

Social Awareness, Consumer Lifestyles, and Household Carbon Emissions in China

By Dayong Zhang, Jun Li, and Bin Su

OVERVIEW

Global average temperatures were 1.3 degrees Centigrade higher in 2016 than that in 1880, and they are expected to rise further. The urgency of controlling global warming (i.e., achieving an increase of global temperature with no more than two degrees) and limiting greenhouse gas (GHG) emissions led to the conclusion of the Paris Agreement adopted by 195 countries in 2015; since then, the US government, though an original signatory, has unfortunately announced its plan to withdraw from the agreement. As the world's biggest carbon emitter, China pledged to reach its carbon emission peak by 2030, which is a very ambitious goal and requires a combination of mitigation policies. An emissions trading system, renewable energy standards, and other instruments have been developed to reduce emissions on the production side. Although economic incentives are effective mechanisms for producers and are relatively easy to implement, mechanisms to affect consumption-side emissions are potentially more complicated.

GHG emissions can result from the direct use of fossil fuels and indirect emissions from consumption of final goods/services by households. They contribute significantly to total emissions in both developed and developing economies. For example, Bin and Dowlatabadi (2005) find that households account for more than 80% of total emissions in the United States; Baiocchi et al. (2010) show that around 74% of carbon emissions in the United Kingdom comes from households; In China, Liu et al. (2011) find that household emissions make up over 40% of total emissions, which has increased recently with rises in Chinese household income and in demand for goods/services.

Many efforts have been made to promote a green consumer lifestyle, and evidence shows that people have been paying more attention to environmental issues (Gadenne et al., 2011). The question is, however, whether awareness can actually cause changes in consumer behavior. Using a unique nationwide survey in China, our study explicitly tests the link between social awareness and carbon emissions by Chinese households. More importantly, we take consumer lifestyles into consideration and see how they interact with the awareness-emissions relationship. The results on the effects of awareness are mixed, depending on which measures we use to capture awareness, but we find that having a green consumer lifestyle does play a strong role.

CHINA HOUSEHOLD FINANCE SURVEY (CHFS) DATA

One of the major obstacles to understand household-level consumption behavior is the lack of micro-level data. The CHFS data, collected by the Survey and Research Center for China Household Finance at the Southwestern University of Finance and Economics in China, comprises a high-quality and detailed nationwide survey about household income, expenses, assets, debt, insurance, employment, subjective attitudes, and other demographic information, which enable us to address the aforementioned issues. Our analysis is based on the first round of the survey results conducted in 2011 with a sample of over 8,000 households in 80 counties and 25 provinces in China (excluding Tibet, Xinjiang, Inner Mongolia, Hong Kong, Macao, and Taiwan). It employs a stratified three-stage probability proportion to size random sampling design that covers both rural and urban households.

SOCIAL AWARENESS AND LIFESTYLES

Two major data issues need to be solved in the empirical study. First, household carbon emissions are not directly available in the survey. We follow Wei et al. (2007) to divide household consumption emissions into direct and indirect emissions. Direct emissions come from the residential consumption of gas, electricity, and other utilities, and indirect emissions result from the consumption of food, clothing, household services, medicine and medical services, transport and communication services, education, cultural activities, and recreation. With the conversion coefficients such as Wei et al. (2007), the monetary expenditure in each category is converted into equivalent carbon emissions. For example, spending on clothing that totals RMB 10,000 (in 2000 prices, equivalent to around 150 US dollar) gener-

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ates 0.302 tons of carbon.

Second, subjective social awareness and consumer lifestyles are likewise not observable directly from the questionnaire. So we have to extract this information from the survey results. Gadenne et al. (2011) review the literature on psychology and sociology and investigate the role of beliefs, social responsibility, and attitudes about energy-saving behavior. Based on their arguments, we choose relevant questions in the CHFS survey to design four measures of social awareness.

In the survey, people are asked for their opinions about local social welfare (*welfare*), whether they obey traffic regulations (i.e., wait for the light to turn green before proceeding or stop when it is red) (*obey*), what kind of information normally interests them (*focus*), and whether they donated to funds intended to help the millions of victims of the 2008 Wenchuan earthquake in Sichuan Province (*donate*). The general arguments/hypotheses about these factors are:

- people who have a positive opinion of social welfare tend to act in ways that benefit society and to be willing to protect the local environment and thus more likely to adopt a green lifestyle;
- a person who obeys social norms/rules tends to follow suggestions on how to reduce emissions; people who pay more attention to social problems tend to be more informed and thus more likely to adopt a green lifestyle;
- people who made donations to assist the victims of the Wenchuan earthquake tend to have greater sympathy for those in distress in their community, which could reflect their positive attitude towards the society.

Economic theory generally assumes that the consumer decision-making process is risk averse, which relates to a preference of consumption smoothing. Psychologically, people value their habitual level of consumption and will be very reluctant to deviate from it. Following this logic, we believe that consumer lifestyles matter in the awareness-behavior relationship. Three measures of consumer lifestyle are used in our empirical study: (a) eating out as a share of total food expenditure, (b) whether people buy luxury goods, and (c) education and training expenditure as a share of total spending on education-culture-recreation. The first two measures are straightforward and show whether a person maintains a frugal lifestyle; however, the third measure is more complex. Investing more in education rather than recreation shows a person's time preference, so this type of household is expected to demonstrate a stronger awareness-behavior link.

RESULTS

We use a natural logarithm of carbon emissions (per head in a household) as the dependent variable, and subjective measures as the key independent variables in the regression analysis. The main results are summarized as follows:

- Residential (direct) emissions are the majority of these emissions, accounting for about 51% of total household emissions in China, followed by the indirect emissions from consuming food, education-culture-recreation, clothing, and other sources.
- Regression results show mixed evidence of an awareness-behavior link. Only welfare has a significant and negative impact on emissions, whereas obey and donate are all positively linked with carbon emissions.
- There are clear rural/urban and regional differences, with positive links found in baseline regressions driven mainly by households in urban areas in Eastern China.
- Maintaining a consumer lifestyle has significant importance in the awareness-behavior relationship. People with a higher share of expenditures on eating out and purchasing luxury goods tend to generate a higher level of emissions. The coefficients of the interaction term of the share of higher education in education-culture-recreation expenditures with obey and donate are all significantly negative, indicating that people who value their future more and who also have a positive attitude tend to reduce their emissions, though the coefficients are generally small.

CONCLUSIONS AND IMPLICATIONS

Using data from a recent national household-level survey in China, this paper presents an overview of the consumption side of carbon emissions. The empirical results demonstrate the significance of household consumption in China's total emissions (over 40% come from households). We also show evidence of the existence of an awareness-behavior link in China. Although many efforts have been made to promote a green lifestyle/low carbon consumption in China, consumer awareness does not necessarily result in a lower level of emissions. This pessimistic result may be due to the preference for consumption smoothing and maintaining a particular lifestyle. In the absence of clear economic

incentives, changing people's habits and encouraging people to adopt green consumption behavior voluntarily is difficult.

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Interviews continued

DAVID WILLIAMS, IAEE EXECUTIVE DIRECTOR

As administrators, we work at the pleasure of the Council; it is our job to implement their vision of the organization. One of our roles is to build a sustainable financial model for the Association and I am happy to say that over the years we have accumulated a good financial base. As a result, the Association can use this reserve to develop new products and services to service the needs of its members. The technological revolution has helped to bring new opportunities for IAEE. Back in the early days we only had one journal, a newsletter (which was very thin) and we didn't have a website. Most of our products are now website-based, which makes the information easily accessible. We have now electronic versions of the *Economics of Energy and Environmental Policy* (EEEP), of *The Energy Journal* as well as of the *Energy Forum* (newsletter). In the future, we continue to focus more on technologically based membership services to benefit our members. One of our coming projects is to develop an application within the website, which will be "Amazon like" – giving a more dynamic web experience for users.



I am very passionate about the organization and have been since day one. IAEE is like a family. We all grow and learn together by sharing our experiences within the field of energy economics. The organization stands on three pillars: business, academia and government. It means a lot to me to work with such a wide group of people. Our leadership is very much involved within the organization; Council members are very enthusiastic about the projects they take on. You might have heard about the Mexico Energy Museum project. During the Singapore conference, we had a meeting between the IAEE's advisory group and energy professionals from Mexico, who are running the development of this project. Our advisory board of energy professionals aims to provide the project with rich knowledge about the history of energy development. In addition to developing the historical background of the energy sector, we also work on the understanding of what does energy mean for our future.

(Interviews continued on page 40)