Valuation of plastic materials in the second-hand markets

○Jinsong Li (李 金松)[*], Kenji Takeuchi (竹内 憲司)[†]

1. Introduction

Clothing is one of the basic needs of human beings. While traditional materials, such as cotton, wool, leather, and silk, have been used to make textiles and clothes for centuries, oil-based synthetic fibers, such as nylon, acrylic, polyester, and elastane, have spread widely during the last few decades. The production and disposal of clothes made from oil-based synthetic fibers, which are certain types of plastics, would greatly impact the environment.

According to Roser et al. (2019), fiber production for textile manufacturing has doubled in the past 20 years even though the population has only grown by 25% over the same period. While there are more than 30% of the clothes purchased in Europe have not been worn for at least one year (European Parliamentary Research Service, 2019).

This study aims to delve into the reuse market of clothes, with a particular focus on clothes made of plastic materials. We investigate how plastic materials in used clothes are evaluated in the market and explore the implication for policy toward the circular economy.

2. Data and Method

We use data from Mercari, which is one of the biggest online second-hand marketplaces in Japan. We obtained the dataset via the National Institute of Informatics (2023) which covers all the commodities posted in Mercari from Jan. 1, 2020, to Dec. 31, 2020. The dataset provides information basically on price, time-on-market, the descriptions written by the sellers, categories, the names of the brands, and the condition of the used items.

In this study, we focus on shirts and T-shirts which have simple designs and less complex combinations of materials. Because the data do not contain exact information on the materials used, we search the keywords of the materials from the comments provided by sellers and extract the numbers after these keywords to obtain the information on the proportion of the material used in clothes. As there are a large number of clothes posted without any description of the material, we lose many observations when analyzing the effect of the proportion of the materials. For example, about 41% of shirts do not have descriptions on the materials.

[*] Graduate School of Global Environmental Studies, Kyoto University. Email: *li.jinsong.4i@kyoto-u.ac.jp*

[†] Graduate School of Global Environmental Studies, Kyoto University.

3. Preliminary Results

Table 1 reports our preliminary results using the OLS model on the effect of the proportion of polyester and cotton on the price and time-on-market of shirts. In these models, we only include clothes with mixed materials, and the clothes that use pure material, such as 100% polyester, cotton, or silk, were dropped to avoid the possible bias caused by the different preferences between clothes made of pure material and mixed material. *Polyester* denotes the proportion of polyester in the clothes while *Cotton* denotes the proportion of cotton in the clothes. *Brand* is a dummy variable that equals 1 if the clothes have a brand listed in the Mercari brand list. *Conditions of Clothes* is measured in five levels where the higher number indicates worse. The estimated coefficient of *Polyester* indicates that a 10% increase in the proportion of Polyester will reduce the price by 123 Yen and the time-on-market by 31 hours.

Table 1 Preliminary Results of Second-hand Clothes with Mixed Materials

Variables *(Unit)*	Price	Time-On-Market
Polyester (%)	-12.34***	-3.115***
	(0.654)	(0.886)
Cotton (%)	-4.208***	2.015**
	(0.705)	(0.894)
Brand (=1 if brand listed,	667.5***	-361.4***
=0 otherwise)	(35.02)	(63.18)
Conditions of Clothes	-368.3***	106.1**
(from 1 to 5, smaller is better)	(29.42)	(43.72)
Shipping Duration	-182.4***	160.1***
(from 1 to 3, smaller is quicker)	(26.84)	(38.29)
Observations	35,226	35,226

4. Findings

Based on our preliminary estimation results, we found that second-hand clothes with a higher proportion of polyester are cheaper and would be sold out quicker and clothes with worse conditions tend to have lower prices and longer time-on-market. From these results, we can infer that to promote the reuse of second-hand clothes, policymakers could encourage or nudge consumers to wear their clothes carefully as clothes in good condition can be traded at higher prices and within shorter times which is beneficial to both consumers and the environment.