

# **RESIDENTIAL WATER USE: WATER CONSERVATION AND WATER QUALITY**

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# **Section I- Household Adoption of Water-Efficient Equipment**

## **Outline**

Urban Demand-Side Management Policies and Water-Efficient Devices

Factors that Affect Adoption

Main Results

Conclusions

# Introduction

- Increased reliance on demand-side management policies
- Debate: price versus non-price policies
- Non-price Policies:
  - water restrictions
  - information campaigns
  - installation of water-efficient equipment (rebate programs)
- Advantage of rebate programs: easy to implement, established savings
- Little empirical evidence on the factors that encourage adoption
- The OECD Household Survey provides unique data to study adoption

# **Water-Efficient Equipment Studied in the OECD Household Survey**

Three indoor water-efficiency equipments:

- water-efficient washing machines
- low volume or dual flush toilets
- water flow restrictor taps or low flow showerheads

One outdoor water-efficiency equipment:

- water tank

## Statistics on the Ownership of Water-Efficient Equipment

Share of respondents owning water-efficient equipment, by country

Country	Water efficient washing machine	Low volume or dual flush toilets	Water flow restrictor tap / low flow shower head	Water tank to collect rainwater
Australia	0.66	0.75	0.63	0.29
Canada	0.49	0.40	0.56	0.13
Czech Republic	0.28	0.67	0.67	0.34
France	0.62	0.61	0.43	0.27
Italy	0.58	0.42	0.58	0.12
Korea	0.31	0.31	0.40	0.11
Mexico	0.61	0.66	0.49	0.14
Netherlands	0.63	0.63	0.64	0.18
Norway	0.45	0.34	0.59	0.04
Sweden	0.44	0.40	0.48	0.13
All countries	0.52	0.51	0.54	0.17

# Factors Explaining Adoption

<u>Socio-demographic variables:</u>	household size, income, ownership status
<u>Characteristics of the dwelling:</u>	size, age, number of rooms
<u>Attitudinal factors:</u>	environmental concern
<u>Behavioural factors:</u>	water-saving habits, purchases of green products, membership in environmental organizations
<u>Policy variables:</u>	
Metering – 3 dummy variables:	<ul style="list-style-type: none"><li>- Not charged for water</li><li>- Charged for water but not metered</li><li>- Charged for water and metered</li></ul>
Labelling – dummy variables:	Relevant national, Nordic, or EU label, or water efficiency label if applicable.
<u>Country-specific dummy variables</u>	

# Modelling

Four separate models of the probability to adopt each equipment

Pooled sample: 9,439 households

Correct predictions: 65-84%

## Main Results

	Indoor equipments	Outdoor equipment
<b>Socio-demographic variables:</b>		
Ownership status	+ (0.06-0.10)	+ (0.09)
Income	+ (close to zero)	- (close to zero)
Household size	+ (0.01)	+ (0.01)
<b>Characteristics of the dwelling:</b>		
Number of rooms	+ (0.04-0.07)	n.s.
<b>Attitudinal factors:</b>		
Environmental concern	+ (0.02)	n.s.
<b>Behavioural factors:</b>		
Water-saving habits	+ (0.07-0.13)	+ (0.05)
Purchases of green products	+ (0.08-0.10)	+ (0.03)
<b>Policy variables:</b>		
Charged and non-metered	+ (0.03-0.06)	n.s.
Charged and metered	+ (0.07-0.10)	n.s.
Labels	+ (0.04-0.06)	n.s.

## Conclusions

- New evidence on the relative impact of socio-economic, behavioural and policy variables.
- Major factors: ownership status, green purchases and water-saving habits, volumetric charging.

### Policy recommendations:

- More widespread introduction of individual metering and charging would encourage adoption.
- Due to data limitations, we have only been able to assess two policy variables: water charging structure, labelling.
- The relative effectiveness of economic instruments versus direct regulation: still an open issue, additional questions required.

# **Section II- Household WTP for Improved Tap Water Quality**

## **Outline**

Introduction

Stated Willingness to Pay (WTP), Opinions and Concerns

Factors Influencing WTP

Main Results

Estimated WTP for an Improved Water Quality

Conclusion

# Introduction

- Increased costs of water treatment
- More stringent regulation on cost recovery (European WFD)
- Debate on the allocation of costs
- Necessary information: consumers' WTP for improved water quality
- Existing evidence: WTP after specific water contamination incidents

## Survey questions

*Q97. What is the maximum percentage increase you would be willing to pay above your actual water bill to improve the quality of your tap water, holding water consumption constant?*

Nothing	34%
Less than 5%	29%
Between 5% and 15%	22%
Between 16% and 30%	5%
More than 30%	< 2%
Don't know	9%

## Simple statistics on WTP (2008 EUR)

Sample (number of obs.)	Mean	Min	Max
OECD 10 (3,329)	7	0	159
Australia (282)	5	0	50
Canada (326)	9	0	127
Czech republic (188)	9	0	69
France (303)	6	0	90
Italy (612)	10	0	75
Korea (645)	3	0	24
Mexico (743)	6	0	25
Netherlands (51)	2	0	20
Norway (99)	7	0	57
Sweden (80)	16	0	159

## Respondents' opinion about quality and safety of their tap water

Country	% of respondents satisfied with their tap water	% of dissatisfied having taste concern	% of dissatisfied having health concern
Netherlands	95	63	31
Sweden	92	68	24
Norway	90	67	29
Czech Republic	72	52	39
Australia	71	55	42
France	70	59	37
Canada	67	43	56
Italy	56	33	61
Korea	30	11	86
Mexico	21	5	92

## **Factors Explaining WTP**

Socio-demographic variables: gender, age, education, income

Attitudinal factors: environmental concern

Behavioural factors: membership in environmental organizations

Households' opinions: taste and health concerns

Country-specific dummy variables

## **Main Results**

Tobit model on pooled data (3,158 observations)

- Age (-), Female (-), Education (+), Income (+)
- Environmental attitudes (+)
- Taste and health concerns (+)

Separate Tobit models on Italy, Korea and Mexico

## Estimated WTP for an improved water quality

### Annual WTP estimates (2008 EUR) – pooled data and Italy, Korea and Mexico

	Median water bill	Mean WTP	WTP as a % of water bill	Min WTP	Max WTP
Pooled data	185	14	8%	8	25
Italy	200	18	9%	8	30
Korea	87	6	6%	3	8
Mexico	74	7	10%	5	9

## Conclusions

- Difficulties with data (missing information + misreporting of annual water bills)

⇒ estimation results and estimated WTP have to be considered with caution.

- Main result: WTP is estimated at **14 EUR** per household per year.

In the low range of existing estimates but most of the other studies were made after some water contamination occurred (not the case here).

- Significant factors: respondent's characteristics (age, gender, education, income), attitudinal characteristics, and household's opinion and concerns.