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# A behavioural economics analysis of the impact of information and knowledge on CO<sub>2</sub> capture and storage acceptance in the European Union

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## Abstract

The paper analyses the impact that European Union citizens' access to information on climate change has on their awareness of carbon capture and storage (CCS), perceived risks and benefits of using CCS and stated choice of preferred CCS options. We use a Eurobarometer dataset about awareness/acceptance of CCS and run structural equation models (SEM) for twelve EU countries with an average sample size of 1,100 observations per country. Results between the different countries are comparable and, alongside other determinants, access to information sources will significantly impact CCS awareness, perceived risk and benefits of CCS and preferences towards options of CCS.

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## 1. Introduction

CO<sub>2</sub> capture and storage (CCS) is a set of technologies that facilitates the reduction of CO<sub>2</sub> emissions from coal-based electricity production. In order for CCS to be utilised on a large scale, there is a need for its public acceptance. Based on the results of several studies, it is believed that the CCS awareness of the majority of public is largely non-existent and therefore it cannot genuinely decide whether it is for or against CCS

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(Schumann & Simon, 2009). A number of studies have analysed the impact of information on public awareness and perceptions of CCS (Schumann & Simon, 2009; Best-Waldhobera & Daamena, 2011; Alphen et al., 2007; Huijts et al., 2007; Itaoka et al., 2009). Most studies found that information is a key factor influencing public's CCS awareness and perceptions, however, despite increased communication to public, CCS awareness level is still low and better communication strategies are needed.

The paper analyses the impact that the European Union (EU) citizens' access to information on climate change (amongst other a priori determinants) has on their awareness of CCS, perceived risks and benefits of using CCS and stated choice of preferred CCS options.

## **2. Material and methods**

### *2.1. Data*

The data used in this study were extracted from the Dataset Eurobarometer 75.1: Public Awareness and Acceptance of CO<sub>2</sub> Capture and Storage. The Eurobarometer survey was carried out by TNS Opinion & Social by face-to-face interviews with European Union (EU) citizens in February-March 2011 (Eurobarometer, 2011). The original database includes data on access to and trust in climate change information; perceived climate change priorities for the European Union; knowledge about CO<sub>2</sub>, its main sources; perceived impact of CO<sub>2</sub> emissions on climate change; awareness of carbon capture and storage; awareness of energy production aspects; perceptions as regards use of energy sources; perceptions as regards effectiveness of CCS to fight climate change; perceived personal benefit of using CCS technology; risk perceptions; preferred CO<sub>2</sub> storage options; CCS attitudes; and socio-demographic data (political orientation, marital status, education, gender, age, occupation, type of community, number of children).

We analysed the datasets for twelve countries (United Kingdom, Bulgaria, Czech Republic, Germany, Greece, Spain, Finland, France, Italy, Netherlands, Poland and Romania). The countries have a good geographical coverage (Western, Northern, Southern and Central-Eastern Europe) and include old and new European Union (EU) member countries. The average sample size is 1,100 observations per country, ranging from 1,000 observations in Greece and Poland to 1,622 observations in Germany. The variables included in the analysis are socio-demographic (education and number of children living in the household) and climate change related (access to information, CCS awareness, perceptions of CCS effectiveness, benefits and risks, and preferred CCS options).

### *2.2. Structural equation modelling*

We use structural equation models (SEM) with observed and latent variables to test the influence of a priori identified determinants on CCS perceptions. SEM is a statistical technique for testing and estimating causal relationships amongst variables, some of which may be latent, based on a combination of statistical data and qualitative causal assumptions. Latent variables are not directly observed but inferred from other variables that are observed and directly measurable (Bollen, 1989). Examples of latent variables are constructs like extraversion, spatial ability, self-efficacy, and attitudes (Borsboom, 2003). While the idea of causality may be controversial (Mueller, 1996), SEM is not intended to discover causes but to assess the soundness of the causal relationships a priori identified in the scientific literature. Hence it is mostly used as a confirmatory analysis/theory testing tool.

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