-1.75	1.35	-11.2	10.8	-0.000961731	3.44E-15	-0.000120216	-4.44E-16
-2	1.6	-13.2	12.8	-0.000961731	4.00E-15	-0.000120216	-5.55E-16

5. Concluding remarks

- A methodology to overcome the two main limitations:
 - (a) the lack of long term time series data for labelled goods that would allow for traditional econometric analysis and
 - (b) the intention behaviour gap that poses a great bias in the questionnaire based studies.
- The study has allowed us to estimate that when controlling for the rest of the variables, the price premium paid in the market for dishwashers carrying an energy efficient label is close to 15.6% of the final price. This percentage accounts for around €80. What is the effect of €105 subsidy?
- Elasticities necessary to understand how the demand for close substitutes reacts to changes in prices. This information allows to start with welfare analysis.
- Labelled good much more elastic or sensible to changes in prices.