Center for Social and Economic Research

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WP8: Analysis of Household Demand

Survey and Micro-estimations

WP8 Tasks

Task 8.1: Analysis of household demand for low carbon vehicles and transportation modes in Poland

Task 8.2: Data provision for the application of a Poland-Scenario of the CGE Model --- WP10

Objectives of Task 8.1

- Identification of determinants and barriers of ***purchase of low carbon vehicles***
- Analysis of household ***demand for low carbon vehicles*** and examination of ***variability in car use*** of different fuel type vehicles
- Analysis of usage ***patterns of alternative transport modes*** (car-sharing, railway)
- ***WTP for specific attributes*** of passenger vehicles

WP8 Work Plan

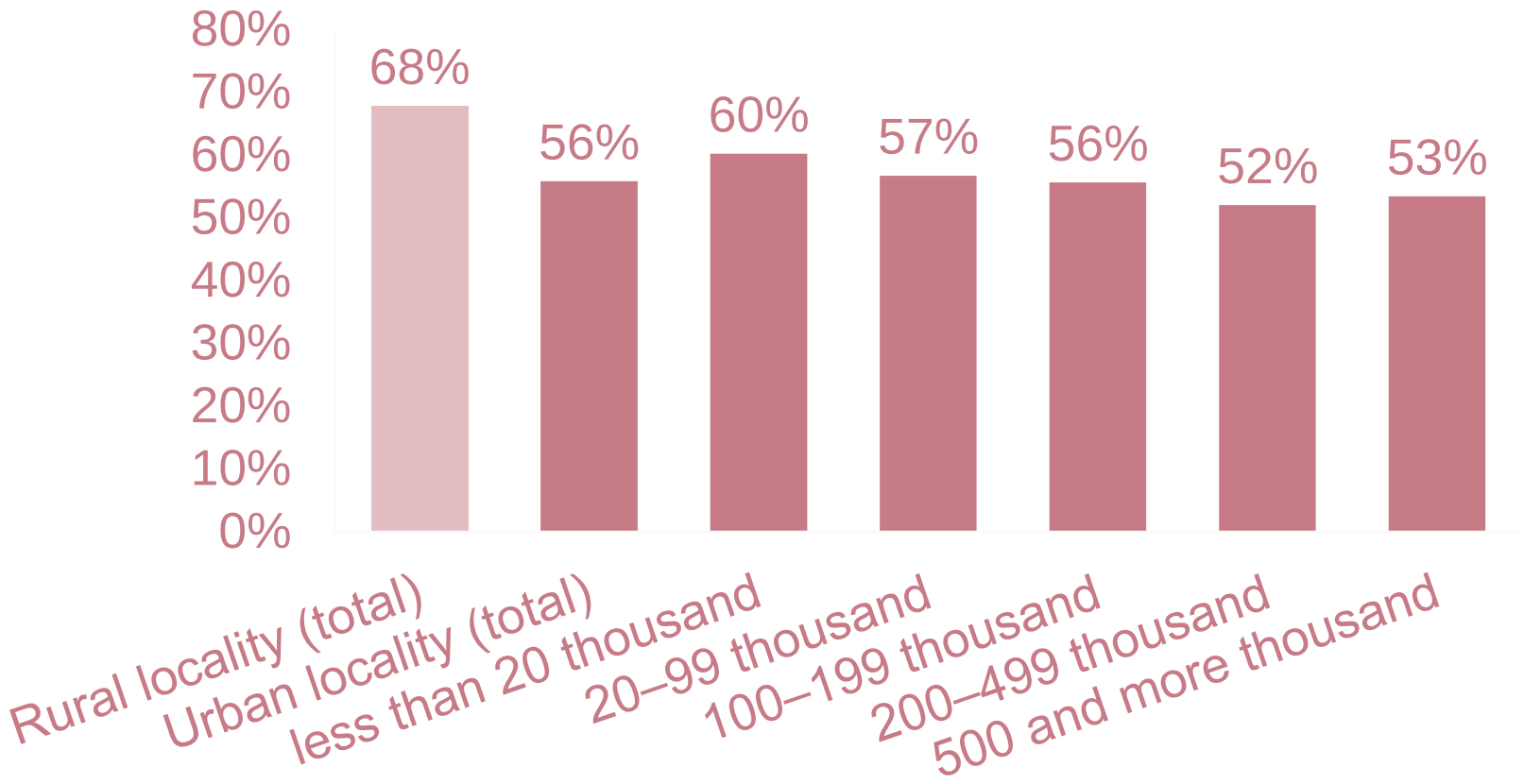
I. Review of available data
II. Literature review
III. Methodology
IV. Pre-survey
V. Questionnaire development
VI. Data collection
VII. Data analysis
VIII. Deliverables

I. Review of available data for Poland

- Household Budget Survey
- EU-SILC

- vehicle register data (?)

Passenger car ownership
by socioeconomic groups, Poland (in % of a given group of households)



(HBS, 2010)

Total: 59.5% car-owning households in 2010

Passenger car ownership

by socioeconomic groups, Poland

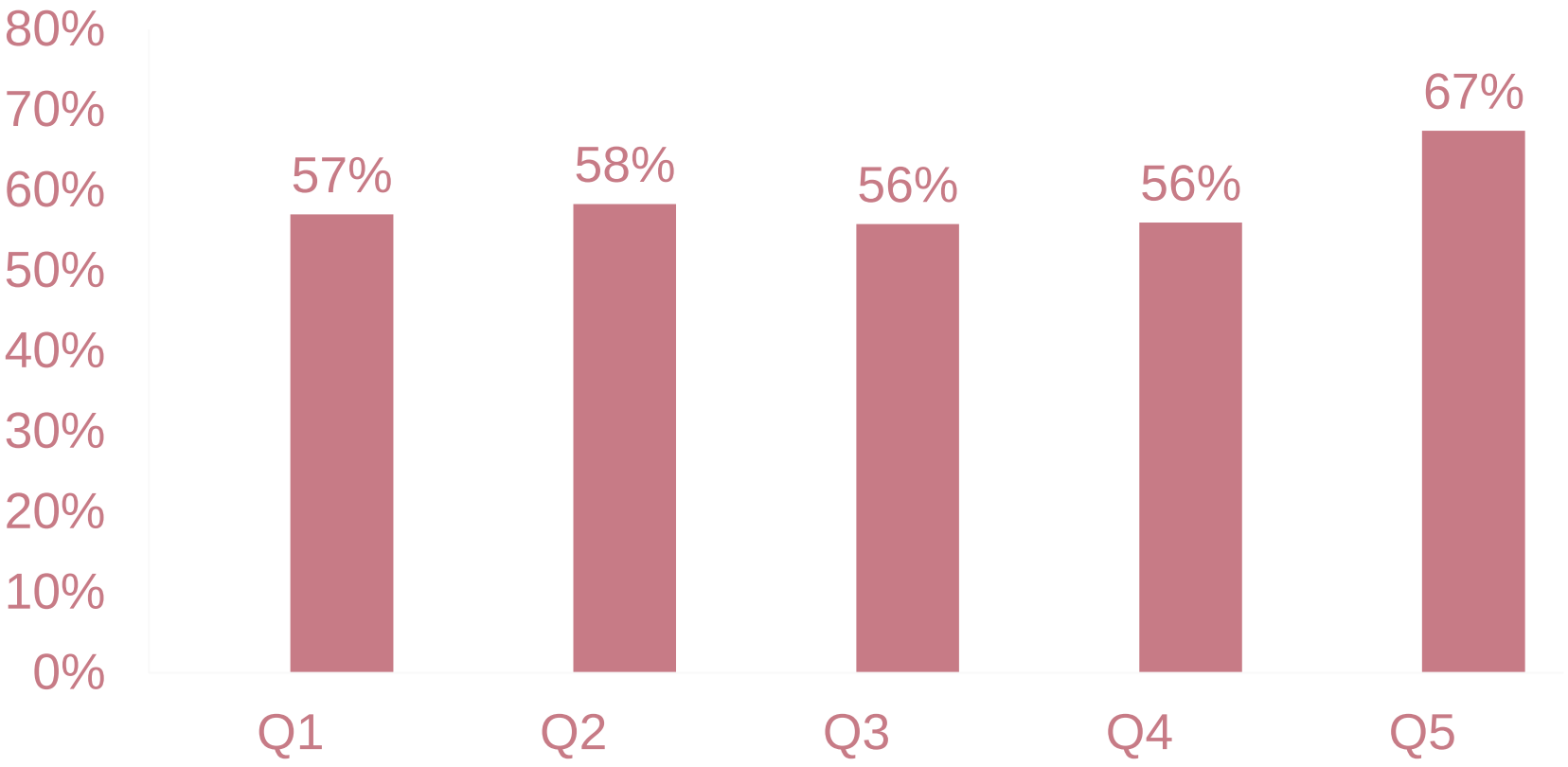
(*in % of a given group of households*)

(HBS, 2010)

Passenger car ownership

by quintile groups, Poland

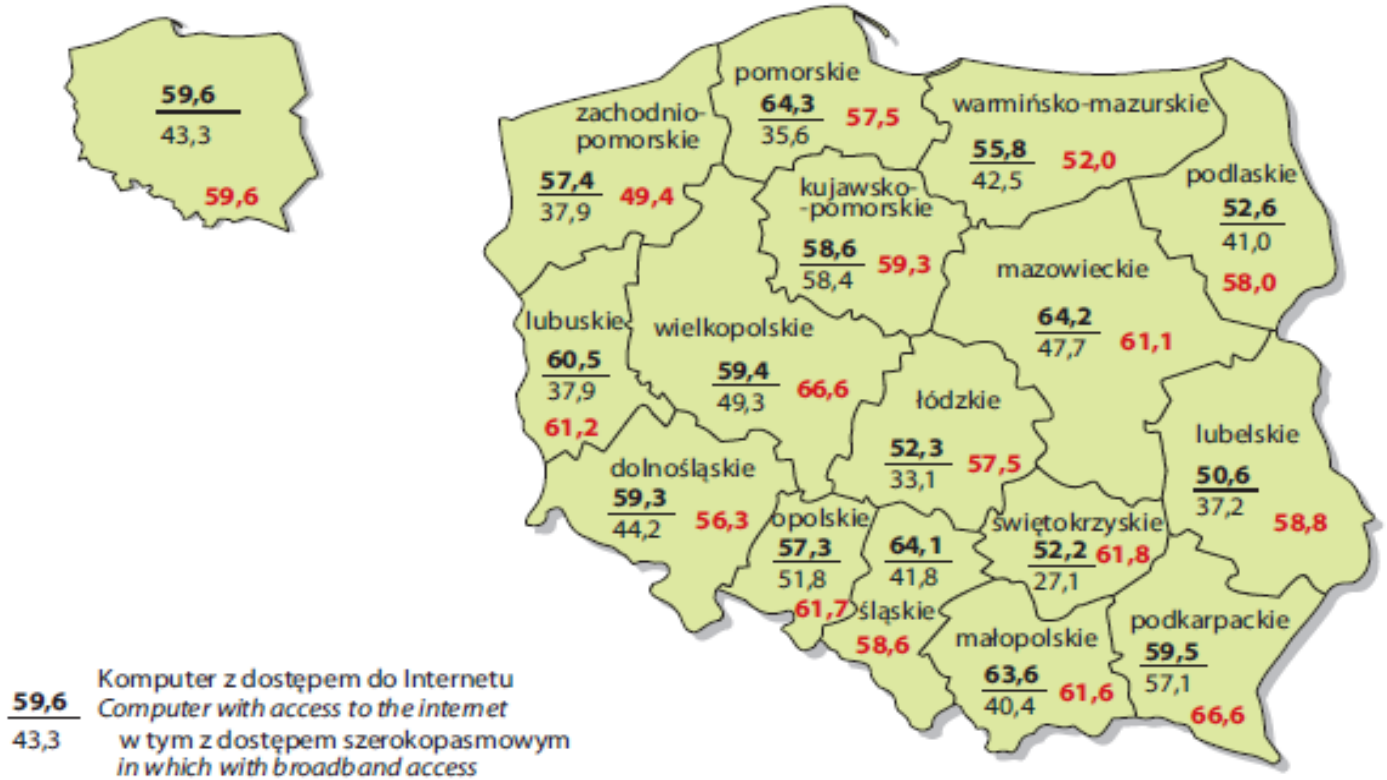
(*in % of a given group of households*)



(HBS, 2010)

Passenger car ownership
by regions, Poland

Households equipped with selected durables by voivodships in 2010 (in %)



(HBS, 2010)

II. Review on vehicle demand models
Revealed choices data

- **Car Ownership Models -- aggregated data**

  - **to explain the total number of vehicles by GDP per capita at national level**

    - aggregated CS / TS models (Wolff, 1938; Kain & Beesley, 1965; O'Herlihy, 1967)

    - cohort models (Van den Broecke, 1987)

    - aggregated car market models (Mogridge, 1975; Manski, 1983; TREMOVE)

II. Review on vehicle demand models
Revealed choices data 2

- **Car Ownership Models -- disaggregated data**

  - **to relate the probability to own a car with the socio-demographic characteristics of the respondent or household, structural variables (home location or attributes), the availability of other means of transport, family members working position and income, and the costs of car ownership and operation**

  - **the utility maximization principle**

II. Review on vehicle demand models
Revealed choices data 3

- **Car Ownership Models -- disaggregated data**
  - **binary choice on *'having a car'*** (e.g. Dargay 2005; Johstone et al. 2009)
  - **binary choice on *ownership status*** (Page et al., 2000)
  - **with the number of cars** (Lerman, Ben-Akiva, 1976; Train, 1980; Nobile et al., 1996; Hanly & Dargay, 2000)**, incl. model improvements by** Bhat and Pulugurta, 1998 (OL vs. MNL) and Wheelan, 2007 (two binary models)
  - ***jointly with car use → discrete-continuous model*** *(Dubin & McFadden 1984; Hanemann 1984;* Train 1986; De Jong 1989; Henscher-Barnard-Smith-Milthorpe, 1992)
  - ***jointly with other choices → SEM*** *(*Simma & Axhausen, 2003; Abreu e Silva-Golob-Goulias, 2006)

II. Review on vehicle demand models
Revealed choices data 4

- **Car Ownership Models --** disaggregated data

- **Vehicle-Type Choice Models --** disaggregated data

  - **type and the number of vehicles are interrelated**

  - **model engine size, fuel type, fuel consumption, or ownership type** (e.g., Hensher and Greene, 2000; Birkeland and Jordal-Jørgensen, 2001; deJong-Fox-Pieters-Vonk-Daly, 2002)

  - **joint RP+SP modelling** (Page-Whelan-Daly, 2000; Brownstone-Bunch-Train, 2000)

  - uptake of **alternatively fuelled vehicles** (Brownstone et al., 2000; Hensher & Greene, 2000; Ewing & Sarigollu, 2000; Dagsvik-Wennemo-Wetterwald-Aaberge, 2002; Batley-Toner-Knight, 2004; Potoglou & Kanaroglou, 2007, 2008; Caulfield-Farrell-McMahon, 2010)

II. Review on vehicle demand models
Revealed choices data 5

- **Vehicle-Holdings Models**

  - the number, type, and annual usage rate of each household vehicle are included in one model, cross-sectional data are used

- **Vehicle-Transactions Models**

  - the choice of a type conditional on the decision of a household to be active in the market within a fixed time-period

(Potoglou and Kanaroglou, 2008)

II. Review on vehicle demand models
Stated choices data

- **if the supply of certain durable goods is constraint or almost zero as is the case for new or not yet existing technologies**
- **demand for cars with alternative drive technologies**
- **especially conjoint analysis - *discrete choice experiments***

II. Review on vehicle demand models
Combination of revealed and stated choices

- convergent validity ⇒ **comparison of SP and RP data from the same sample in order to check whether reveal the same underlying model of preferences**
- means of more efficient sampling ⇒ **each individual in the sample provides more than one observation**
- combination of the desirable features of the two approaches

(Hanley et al., 2002)

III. Methodology

- **discrete choice experiments**

- **socio-psychological approaches, e.g. theory of planned behaviour, Ajzen, 1985, 1991: attitudes and/or subjective/social norms explain the purchase of vehicle**

IV-V. Pre-survey & Questionnaire

- **Pre-survey**

  20 semi-structured interviews **to identify vehicle attributes, accessible beliefs**

- **Questionnaire development –**

  marginal WTP for attributes of vehicles, vehicle ownership, vehicle characteristics, attitudes, subjective norms, socioeconomic, and demographic variables

VI. Data collection

- Target population: the Polish adult population
- Quota sampling
- Sample size: N=2000
- Structured face-to-face computer-assisted interviews

VI. Data analysis

- Having a vehicle: binary logit, eventually structural equation modelling
- Number of vehicles: multinomial logit model (MNL)/ conditional MNL
- Discrete choice experiments

VIII. Deliverables & Timeplan

8.1. Report on determinants and barriers of purchase of low carbon vehicles, including WTP estimates for specific attributes of passenger vehicles in Poland (month 24)

		2012								2013												2014									
		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30
		May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	June	July	Aug	Sep	Oct
WP3	IHS		START									DATASET						ESTIMATIONS													
WP8	CASE										START						DATASET					ESTIMATIONS								

Thank you for your attention

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„Park and charge“ in Iceland
(Pickard, 2011)

Task 8.2

- **Parameter of household demand for vehicles for macro model**
  - planned for month 24
- **Social Accounting Matrix for Poland**
  - IOT 2005 compiled by the Polish Statistical Office
  - IOT 2010 due the end of 2014
- **Data on the electricity and energy sectors of Poland necessary for scenario applications of the general equilibrium model (WP6/WP10)**
  - data available: generation capacities for specific techs, future energy mix, historic price and consumption of electricity, length and load of line capacity of Polish grid
- **Deliverable**
  - in month 24