

# Stores Going Online: Market Expansion or Cannibalization?\*

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## Abstract

With the rise of e-commerce, more chain stores have opened online sales channels. For one chain, there are usually one online store and many offline stores. Online stores may cannibalize the sales of the existing physical stores because of their advantage in lower shopping costs. On the other hand, the online sales channel is usually a tool for advertisement, which may expand the offline store's market. Also, the existence of the online store could increase consumers' utility in shopping in the offline store since they could check the product information before shopping in the physical store. From our novel daily revenue data of 380 offline stores from 2016 to 2020, we separately identify and estimate the countervailing cannibalization effect and the informative effect of opening up online branches on offline stores. We first use offline or online exclusive exogenous demand shocks (rainy days, Covid-19, and online shopping festivals) to provide solid evidence of these two effects. We then separately estimate these two effects by a nested logit model. We find that the cannibalization effect dominates the informative effect in most cases. The electronics category has the largest cannibalization effect, while the cosmetics and jewelry category has the smallest effect.

**Keywords:** e-commerce, multichannel store, cannibalization, informative effect, shopping mall

**JEL codes:** L13, L81

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# 1 Introduction

With the rise of e-commerce, online sales have been continuously growing in the past decades. In 2019 China has experienced a fast growth in online retail sales. It reached \$1.935 trillion in 2019, which accounts for 36.6% of its total retail sales.<sup>1</sup> More and more consumers make daily purchases by scrolling down screens on electronic devices instead of walking inside Brick-and-Mortar (B&M) stores.

In this paper, we study the interaction between online and offline sales channels of multichannel stores. We gather a unique data set matching B&M stores in shopping malls and their corresponding online sales channels. With this novel data set, we can separate and quantify two countervailing effects of online sales on the revenues of physical stores: cannibalization effect and informative effect.

The cannibalization effect occurs when opening up an online sales channel decreases the sales of the physical store. There are two main reasons for the cannibalization: First, consumers typically incur lower shopping (transportation) costs and search costs in online sales channels (Bakos, 1997; Forman et al., 2009) due to the user-friendly interface, convenient search tools, and electronic payment. Second, the online channel may also have a price advantage over the offline stores, and thus, in-store consumers may explore and search in physical stores but purchase the goods online (Basak et al., 2017; Daunt and Harris, 2017; Gensler et al., 2017; Kuksov and Liao, 2018; Wang and Wright, 2020).<sup>2</sup>

The informative effect exists if opening up an online sales channel increases the physical store sales. There are two main mechanisms: First, the online sales channel (website, app ...) usually carries advertisement or promotion information. Consumers who receive information from the online sales channel are more likely to learn and search for the brand or the store. Second, consumers can find the price and comments about the quality of the goods in an online store. This knowledge can potentially increase the expected utility of going to the offline branch (Honka et al., 2017).<sup>3</sup>

The core contribution of this paper is providing empirical evidence and quantifying how expanding online sales influences B&M stores through the cannibalization and informative effects. Many researchers have studied the interaction between online sales and offline sales, but few works have separately quantified the positive and negative impacts of online stores on the revenue of offline stores. One reason is the difficulty in obtaining data that matches online and offline sales channels. Most existing empirical studies use data on either online platforms or physical stores but not both

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<sup>1</sup>[www.emarketer.com/content/china-ecommerce-2019](http://www.emarketer.com/content/china-ecommerce-2019).

<sup>2</sup>68% of U.S. internet users indicate that they showroom at least occasionally. [www.statista.com/statistics/448677/us-webrooming-showrooming-penetration/](http://www.statista.com/statistics/448677/us-webrooming-showrooming-penetration/) Retailers such as Toys“R” Us, Bed, Bath & Beyond, and Best Buy often appear to be showrooms for Amazon.com. [www.placed.com/press-release/aisle-to-amazon-showrooming-retail-impact](http://www.placed.com/press-release/aisle-to-amazon-showrooming-retail-impact). Many B&M stores use price matching and exclusive product assortment to combat showrooming (Mehra et al., 2018).

<sup>3</sup>Some previously uninformed consumers can learn about the store from the online advertisements and decide to visit it in person. Consumers may visit the B&M stores for “touch and feel” experiences, shopping assistance, product returns, or other services (Ofek et al., 2011), (Jing, 2018).

(Ofek et al., 2011; Kireyev et al., 2017).

Our unique dataset enables us to identify the cannibalization effect and informative effect separately. The data consists of three parts: The first part is administrative data of a large shopping mall in Ningbo, China, containing rich and high-frequency information, including daily revenue of 380 stores operating in the mall from Sept 2016 to May 2020. We also have access to all the contracts between the stores and the shopping mall, so we observe rent information of all stores. The second part of the data is about the online sales channels, including the online store rating and accumulated sales. We construct the data by matching the B&M stores to their corresponding online stores on Taobao, the largest e-commerce platform in China. The third part of the data is the survey results from all store managers (or owners) in the shopping mall on February 13, 2021. We got 205 responses covering 99% of all the stores with a long-term rental contract with the shopping mall. In the survey, we collect additional store characteristics such as the number of employees, average wages, promotion and discount levels on big festivals, consumers' average spending, and profit margins.

Therefore, the shock caused by opening up the online sales channel could be considered exogenous to the mall's offline store owners.

In the empirical analysis, we first utilize exogenous demand shocks for offline and online stores to identify the existence of the cannibalization effect and informative effect. For consumers, the online shopping costs (delivery time and shopping fee) are typically fixed and are independent of distance and weather. However, the shopping costs in B&M stores (transportation costs) are affected by distance, weather, air pollution, and other factors.

After establishing the reduced-form evidence, we construct a discrete choice model for how consumers choose purchasing channels following Holmes (2011) and Zheng (2016). We apply the nested logit model to stores with possible online branches. Each store in the shopping mall, with or without the online channel, is represented by a brand. Consumers first choose which brand to buy and then decide whether to purchase via the online channel, the offline channel, or an outside option. We assume the store revenue as the product of consumer average spending, population number, and the probability representative consumer purchases in the store. We calculate the store revenue based on the model and assume the discrepancy between model-predicted log revenue and observed log revenue follows the normal distribution. Then, using maximum likelihood, we could estimate the demand side parameters.

Following Goeree (2008), we incorporate the informative effect into the model by assuming that the online channel enlarges the consumer base. We assume that the informative effect will only exist when the online store has some advertisement campaigns or promotions, then we could separate the informative effect and cannibalization effect. Then we define the cannibalization effect as the proportional revenue change after opening the online branch when there is no informative effect.

We also include a simplified supply-side model to help estimate the demand-side parameters. We make two assumptions about the choice variables of the chain and the local offline branches:

First, from our questionnaire survey towards all store managers, we confirm that the chain makes the opening decision of online branches, pricing for all products, and some chain-level promotions. Hence, we assume these decisions are exogenous to the local offline stores. Second, we assume local offline store managers make decisions like entry/exit, number of employees to hire, location decisions, and local promotions. These variables are endogenous. Then we use a two-stage supply model as [Fan \(2013\)](#) and [Eizenberg \(2014\)](#) that offline stores make decisions on the number of employees, store location (signing the contract with the shopping mall), and promotion numbers in stage I and price cut levels in Stage II.

Our paper contributes to the literature about how expanding online sales channels affects B&M shopping malls. Previous studies demonstrate different aspects of the impact ([Balasubramanian, 1998](#)). [Biyalogorsky and Naik \(2003\)](#) find that offline retailers are reluctant to extend their online business due to the fear of cannibalization. However, [Biyalogorsky and Naik \(2003\)](#) do not find evidence for cannibalization in the data they collected.

## 2 Next Step

Currently, we finished the data collection process and got reduced-form evidence that both the cannibalization effect and the informative effect exist. We also derived preliminary results from the simplified structural estimation. In the following year, we will use a full nested logit model for structural estimation and try to separate the channels behind the informative effect. After getting the results, we will then compose the main body of the paper.

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