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### **Consumer preferences for high-quality plastic take-back systems in Denmark: a study in progress**

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**Abstract:** In the advent of climate change and resource depletion, the concept of the 'circular economy' is gaining widespread attention worldwide, deviating from the traditional and linear "take-make-use-dispose" model (Korhonen et al., 2018; MacArthur, 2013; Stahel, 2016). Because plastic production and consumption are linked to environmental problems, several stakeholders are looking for ways to recycle and reuse plastics (Cabernard et al., 2022; Heidebreder et al., 2019). Closed loop systems, where materials can in principle be recycled or reused indefinitely without degradation of properties, are particularly interesting for high-quality plastic packaging. While plastic waste is collected for recycling from almost all households as part of the current household waste sorting system in Denmark, the current system is essentially an open loop system. This entails that all plastic waste, whether it is high-quality plastic or low-quality plastic, is mixed and collected in a single fraction. The collected plastic waste can be recycled and used for producing low-quality plastic products, but not for products requiring high-quality plastic. As a consequence, extraction of new and pristine natural resources are still necessary for producing new high-quality plastic products. Closed loop systems can avoid this further processing of plastics, as producers have the possibility to separately get their original high-quality plastic products from users. This way of reusing high-quality plastic products can benefit the environment and the climate.

Aiming to transition towards more closed loop plastic recycling systems, new business models, including take-back systems, are being explored (Korhonen et al., 2018; Uhrenholt et al., 2022). In Denmark, a few closed loop take-back systems exist, including Novo Nordisk's Returpen scheme, where users are asked to return their used insulin injection pens to the company through pharmacies in Denmark. Despite users' high intention to use this scheme – around 80% say they would return their used insulin pens – only around 20% actually return the products in practice. In order to avoid failure of take-back systems, it is thus essential to identify incentives and drivers that can close, or at least significantly reduce, such intention-behavior gaps.

The primary aim of this study is to contribute to this intention-behavior challenge through an investigation of consumers' preferences for take-back systems for high-quality plastic packaging. We conduct discrete choice experiments to evaluate the role of different

incentives and attributes in increasing the reuse of high-quality plastic products, including packaging from medical, cosmetic, and cleaning products in their original forms, through take-back systems. We test the influence of extrinsic (e.g. deposit-refund) and intrinsic (e.g. donation) motivations based a control-treatment experimental study design. Specifically, we answer the following research questions:

1. What factors influence take-back, reuse, or recycling behavior? Are economic factors or other non-economic factors, such as return locations, convenience, (energy, distance, and time) and altruistic behavior influential?
2. Do financial incentives have unintended consequences? Will they lead to a crowding-out effect, for example, reducing the willingness to pay for take-back systems?
3. Are consumers willing to pay for plastic take-back systems?
4. Which attributes of a take-back system play a significant role in consumer preferences?
5. What are the implications of the results for the intention-behavior gap?

We have conducted focus group discussions and received feedback from experts to validate our questionnaires. We will send the questionnaires to a representative sample of around 50000 Danes through e-Boks. We expect to have completed data collection (at least 5000 respondents) in early August 2024, enabling us to present results at the Danish Environmental Economics conference in the end of August.

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