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Using Choice Experiments to Assess Environmental Impacts Of Dams in Portugal

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- **Structure of presentation**

  - **Motivation**
  - **Background**
  - **Design and data collection**
  - **Results**
  - **Concluding remarks**

- **Motivation**
  - **Hydroelectric dams have significant environmental advantages when compared with burning of fossil fuels however the presence of dams is not free of environmental impacts**
  - **These environmental impacts are not usually included in cost-benefit analysis.**
- **Objective: determine the total economic value of environmental impact of dams in Portugal**
- **Methodology: Discrete choice experiments**

- **Environmental impacts of large dams**
  - **Biodiversity limitations (Rosenberg et al 1997)**
  - **Impacts on fauna and flora (Wang and Chen 2013)**
  - **Flooding of large areas of arable land (Wang et al 2013).**
  - **Water quality degradation (Wang et al 2010)**
  - **Landscape intrusion (Zhao et al 2012)**
  - **Destruction of architectural, historical and archaeological (Ferreiro et al 2006)**
  - **Noise (JKA 2010)**

- **Discrete choice experiments**
  - **Assumes people derive utility from the attributes of goods (Lancaster 1966)**
  - **Consists in:**
    - **Identify the attributes that characterize a good/service**
    - **Identify the relevant levels of attributes**
    - **Construct choice sets (combinations of attribute/levels)**
    - **Implement survey**
    - **Estimation of results**

- **Selection of Environmental impacts**
  - **Literature review**
  - **Focus groups**
  - **Think aloud**

- **Choice attributes:**
  - **Significant impacts on fauna and flora (0/1)**
  - **Significant impacts on landscape (0/1)**
  - **Noise that significantly affects population (0/1)**
  - **Destruction of architectural, historical and archaeological (0/1)**
  - **Increase in monthly electricity bill (4, 8, 12 Euros)**

- **Choice sets**
  - **8 choice sets combining attributes and levels maximizing statistical efficiency without compromising reasonability**

	Form A	Form B
Significant impact on landscape	Yes	Yes
Significant impact on fauna/flora	No	Yes
Noise affecting population	No	Yes
Destruction of heritage	Yes	No
Increase in monthly electricity bill €	12	8
Your choice	☐	☐

- **Data collection:**
  - **Survey of 250 people nationally by personal interview during the first semester of 2014.**
  - **Total of 250*16=4000 choices.**
  - **Sample Characteristics:**
    - **Average age is 49;**
    - **46% male;**
    - **36% employed**
    - **29% have university degree**

- **Sample Characteristics:**
  - **Use of fossil fuels is associated with**
    - **Water pollution (66%)**
    - **CO2 accumulation (56%)**
    - **Climate change (43%)**
  - **Vast majority know electricity production by wind and photovoltaic farms and dams; and consider them friendly.**
  - **Respondents consider that knowing source of electricity is important or very important**
  - **Monthly electricity bill is 70Euros, on average.**
  - **Only 20% of respondents see electricity production sites on a daily basis.**
  - **22% say they considered all impacts in their decision**

- **Results**

Variables	WTP	Standard error
Landscape	5.8300***	1.1782
Fauna/Flora	15.1030***	3.8913
Noise	9.1016***	2.3059
Heritage	4.1770***	1.5732

- **Conclusions**
  - **Use of hydropower sources to produce electricity present several important advantages**
  - **However, it produces significant environmental impacts that strongly depend on size and location.**
  - **These impacts may affect the general population well-being.**
  - **Our results show that:**
    - **(1) the general public is willing to pay significant amounts to avoid the impacts considered; and**
    - **(2) they are WTP different amounts for different impacts;**
  - **Thus, the consideration of the effect of the impacts on general population well-being should be considered in the public decision making.**

Thank you for your attention!