Extended Abstract
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Customer Engagement – When do Circular Business Models Pay Off?

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Introduction

The apparel industry is under increasing scrutiny for its linear business model, which rapidly depletes natural resources, drives overconsumption, and generates waste. The rise of fast fashion in recent decades has further exacerbated these challenges by accelerating production volumes, lowering price points, and shortening the average usage time of apparel (Coscieme et al., 2022; Niinimäki et al., 2020; Peters et al., 2021). This state of overproduction and overconsumption, where raw materials are assumed to be abundant (Kjellberg, 2008; Trudel, 2019), is causing irreversible damage to our ecosystem (Richardson et al., 2023; Rockström et al., 2009).

In response to growing awareness of the apparel industry's unsustainable practices, policymakers are emphasizing the urgent need for systemic change. In alignment with United Nations Sustainable Development Goal 12, the European Commission seeks to spearhead the sustainability transition by adopting circular economy principles. *The Strategy for Sustainable and Circular Textiles,* for example, introduces nearly twenty proposals to support the transition toward a circular textile economy (COM 141 final, 2022).

The Sustainability Dilemma of Circular Business Models

While the circular economy and the sustainability transition are closely linked, they are not interchangeable. Circular economy practices have a long history (Belk, 2014; Belk et al., 1988), yet the precise sustainability benefits of these practices remain contested (Geissdoerfer et al., 2016; Geissinger et al., 2019; Kirchherr et al., 2017; Köhler et al., 2019). The sustainability potential of circularity lies in decoupling value creation from waste generation and resource depletion. However, this outcome is not guaranteed, particularly when customer engagement is considered (Ackermann & Tunn, 2024; Geissinger et al., 2019; Parguel et al., 2017). Circular business models engaging the customer, such as buy-back and resale, could contribute to the sustainability transition if they effectively extend the lifespan of clothes and alter consumption patterns, ultimately decreasing demand for new production (Peters et al., 2021; Wiedemann et al., 2023). Yet, emerging research suggests that the availability of buy-back and resale may, paradoxically, accelerate consumption. This rebound effect is driven by an oversupply of goods at a lower price point, the urgency created by the unique availability of individual pieces, and the perception of resale as an attractive investment opportunity (Dion et al., 2024; Henninger et al., 2021).

With policy incentives and regulatory frameworks promoting a circular textile economy and previous research highlighting both its potential and limitations, a critical question arises: When do circular business models pay off - both in regards to sustainability transitions and being able to sustain the business?

Buy-back and Resale Models in Fashion Retail

A buy-back and resale model, in which retailers incentivize customers to return worn clothes by offering compensation, is an increasingly common circular business strategy in fashion retail. Retailers may offer discounts for returned items, which are then resold, upcycled, or recycled (Hvass & Rahbek Pedersen, 2019; Rahbek et al., 2018; Thorisdottir et al., 2024). Despite the growing interest in buy-back and resale, empirical insights remain scarce. This gap stems from a restricted data pool and difficulties in accessing relevant datasets (Hvass & Rahbek Pedersen, 2019; Nielsen & Skjold, 2024).

Method and Data

To address this challenge, we collaborated with a Nordic apparel retailer to examine customer engagement in buy-back programs. Our dataset consists of transaction-level data collected over a period of more than four years, spanning from January 1, 2020, to May 31, 2024. The introduction of the retailer's buy-back program took place in June 2021. During our period of analysis, we observe 367,097 purchases made by 177,007 distinct customers.

Table 1: Descriptive Statistics for Orders

	Regular customer	*Buy-back customer*
Sales, €	169	182
Sales, units	2.41	2.60
Returns, €	44	55
Returns, units	0.52	0.63
N, customers	175,990	1,017
N, orders	357,747	9,350

The descriptive statistics in Table 1 show that only a minor fraction of customers have engaged in the buy-back program since its inception (1,017 customers or 0.6%). However, order values are 8% higher for buy-back customers (€182) compared with all other (regular) customers (€169). With an overall return rate of 26% of the order value, the retailer experiences moderate return rates. We remark though that buy-back customers exhibit a slightly higher return rate, returning approximately 30% of the order value. Interestingly, buy-back customers exhibit a much higher order frequency, placing an average of nine orders compared with just two orders for regular customers over the analysis period. This indicates that customers engaging in the buy-back program may differ considerably from the average customer. Since this may cause bias from self-selecting into treatment (i.e., engaging in the buy-back program), we apply a rolling matching approach (Unal & Park, 2023). This technique lets us overcome the difficulties of different pre- and post-treatment periods as suitable control customers are matched to the treated at the time of treatment, which provides a fairer comparison between customers participating in the take-back program with those who do not.

We identify suitable control customers for 799 out of the 1,017 buy-back customers (79%) in our data. This is because, for many of the customers engaging in the program, we do not observe any subsequent purchase activity. We then applied a fixed effects panel regression model to examine changes in purchase behavior between the treated and control customers. The results of this analysis are shown in Table 2 below.

Table 2: Regression Results

	Sales (€)	*Returns (€)*
Treatment	-76.97***	-41.36**
Constant	756.85	217.05
N, observations	1,598	1,598
R^2	0.82	9,350

Note: ***p<0.01; **p<0.05

Discussion

Contrary to previous literature, our preliminary findings indicate that customers reduce their spending by an average of €76.97 after participating in the retailer's buy-back program, even after accounting for any discounts. Additionally, returns decreased by, on average, €41.36. Forthcoming analyses explore potential explanatory factors, such as customer heterogeneity, to identify conditions under

which buy-back programs in general may reduce overall consumption. In our case, allowing customers to sell back worn items through a buy-back program could potentially extend product lifespans and lower the demand for newly produced items.

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