Information Systems and Economics (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/infse.2025.060104
ISSN 2523-6407 Vol. 6 Num. 1

The Effect of Cross-Border E-Commerce on Hong Kong (China)'s Retailing Market

Yuqing Wu[a,*], Xiao Wang[b]

School of Management, Qingdao City University, Qingdao, Shandong, China
[a]wuyuqing1000@163.com, [b]982184899@qq.com
**Corresponding author*

Keywords: Cross-border e-commerce, Store-based retailing, Covid-19, Hong Kong (China)

Abstract: Hong Kong (China) government has introduced lots of policies to support the growth of cross-border e-commerce in these years. Cross-border e-commerce promotes the efficient use of multilateral resources and generate multiple advantages which contribute to the growth of Hong Kong (China) economy. However, the effect of cross-border e-commerce growth on the local retailing industries remains under-explored. To address this gap, this paper studies the impact of cross-border e-commerce on local retailing industries in Hong Kong (China), especially on store-based retailing. In addition, this paper also investigates the impact of covid-19 pandemic on the retailing market. Firstly, our result shows that the cross-border e-commerce has a negative effect on total retailing, however, it hasn't actually turned into a barrier to the growth of the entire retailing industry. Additionally, cross-border e-commerce has brought benefits during the covid-19 pandemic, which helped cushion the blow to the total retailing market. Secondly our study reveals that the cross-border e-commerce negatively affected the store-based retailing, but some subcategories such as Grocery retailers were not negatively influenced due to uniqueness of grocery products.

1. Introduction

Cross-border e-commerce refers to business transactions between consumers and suppliers in different countries through electronic trading platforms, using cross-border logistics for products delivery [1]. With the development and popularization of the Internet, Hong Kong (China) has seen a rapid growth in cross-border e-commerce in the past 10 years. The proportion of cross-border e-commerce in total retail volume has increased over the years in Hong Kong (China), from less than 0.3% in 2011 to 4.3% in 2022. Local retail market may be hit, since the booming of cross-border e-commerce has affected the consumer behavior. However, the existing literature has not empirically verified the effect of cross-border e-commerce on the retailing market. Therefore, further empirical research is warranted to discover what kind of impact it brings to local retail industries.

Covid-19 pandemic has spread wildly in Hong Kong (China), which also influenced the local economy. Thus it is crucial to explore how the pandemic impacts cross-border e-commerce and Hong Kong (China)'s retailing market. Moreover, this paper also provides suggestions for Hong Kong (China) government.

2. Literature Review

The cross-border e-commerce owns open and multidimensional trade mode, which promotes the efficient use of multilateral resources and encourages the enterprises to enter the international market [2]. There are many motivations for foreign enterprises to choose cross-border e-commerce as their market entry mode, lower transaction cost with this mode is one of the key factors [3]. In these years, many policies have introduced to support the development of cross-border e-commerce. The supply chain management for cross-border e-commerce has also been improved over years to provide higher security [4]. These positive factors have made cross-border e-commerce become a new force of retailing industry.

There are many researchers studying cross-border e-commerce from the perspective of consumer benefits. For example, Gomez-Herrera has mentioned in his study that consumers could get welfare because of increased diversity of product supply and more price competition [5]. Dixon pointed out that Internet-based cross-border e-commerce was unique in that it has given sellers the opportunity to provide products of great value at a low price [6]. Similarly, Martens emphasized that the increasing online trade competition caused online price reduction, which also led to downward pressure on product prices of local supplies, both online and offline [7]. These studies have shown that cross-border e-commerce has price advantages comparing to the traditional retail modes.

Moreover, some researchers also found that cross-border e-commerce as an online buying method saved plenty of time and made it easier for consumers to compare products on the website [8]. Those advantages of cross-border e-commerce have driven a large percentage of people from offline to online. However, whether this transformation negatively affects local retail remains uncertain and requires further research.

Pantano analyzed the challenges faced by retailers during the pandemic, the study also showed that covid-19 has affected consumer behavior and led to online business [9]. In 2022, 73% online shoppers of Hong Kong (China) shopped cross-border. [10] In this study we also talked about the covid-19 impact on Hong Kong (China) retailing industry.

3. Analytic framework

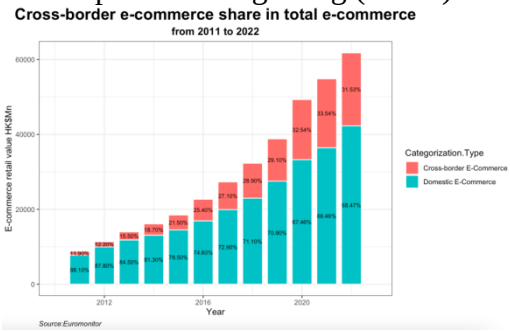
3.1. Retailing structure of Hong Kong (China)

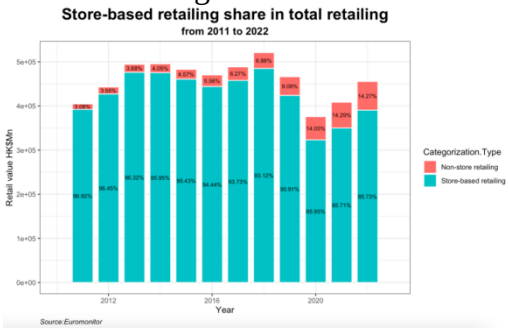
Figure 1 shows the structure of current retailing industries of Hong Kong (China). The total e-commerce, including cross-border e-commerce and domestic e-commerce, here only refers to B2C sales (business-to-consumer), and it excludes C2C (consumer-to-consumer) and B2B (business-to-business). The e-commerce transaction obeys the following rules: if an order is initiated online, even if it is ultimately paid for in-store, this order is still considered to be an e-commerce transaction. There is no overlap between total e-commerce and store-based retailing.

Figure 1: Retailing structure of Hong Kong (China) (Data source: Euromonitor).

Figure 2 shows the cross-border e-commerce trend and it's share in total e-commerce. We can see that both domestic and cross-border e-commerce has continued to grow in the past years, but the proportion of cross-border e-commerce has increased from 11.9% (2011) to 31.53% (2022). The rapid growth of cross-border e-commerce could affect the retailing market. Thus, the following research hypothesis was proposed: Hypothesis 1 (H1). The cross-border e-commerce has a negative impact on Hong Kong (China) total retailing market.

Figure 3 shows the trend of store-based retailing and it's share in total retailing of Hong Kong (China). The proportion of store-based retailing has decreased from 96.92% (2011) to 85.73% (2022), but it is obvious that store-based retailing still dominants the retailing market of Hong Kong (China). The products through cross-border e-commerce own a cheaper price and even better product quality than traditional retailing products, which may be a threat to local retailing industry [11]. It is critical to investigate the impact of cross-border e-commerce on store-based retailing. Therefore, we proposed the following hypothesis: Hypothesis 2 (H2). The cross-border e-commerce has a negative impact on Hong Kong (China) store-based retailing.





(Data source: Euromonitor)

Figure 2 Retailing share (1)

Figure 3 Retailing share (2).

3.2. The covid-19 impact on Hong Kong (China)'s retailing market

A multiplicative decomposition of total retail sales value was implemented from 2005 to 2022. The method used for estimating components here is STL (Seasonal and Trend decomposition using Loess) [12]. The residual component is what is left over when the seasonal and trend components have been subtracted from the data. We use the residual component to do the anomaly detection. Figure 4 is the residual plot with the upper and lower limit. The upper limit and lower limit are defined as following: lower=resid_mu - 3*resid_dev; upper=resid_mu + 3*resid_dev. Resid_mu represents the mean of the residual and resid_dev represents the standard deviation of residual. Any time point which breaches the green bars either the upper limit or lower limit is classified as an anomaly. Based on Figure 4 five anomalies can be observed: Feb 2015, Feb 2018, Feb 2020, Mar 2020, Mar 2022. Figure 5 shows the original total retail sales value with these five anomalies which were marked red.

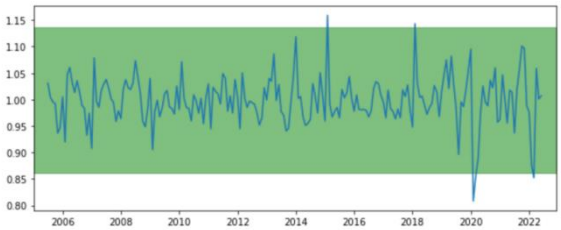


Figure 4: Residual plot.

Figure 5: Total retail sales value trend of Hong Kong (China).

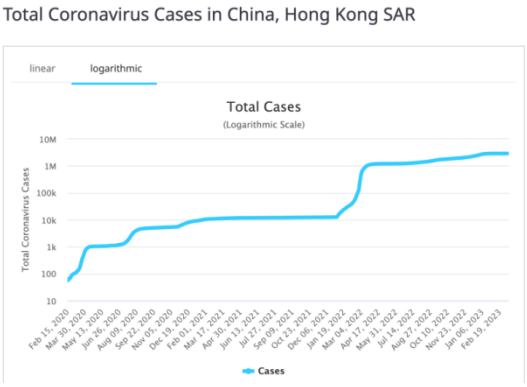


Figure 6: Total Coronavirus Cases in China, Hong Kong (China) [13]

Three anomalies can be observed since 2020: Feb 2020, Mar 2020, Mar 2022. It is obvious that there is a remarkable decline of the total retail value in Feb 2020, Mar 2020 and Mar 2022. Figure 6 shows the trend of total confirmed cases of Hong Kong (China) in logarithmic scale. The retailing industry saw a significant decline in Feb and March 2020 but began to recover afterward. However, it declined remarkably again in March 2022, throughout this period, the number of confirmed cases peaked and reached a new high in Hong Kong (China). Zohal spotted out that due to the widespread lockdown in the first quarter of 2020, China's economy shrank and experienced the first quarter GDP decline since 1992 [14]. In this period, e-commerce has grown relatively faster during the epidemic where implemented containment methods were stringent [15], therefore we proposed the following hypothesis: Hypothesis 3 (H3). During the pandemic, the cross-border e-commerce is a positive rather than a negative influencing factor on total retailing market of Hong Kong (China).

4. Empirical analysis

The data in this study is from 2011 to 2022. In view of sample size and data availability, the data was collected from two datasets. Data on total retail value, cross-border e-commerce, and store-based retail value were collected from Euromonitor Database, while the data of GDP per capita were sourced from the Census and Statistics Department of Hong Kong (China). In this study, the introduction of time variable and interactive variable that consists of time and core explanatory variable allows us to verify if parameter coefficients of the variables will change over time [16].

4.1. Impact of cross-border e-commerce on total retail value

4.1.1. Variable selection and model building

In order to test H1, we chose the total retail value (denoted as retail) of Hong Kong (China) as the dependent variable, and cross-border e-commerce retail value (denoted as cross) as the core explanatory variable. To control for macroeconomics trend, we also took GDP per capita (pgdp) as

an independent variable. To reduce variability, we standardized these three variables by taking logarithm. The basic model is formulated as follows:

$$\text{logretail} = \beta_0 + \beta_1 \text{logcross} + \beta_2 \text{logpgdp} + \varepsilon \quad (1)$$

Since 2011 comes many good supports and policies toward e-commerce and retailing, which may influence retailing sales, we added time relevant independent variables including time trend (denoted as t, the variable equals to one if the observation was in 2011, equals to two if it was in 2012 and so on), interactive trend (denoted as t* logcross, used to test if the effect of cross-border e-commerce on total retail value has changed significantly since 2011). Our final model is as follows:

$$\text{logretail} = \beta_0 + \beta_1 \text{logcross} + \beta_2 \text{logpgdp} + \beta_3 t + \beta_4 t * \text{logcross} + \varepsilon \quad (2)$$

where β_0 is a intercept, β_1–β_4 are coefficients, ε is a stochastic disturbance term.

4.1.2. Empirical results and discussions

We used least square regression to build model for this study. As shown in Model 1 of Table 1, the coefficient of cross-border e-commerce is significant. When the cross-border e-commerce increased 1%, total retail value would decrease by 0.29%. Therefore, H1 is supported.

Table 1: Regression results for total retail value

	(1)	(2)
	lnretail	lnretail
lncross	-0.290*** (0.083)	-0.533** (0.184)
lnpgdp	2.343*** (0.677)	0.991 (0.607)
t*lncross		-0.045** (0.014)
t		0.575** (0.190)
_cons	-14.293 (7.926)	3.951 (7.642)
adj. R2	0.485	0.756

Note: Significance: * p < 0.1, ** p < 0.05, *** p < 0.01

The results of Model 2 in Table 1 show that the coefficient of the interactive trend is -0.045, which is small but significant. This indicates that the negative impact of cross-border e-commerce on total retail value not only persists each year but also varies significantly year by year. The coefficient of t is 0.575, positive and significant, indicating changes in the total retail value cannot be fully explained by lncross and lnpgdp alone. The positive effect increases year by year, showing a strong growth momentum of total retail value. The absolute value of the coefficient of lncross (0.533) is lower than that of t in 2011 (0.575), which means that the total retail's strong growth momentum has sufficiently offset the negative impact of cross-border e-commerce. Therefore, cross-border e-commerce has not really become an obstacle of the growth for total retail value.

4.2. Impact of cross-border e-commerce on store-based retailing

4.2.1. Variable selection and model building

To test the cross-border e-commerce's impact on store-based retailing (H2), store-based retail value (denoted as store) was chosen as the dependent variable. The regression is as follows:

$$logstore = \beta_0 + \beta_1 logcross + \beta_2 logpgdp + \varepsilon \quad (3)$$

4.2.2. Empirical results and discussions

As shown in Model 1 of Table 2, the coefficient of cross-border e-commerce is significant. When the cross-border e-commerce increased 1%, store-based retail value would decrease by 0.398%. From the results above, we can conclude that H2 is wholly fulfilled.

Table 2: Regression results for store-based retail value

	(1)
	lnstore
lncross	-0.398*** (0.096)
lnpgdp	2.891*** (0.781)
_cons	-20.416* (9.146)
adj.R2	0.606

Note: Significance: * p < 0.1, ** p < 0.05, *** p < 0.01

The store-based retailing consists of three subcategories: Grocery retailers, Non-Grocery Specialists and Mixed retailers (as shown in Fig.1). In order to test whether the impacts of cross-border e-commerce are different between these three subcategories, we build regression model respectively, (4) for Grocery retailers, (5) for Non-Grocery Specialists and (6) for Mixed retailers:

$$loggrocery = \beta_0 + \beta_1 logcross + \beta_2 logpgdp + \varepsilon \quad (4)$$

$$lognongrocery = \beta_0 + \beta_1 logcross + \beta_2 logpgdp + \varepsilon \quad (5)$$

$$logmix = \beta_0 + \beta_1 logcross + \beta_2 logpgdp + \varepsilon \quad (6)$$

According to the results shown in Table 3, the cross-border e-commerce has negative effect on non-grocery specialists and mixed retailers (with coefficient -0.637 and -0.373 respectively), while it has positive effect on grocery retailers (with coefficient 0.135).

Table 3: Regression results

	(1)	(2)	(3)
	lngrocery	lnnongrocery	lnmix
lncross	0.135*** (0.021)	-0.637*** (0.124)	-0.373** (0.123)
lnpgdp	-0.290 (0.174)	4.331*** (1.010)	3.005** (1.009)
_cons	13.987*** (2.043)	-37.131** (11.826)	-24.144* (11.812)
adj. R2	0.969	0.743	0.394

Note: Significance: * p < 0.1, ** p < 0.05, *** p < 0.01

4.3. The performance of cross-border e-commerce during covid-19 pandemic

4.3.1. Variable Selection and Model Building

To test H3, we selected the total retail value (monthly data from 2020 to 2022) as the dependent variable and cross-border e-commerce value as the core explanatory variable. Given the lack of

monthly data on cross-border e-commerce from 2020 to 2022, we used value of online retail sales by selected type of retail outlet that was available as a measure of the cross-border e-commerce value. (Data source: Census and Statistics Department of Hong Kong (China)). Moreover, during the pandemic, a series of policies has been taken by Hong Kong (China) government to tackle covid-19, thus we used stringency index (monthly data) from Oxford Covid-19 Government Response Tracker as a control variable. The stringency index records the strictness of "lockdown style" policies that primarily restrict people's behavior. It is calculated using the following indicators: school closing, workplace closing, cancel public events, restrictions on gathering size, close public transport, stay at home requirements, restrictions on internal movement, restrictions on international travel and public information campaigns [17]. The regression model is as follows:

$$\text{logretail} = \beta_0 + \beta_1 \text{logcross} + \beta_2 \text{stringency} + \varepsilon \quad (7)$$

4.3.2. Empirical results and discussions

According to the results of Table 4, the adjusted R-squared is 0.2110. Despite the relatively low adjusted R-squared, the low p-values indicate a significant relationship between the independent variables and the response variable. Specifically, the coefficient of cross-border e-commerce is positive and significant, confirming its positive impact on total retail value during the pandemic. Conversely, the coefficient of the stringency index is negative and significant, suggesting that stricter containment measures have a greater negative effect on the total retail market.

Table 4: Regression results for total retail value during pandemic

	(1)
	lnretail
lncross	0.253**
	(0.100)
stringencyindex	-0.004**
	(0.001)
_cons	8.742***
	(0.676)
adj. R2	0.211

Note: Significance: * p < 0.1, ** p < 0.05, *** p < 0.01

5. Conclusions and Implications

Our empirical analysis shows a significant negative relationship between cross-border e-commerce and total retail value. However, this negative impact has been offset by other factors, preventing cross-border e-commerce from being a true obstacle to total retail growth. Moreover, a positive relationship emerged during the pandemic, indicating that cross-border e-commerce helped mitigate some negative effects of Covid-19 and supported the growth of total retail.

This study also reveals a significant negative relationship between cross-border e-commerce and store-based retailing. Specifically, cross-border e-commerce negatively impacts non-grocery specialists and mixed retailers but positively affects grocery retailers. This discrepancy is partly due to the nature of grocery products. Grocery stores mainly sell fresh and packaged food products, which are unsuitable for long-distance shipping. As a result, cross-border e-commerce rarely involves food products, and its development does not threaten local grocery sales in Hong Kong (China).

During the pandemic, Hong Kong (China) government should promote favorable policies for cross-border e-commerce to mitigate the negative effects of covid-19 on total retailing industry. At

the same time, we can't ignore the long-term negative impact of cross-border e-commerce on store-based retailers, especially for non-grocery specialists and mixed retailers. Despite the growth of cross-border e-commerce, store-based retailing will remain dominant in total retailing market for a long time, therefore Hong Kong (China) government should take measures to support store-based retailers, such as providing more business premises for store-based retailers and reducing the use-cost.

References

[1] N. Chen and J. Yang, "Mechanism of government policies in cross-border e-commerce on firm performance and implications on m-commerce," International Journal of Mobile Communications, vol. 15, no. 1, pp. 69–84, Jan. 2017, doi: 10.1504/IJMC.2017.080578.

[2] C. Wang, "Analyzing the Effects of Cross-Border E-Commerce Industry Transfer Using Big Data," Mobile Information Systems, vol. 2021, pp. 1–12, Jun. 2021, doi: 10.1155/2021/9916304.

[3] X. Qi, J. H. Chan, J. Hu, and Y. Li, "Motivations for selecting cross-border e-commerce as a foreign market entry mode," Industrial Marketing Management, vol. 89, pp. 50–60, Aug. 2020, doi: 10.1016/j.indmarman.2020.01.009.

[4] Z. Liu and Z. Li, "A blockchain-based framework of cross-border e-commerce supply chain," International Journal of Information Management, vol. 52, p. 102059, Jun. 2020, doi: 10.1016/j.ijinfomgt.2019.102059.

[5] E. Gomez-Herrera, B. Martens, and G. Turlea, "The drivers and impediments for cross-border e-commerce in the EU," Information Economics and Policy, vol. 28, pp. 83–96, Sep. 2014, doi: 10.1016/j.infoecopol.2014.05.002.

[6] T. Dixon and A. Marston, "U.K. Retail Real Estate and the Effects of Online Shopping," Journal of Urban Technology, vol. 9, no. 3, pp. 19–47, Dec. 2002, doi: 10.1080/1063073022000044279.

[7] B. Martens, "What Does Economic Research Tell Us about Cross-Border E-Commerce in the EU Digital Single Market?" Feb. 15, 2013, Rochester, NY: 2265305. doi: 10.2139/ssrn.2265305.

[8] M. Limayem, M. Khalifa, and A. Frini, "What makes consumers buy from Internet? A longitudinal study of online shopping," IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans, vol. 30, no. 4, pp. 421–432, Jul. 2000, doi: 10.1109/3468.852436.

[9] E. Pantano, G. Pizzi, D. Scarpi, and C. Dennis, "Competing during a pandemic? Retailers' ups and downs during the COVID-19 outbreak," Journal of Business Research, vol. 116, pp. 209–213, Aug. 2020, doi: 10.1016/j.jbusres.2020.05.036.

[10] "PPRO Payments & E-Commerce Report: Asia Pacific," PPRO. Accessed: Mar. 28, 2023. [Online]. Available: https://www.ppro.com/insights/ppro-payments-e-commerce-report-asia-pacific/

[11] J. Chen, N. Tournois, and Q. Fu, "Price and its forecasting of Chinese cross-border E-commerce," Journal of Business & Industrial Marketing, vol. 35, no. 10, pp. 1605–1618, Jan. 2020, doi: 10.1108/JBIM-01-2019-0017.

[12] R. B. Cleveland, W. S. Cleveland, and I. Terpenning, "STL: A Seasonal-Trend Decomposition Procedure Based on Loess," Mar. 1990, Accessed: May 07, 2023. [Online]. Available: https://www.proquest.com/docview/1266805989

[13] "Hong Kong COVID - Coronavirus Statistics - Worldometer." Accessed: Mar. 28, 2023. [Online]. Available: https://www.worldometers.info/coronavirus/country/china-hong-kong-sar/

[14] Z. Habibi, H. Habibi, and M. A. Mohammadi, "The Potential Impact of COVID-19 on the Chinese GDP, Trade, and Economy," Economies, vol. 10, no. 4, p. 73, Apr. 2022, doi: 10.3390/economies10040073.

[15] V. H. Alfonso, C. Boar, J. Frost, L. Gambacorta, and J. Liu, "E-commerce in the pandemic and beyond: online appendix," 2021. Accessed: Feb. 08, 2025. [Online]. Available: https://www.semanticscholar.org/paper/E-commerce-in-the-pandemic-and-beyond%3A-online-Alfonso-Boar/c30fffbb05adcb6711dfd1ffc62f20159809e1f2#citing-papers

[16] Y. Wang, Y. Wang, and S. H. Lee, "The effect of cross-border e-commerce on China's international trade: An empirical study based on transaction cost analysis," Sustainability, vol. 9, no. 11, p. 2028, 2017.

[17] "COVID-19 Data Explorer," Our World in Data. Accessed: Mar. 28, 2023. [Online]. Available: https://ourworldindata.org/explorers/coronavirus-data-explorer