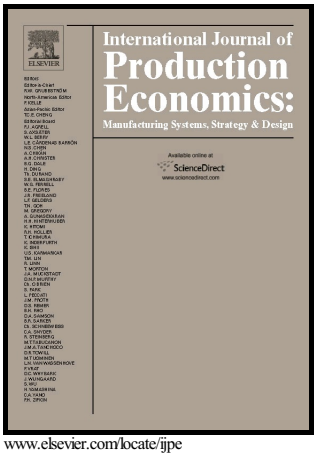

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The Influence of E-services on Customer Online Purchasing Behavior toward Remanufactured Products [1]

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ABSTRACT

Remarketing and reselling remanufactured electronic products is one of the effective and sustainable approaches to deal with the rapidly increasing e-waste. Studying customer purchasing intention and behavior toward remanufactured products can help businesses better understand customers' needs and improve closed-loop supply chain performance. Via an empirical study based on new, manufacturer remanufactured, seller remanufactured, and used products transaction data from eBay, one of the most popular online markets, this paper investigates the impact of e-service offerings in four online transaction phases (i.e., information, agreement, fulfillment, and after-sales phase) on customer purchasing intention toward remanufactured products in both auctions and fixed price transactions. The results indicate that e-service offerings in the information phase are most influential on customers' willingness to pay (WTP) in both types of transactions. In addition, we find e-services in auctions has higher positive influence on customers' WTP compared to fixed price transactions, as demonstrated by the results that e-services in all four online transaction phases significantly influence customers' WTP in auctions, but not in fixed price transactions. The results also show that in both types of transactions, customers are willing to pay a premium for seller remanufactured products, and even more for manufacturer remanufactured products and new products, compared with used products. Furthermore, we discuss the managerial implications on customer online purchasing intention toward remanufactured products and online sellers' sales strategies.

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Closed-loop supply chain management, remanufactured product, e-service, consumer willingness to pay (WTP)

1. Introduction

Climate change is real, and our society is realizing the urgency of actions for sustainable development. As of August 2016, 180 UNFCCC (United Nations Framework Convention on Climate Change) members have signed the PARIS treaty aiming to reduce the adverse impacts of climate change, foster climate resilience, and reduce greenhouse gas emissions. Significant changes are also being made in various industries. One of the areas that attract major research attention is how to deal with the rapid increase of electrical and electronic equipment waste (e-waste). In the European Union alone, e-waste grows at a rate of 3-5% annually, which is about three times faster than average waste (Wakolbinger et al., 2014). In United States, the total weight of e-waste in the first decade of the 21st century is more than 120% over the e-waste generated during the last decade of the 20th century (Wang et al., 2017). However, about 90% of e-waste is still landfilled or incinerated, which damages both environment and human health (Wakolbinger et al., 2014).

At the same time, e-waste can be a treasure trove through sustainable development approaches such as closed-loop supply chain (CLSC) management. By recycling, remanufacturing, remarketing, and reusing used materials or parts, circle of materials usage may be created. Hence, closed-loop supply chains help creating the newly defined "circular economy" (MacArthur, 2013). With the rapid development of technology, remanufacturing in the CLSC management has been advocated as an important approach to reduce the e-waste disposal and the associated costs (Wang et al., 2017).

Remanufacturing can be implemented by either original equipment manufacturers (OEMs), certified manufacturers, or the retailers. Despite the economic and environmental merits of remanufacturing, reselling and remarketing of remanufactured products can be challenging. From the consumers' perspective, there may be low incentive to purchase remanufactured products due to a variety of reasons including concerns on quality, trust on CLSC processes, trust on resellers, perceived risk in online environment, and concerns on reselling prices and

related costs (Subramanian and Subramanyam, 2012). Therefore, how to promote remanufactured products through remarketing and reselling processes to enhance customer purchase intention on remanufactured products is critical for the success of CLSCs.

Online retailing through e-commerce has become one of the most active channels for remanufactured products (Neto et al., 2016). E-commerce channels are different from traditional retailing channels in terms of overall sales turnover and characteristics of customer order flows (Canetta et al., 2013). E-service offerings, defined as services offered by online sellers during the four transaction phases of online shopping process (Xu et al., 2017), can enhance customers' perceived quality of products and customer perception including retention, satisfaction, and loyalty (Cristobal et al., 2007). E-service offerings normally cover all the online transaction phases: information services, agreement services, fulfillment services, and after-sales services (Bauer et al., 2006; Xu et al., 2017). Thus, it is of particular importance to understand the role of e-services in influencing the consumer purchasing intention toward remanufactured products, and to improve corresponding e-services provided through e-commerce channels.

Some recent studies explored the influential factors of customer purchasing intention and behavior toward remanufactured products (e.g., Subramanian and Subramanyam, 2012; Neto et al., 2016). However, a systematic view of the roles of e-service offerings in all online transaction phases on customer purchasing intention toward remanufactured products is lacking. Also, previous studies focused on customer perception toward limited product conditions only in auctions such as remanufactured products in C2C auctions (e.g., Pang et al., 2015). Our study provides a more comprehensive view on customer perception toward products of various conditions (i.e., new, manufacturer remanufactured, seller remanufactured, and used products) in both auctions and fixed price transactions in online markets.

Specifically, the objective of this study is to investigate the factors influencing consumer purchasing intention, in terms of willingness to pay (WTP), toward remanufactured products from the perspective of e-services provided in the four online transaction phases (i.e. information phase, agreement phase, fulfillment phase, and after-sales phase) in both auctions and fixed price transactions. Our study aims to answer the following research questions. First, how e-service offerings in each online shopping transaction phase impact customers'

WTP toward remanufactured products? Second, how customers' WTP differs between products of various conditions? Third, how do different types of online transactions environments (i.e. auctions and fixed price transactions) influence customers' WTP? Finally, how should reselling and remarketing decision makers improve e-services to enhance the CLSC performance? In order to address these research questions, data of completed transactions are collected from eBay - one of the leading online markets in the U.S., and multiple regression is used to analyze the data.

Our study has four major contributions to the current literature. First, it is among one of the first few papers to investigate the impact of e-service offerings on customers' WTP in all four online transaction phases. Second, our analysis considers more product conditions (new, manufacturer remanufactured, seller remanufactured, and used) comparing with previous studies on remanufactured products reselling. Third, additional new influential variables such as autopay, expedited shipping, and bid count are considered in our study to test for customers' WTP under different product conditions. Lastly, we examine the role of the type of online transactions environment (i.e., auctions and fixed price transactions) in the impact of e-service offerings on customers' WTP for products of various conditions. We further provide the managerial implications for improving corresponding e-services offerings in both types of transactions.

The rest of the paper is organized as follows. Relevant literature is reviewed in Section 2. In Section 3, the hypotheses are presented. Section 4 introduces data and methodology. Section 5 elaborates the model and analysis. Regression results are discussed in Section 6. Section 7 explores the theoretical and managerial implications of the results. In the end, Section 8 concludes the paper, and discusses the limitation and future research directions.

2. Literature Review

2.1 Sustainable and CLSC

Sustainable supply chain management (SSCM) and CLSC literature has developed rapidly during the past two decades. Previous survey papers about SSCM focus on the three dimensions of sustainability: environmental, social, and economic sustainability (e.g., Kleindorfer et al., 2005; Seuring and Muller, 2008; Ashby et al., 2012; Malviya and Kant, 2015; Xu and Gursoy, 2015). Within the scope of sustainable supply chain management literature, our study investigates the economics in remanufactured product selling, which generates managerial

insights on enhancing the efficiency and incentivizing the innovation in closed-loop supply chains. The current main methodologies (survey and case study) used in sustainable supply chain management literature are still at the descriptive level (Ashby et al., 2012; Touboulic and Walker, 2015). This paper applies predictive analytic tools by investigating data collected from eBay. In this sense, our paper contributes to the broader sustainable supply chain management literature by investigating the economic dimension of closed loop supply chains and applies predictive analytical tools.

For CLSC management, Govindan et al. (2015) reviewed 382 papers related to reverse logistics and CLSC from 2007 to 2013, categorized the CLSC problems into 12 main streams, and identified the gaps for future research. Our study can be considered as contributing to one of streams - quantitative analysis of customer behavior in CLSC. And our study fills one of the gaps identified by Govindan et al. (2015) by forecasting customer behaviors in CLSC through examining uncertain parameters. Atasu et al. (2008a) classified the CLSC research into four streams: industrial engineering/operations research, design, strategy, and behavioral; and presented a framework linking these streams. According to Atasu et al. (2008a), remarketing and reselling of remanufactured products are related to both CLSC strategy and CLSC design. Our study follows this research stream on reselling and remarketing of remanufactured products.

2.2 Remarketing and Reselling of Remanufactured Products in CLSC

Remanufacturing can be used as a marketing strategy for various purposes such as providing the opportunities for businesses to defend markets through pricing discrimination strategy (Atasu et al., 2008b). The profitability of remanufacturing processes strongly depends on remanufacturing cost savings, green segment size, market growth rate, and consumer valuations for the remanufactured products (Atasu et al., 2008b).

One of the main streams of CLSC research focuses on the reselling and remarketing of remanufactured products (e.g., McConocha and Speh, 1991; Debo et al., 2005). Remarketing is the commercialization of remanufacturing technology (McConocha and Speh, 1991). Remarketing and reselling are among the important activities in the evolution of CLSC (Guide and Van Wassenhove, 2009). However, the remarketing process can be a bottleneck preventing the whole CLSC from realizing the potential value from remanufacturing (Guide and Li, 2010).

Previous studies analyzed the production, remarketing, and reselling of remanufactured products with the existence of new products (i.e., market cannibalization between new and remanufactured products) (e.g., Ferrer and Swaminathan, 2006; Ovchinnikov, 2011). The important issues of remarketing and reselling remanufactured product include pricing and sales channel decisions.

In terms of pricing issues, dynamic pricing decision of remanufactured products with new products is one of the key remarketing and reselling strategies (Chen and Chang, 2013). For example, Ferrer and Swaminathan (2006) found that if remanufacturing is very profitable, OEM can lower the price of new products, and thus increase the product cores available for remanufacturing in future periods. However, as the threat of competition increases, OEM tends to utilize all core products for remanufacturing, and resell those remanufactured products at a lower price. Ovchinnikov (2011) found that businesses can earn more profits from remanufacturing by producing more units of remanufacturing products and charging a much lower retail price compared with the new ones. Overall, low-price strategy is of high importance for marketing remanufactured products (Michaud and Llerena, 2006; Guide and Li, 2010). The main reason is because the OEM with a name brand premium would be better benefited by marketing and selling remanufactured products because the lower priced remanufactured products reach a customer segment who desires to have the name brand, but do not have the willingness to pay for the name brand premium price (Guide and Li, 2010).

In terms of sales channel decisions, previous studies examined the management of secondary distribution channels in which sellers and customers sell remanufactured and used products, and found that secondary distribution channels can influence the profits of new product supply chain (e.g., Purohit and Staelin, 1994). Managing secondary distribution channels can also help minimize the risk of offering remanufactured products to quality/newness conscious customers (Atasu et al., 2010). Businesses need to make the decision whether to remanufacture the products and introduce them into a secondary market or not. Debo et al. (2005) identified the key technology and market drivers for companies to produce remanufactured products, and introduced the strategies of how the remanufactured products should be introduced to the market. They identified that the main target market of remanufactured products should be the lower-end market, as also confirmed by Ovchinnikov (2011). Gan et al. (2016) found implementing a separate sales channel for remanufactured products through

manufacturer's direct channel can make the supply chain earn more profits compared with using a single-channel only through retailers. Our study bridges the studies of pricing and sales channel of remanufactured products via examining the market price (customers' WTP) of online remanufactured products market in two sub sales-channels (transaction types): auction and fixed price. In addition, our research attempts to identify the online sellers' influential e-services as one of the remarketing and reselling strategies of remanufactured products.

2.3 Customer Perception of Remanufactured Products

Understanding customer perception toward remanufactured products is the key of remarketing and reselling remanufactured products (Subramanian and Subramanyam, 2012). Previous studies discussing customer perception toward remanufactured products can be categorized into three streams.

The first stream is to analyze the influential factors of customer perception toward the perceived quality of remanufactured products (e.g., Hazen et al., 2012). These influential factors include customers' ambiguity tolerance (Hazen et al., 2012), and customers' relationship with the sellers and other stakeholders in the close-loop supply chain (Östlin et al., 2008). Hazen et al. (2012) found increasing customer tolerance of ambiguity can enhance the perceived quality toward remanufactured products. Thus, reducing ambiguity level in the remanufacturing production processes is beneficial. The attractiveness of remanufactured products is positively related to the price discount, perceived quality, customers' green perception toward the product, and negatively related to their disgust perception toward them (Abbey et al., 2015).

The second stream is to examine the influential factors of customer purchasing intention toward remanufactured products (e.g., Wang and Hazen, 2016). These influential factors include purchase attitude, perceived behavioral control, perceived risk and benefit, product knowledge (Wang et al., 2013), brand equality (Keller 1993, Abbey et al. 2015); and customers' cost knowledge (Wang and Hazen, 2016). Since remanufactured products reflect the essence of sustainability, customers' green knowledge (Wang and Hazen, 2016) and green behavior (Hazen et al. 2011) also influence their purchasing intention toward remanufactured products. Wang and Hazen (2016) studied consumer perception of remanufactured products from the perspectives of cost, quality, and green attributes; and the results show consumer purchase intention on remanufactured products is positively

impacted by perceived value, which is influenced by customers' quality, cost, and green knowledge; and negatively impacted by perceived risk, which is influenced by customers' quality and cost knowledge.

The third stream is to compare customers' WTP among remanufactured products and new products (e.g., Pang et al., 2015). Two types of customers: newness-conscious and functionality-oriented consumers are described in Atasu et al. (2010) study. Newness-conscious consumers value newness with quality, and are willing to pay a premium for it. Functionality-oriented consumers value the services delivered by the product more than newness, and thus would like to pay less. Thus, the differences of customers' WTP exist among new, manufactured, and used products. On one hand, remanufactured products are characteristically different from used products because they are restored to a like-new condition (Hazen et al., 2012). On the other hand, customers still generally value remanufactured products less than new ones (Debo et al., 2005), and thus would like to pay less for remanufactured products compared with the new ones (Guide and Li, 2010). Therefore, customers' WTP for remanufactured products is between new and used products (Neto et al., 2016). In addition to product condition, other factors such as seller reputation (Subramanian and Subramanyam, 2012) and length of warranty (Pang et al., 2015) also influence customers' WTP for the remanufactured products.

While a few studies about customer perception toward remanufactured products use theoretically modeling approach (Örsdemir et al., 2014), most of the relevant studies apply empirical methods such as structural equation modeling (e.g., Hazen et al., 2012) and multiple regression (e.g., Neto et al., 2016). Following the research stream on customer perception and WTP on remanufactured products, our paper attempts to build the linkage between various customer perceptions on remanufactured products and the e-services provided in the online trading environment, and investigates specific e-services that may either improve consumer's perceived value or reduce perceived risk on remanufactured products to enhance customer purchasing intention toward remanufactured products (Wang and Hazen, 2016). Our work also contributes to the brand equity literature (Abbey et al. 2015) by investigating the differences in willingness to pay between manufacturer remanufactured products and the third-party (e.g., online seller) remanufactured products. More conditions of products and more influential factors that may affect customers' WTP are examined in our model. Moreover, we analyze customers'

WTP for remanufactured products in both auctions and fixed price transactions to examine the role of transaction type in the impact of particular e-service on customers' WTP for remanufactured products.

3. Theoretical Background and Hypotheses Development

3.1 Theoretical Background

The theoretical foundation of this study is mainly based on three theories: utility theory, transaction cost theory, and market signal theory. Utility theory describes customers' preferences toward a product or service (Fishburn, 1970). Customers often order the products and services according to their preferences, and therefore utility theory explains customers' decisions about online purchasing (Wallenius et al., 2008). Transaction cost theory explains the costs of participation in a market (Williamson, 1989). For online shopping, these transaction costs include searching and information cost, which occurs when determining the product quality and obtaining seller's information; bargaining cost, which happens during online auctions and agreement with sellers about the final price; and policing and enforcement cost, which happens when customers ensure the products received to have promised quality, and return the products when they are not desired (Dahlman, 1979). Different transaction cost occurs for customers in various types of online transactions (e.g., auction and fixed price) (Wang et al., 2008). Market signal theory describes how, in the market, one party uses signals to convey information to other parities (Kelley, 1988). In online shopping environment, sellers use various forms of signals such as posting product pictures, descriptions of product and e-services, showing customer ratings to convey the quality of products and reputation of the sellers (Biswas and Biswas, 2004). Depending on many factors, which include the utility, transaction costs, the conveyed product and service information from market signal, and perceived risk, customers decide their WTP for the products (Srinivasan et al., 2002).

3.2 Hypotheses Development

Customers' expectation before consumption is influenced by many factors. These factors include product and service provider related factors and customer related factors. The product and service provider related factors influence customers' expectation according to market signal theory (Priest, 1981). These signals are indicated by the additional information that contributes to customers' expectations of the features of products and services (Kelley, 1988). In online shopping environment, signals are often in the form of posted information on the

websites, including sellers' background information and editor-recommendation, which are examined by online customers (Srinivasan et al., 2002) and influence their expectations (Boulding et al, 1993).

One of the significant advantages of online shopping compared with brick-and-mortar store shopping is easier comparison between products and sellers with only a few mouse clicks away (Mallapragada et al., 2016). Providing e-services in the information phase by posting more information about products and online sellers can help online customers gain more knowledge about them, and thus enhance their familiarity and trust (Resnick et al., 2006). Also, providing e-services in the information phase can help online customers examine and compare market offerings more conveniently (Bauer et al., 2006), and provide online customers more accessibility about products and sellers (Bauer et al., 2006).

According to utility theory (Gumasta et al., 2011) and social exchange theory (Gefen and Ridings, 2002), online customers seek equal utility exchange during their online shopping, which can be considered as a social exchange process. E-services releasing product information help online customers understand more about the functionality and the enjoyment of the product. Therefore, with more information bringing enhanced consumer utility, customers' WTP increases.

In this study, under the framework of CLSC, we differentiate the e-services offerings in information phase into two main categories: e-services of online seller's posting the product information and the seller information. We further differentiate product information into two sub-categories: product condition information and product non-condition information. Using the same definition as in previous studies (Subramanian and Subramanyam, 2012; Pang et al., 2015; Neto et al., 2016), product condition information refers to the condition of a product as in one of the following categories: new, manufacturer remanufactured, seller remanufactured, and used. Posting product condition can effectively reduce information asymmetry (Akerlof, 1995), lower the variability of product quality (Kahneman and Tversky, 1979), and serve as a quality signal of the products (Neto et al., 2016), and thus enhance customers' WTP. Based on the above discussion, this study proposes the following hypothesis:

H1a: *Providing e-services of posting product condition information in information phase positively influences customers' WTP.*

Product non-condition information includes any information showing the features of the products, but without specifying the condition of the product. Such e-services release more information about the product. These graphical and visual presentations of the product information enhance customers' familiarity of the product, and reduce the perceived risk of being unable to try out products before purchasing in online shopping (Resnick et al., 2006), and thus increase customers' WTP (Koppius et al. 2004). More information posting can also serve as a competitive advantage of the online sellers (Neto et al., 2016), have an advertising effect (Milgrom and Roberts, 1986), build customer trust to online sellers (Grabner-Kraeuter, 2002), and enhance customer loyalty and WTP (Shankar et al., 2003). Based on the above discussion, this study proposes the following hypothesis:

H1b: *Providing e-services of posting product non-condition information in information phase positively influences customers' WTP.*

E-services of releasing seller information allows online customers to learn more about the seller, which enhances customers' trust toward the seller, broadens the communication opportunity with the seller, and strengthens the relationship between customers and sellers (Gefen et al., 2003). With more information about the seller, customer's perceived risk, as one of the biggest cons of online shopping, can be effectively reduced (Yan and Liu, 2009). With more detailed seller's information such as seller history and customer feedback posted, goodwill is generated as the intangible asset (Bunduchi, 2005). The revealed online seller's customer feedback can be a measurement of online seller's reputation, which generates electronic word-of-mouth (eWOM) effect influencing future customer perception and purchase intention (Cheung et al., 2008). Based on the above discussion, this study proposes the following hypothesis:

H1c: *Providing e-services of posting online seller information in information phase positively influences customers' WTP.*

Transaction costs incurred during online purchasing exchange (Weber and Mayer, 2014) mainly happen in the agreement phase. The e-services offerings in the agreement phase can make the ordering process more efficient and reduce the transaction cost (Bauer et al., 2006). These e-services include providing efficient communication channels and more payment and transaction options. E-services in the agreement phase enhance the convenience of online transactions, which saves transaction time for customers and is highly valued by online

customers (Park and Kim, 2003). In addition, e-services in the agreement phase enhance the privacy and security of online transactions by promising the non-disclosure of customers' private and financial information (Elliot and Fowell, 2000). The e-services offerings in agreement phase can also cultivate trust between customers and sellers, which stimulates customers' online purchase intention and enhances customers' WTP (Fang et al., 2014). Efficient website design such as clear website architecture and customized website design supports the e-services in the agreement phase, which amplifies the positive effect of e-services on customer perception (Thirumalai and Sinha, 2011). Based on the above discussion, this study proposes the following hypothesis:

H2: *Providing e-services in agreement phase positively influences customers' WTP.*

With features different from traditional offline shopping, online shopping separates the online ordering process and the fulfillment process. E-services in the fulfillment phase are beneficial for customers to receive the ordered products as expected. Online customers value the e-services in the fulfillment phase from the perspectives of security, privacy, reliability, and timeliness (Bauer et al., 2006). Supply chain management and logistics management for the online sales channel supports the fulfillment phase (Thirumalai and Sinha, 2005). Supply chain management strategies such as reduction of lead time (including both handling time and delivery time) contribute to the quality of e-services in the fulfillment phase (Yang et al., 2014). High delivery reliability and fast delivery speed alleviate online customers' anxiety of waiting for products arrival, and enhances product functionality, attractiveness, and enjoyments with earlier product usage (Jie et al., 2015). Safe and fast delivery positively influence customer satisfaction (Liu et al., 2008), which increases customer loyalty and willingness to pay (Xu and Gursoy, 2015). The e-services in fulfillment process can enhance customers' perceived service and product quality, improve product freshness due to fast delivery, and save customers' time, and thus enhance customers' online purchasing intention and behavior (Boyer and Hult, 2006). Based on the above discussion, this study proposes the following hypothesis:

H3: *Providing e-services in fulfillment phase positively influences customers' WTP.*

E-services in after-sales phase include complaint handling, customer service responsiveness, warranty, return and refund policy, and other non-routines services (Bauer et al., 2006). Product and service failure happens when the perceived quality doesn't meet customers' expectation, which arouses customer dissatisfaction (Oliver,

1980). After-sales e-services are among the important forms of service failure recovery actions, which can alleviate customer dissatisfaction and enhance customer overall satisfaction (Gu and Ye, 2014). E-services in the after sales phase can reduce the perceived risk of online shopping and enhance online shopping intention (Rafiq et al., 2013). Offering after-sales e-services such as return and refund opportunities can enhance customers' confidence in the seller through enhanced comfort and trust toward seller (Gwinner et al., 1998), which are among the key drivers of customer purchase intention (Howard and Sheth, 1969). According to procedural justice theory (Lind and Tyler, 1988), return and refund opportunities can also enhance customers' perception of fairness toward the transaction with the seller, strengthen the relationship between online sellers and customers, and increase customer satisfaction and purchase intention (Griffis et al., 2012). Providing warranty and return opportunity offers additional product value and utility from online purchase experience, which enhances customers' WTP (Pang et al, 2015). Based on the above discussion, this study proposes the following hypothesis:

H4: *Providing e-services in after-sales phase positively influences customers' WTP.*

4. Data and Methodology

4.1 Data Collection

We collected data from eBay, which is one of the most popular online markets in U.S. This choice is mainly due to two reasons. First, eBay allows product selling via auctions or fixed price transactions (i.e., buy-it-now only), which is one of research questions that we aim to address. Second, the condition of the products sold on eBay varies, which includes new, manufacturer remanufactured, seller remanufactured, and used. In our paper, manufacturer remanufactured products include the products that are refurbished, reconditioned, and/or remanufactured by the original equipment manufacturer or manufacturer-certified party. Seller-remanufactured products include the products that are refurbished, reconditioned, and/or remanufactured by eBay sellers or any third party not certified by the original manufacturer. Due to the variety of these product conditions and the volume of transactions on eBay, eBay was chosen as the platform to study customer behavior in many previous studies (e.g., Subramanian and Subramanyam 2012; Pang et al. 2015; Neto et al. 2016).

Similar to previous studies (e.g., Neto et al., 2016), we focus on a particular brand and model of electronics (Apple iPad 2) due to its unique features, and standard and homogeneous attributes, which reduce the

requirements of control variables in our study (Eaton, 2005). In addition, Apple iPad 2 is chosen because it is sold in various conditions with plenty of new, remanufactured, and used products transactions on eBay, allowing a sizable data set to be collected and analyzed.

A Java program is coded to collect completed transaction data of Apple iPad 2, in particular the 16GB model, from July 2015 to August 2016 for auctions, and from September to December 2016 for fixed price transactions. The variables in the dataset are collected from two different sources of eBay - either through Application Programmable Interface (API) or through eBay's webpages directly. The program starts by retrieving a list of completed transactions through API, and then extracts details of each transaction. Details of transactions collected from API and through eBay's webpage include product information, transaction information, return and refund policies, product price, shipping options and shipping costs, and seller's relevant information such as customer ratings. In total, 23,282 auctions and 6,197 fixed price transactions were collected.

4.2 Data Processing

For each of these two datasets (i.e., auction dataset and fixed price dataset), a subset of transactions is used that meet all of the following criteria: 1) Only those transactions that end with sales are kept; 2) To reduce the variation of shipping cost, we restricted the transactions in which the seller and the customer are both in the U.S.; 3) We keep transactions in which the condition of the product is either new, manufacturer remanufactured, seller remanufactured, or used. These criteria result in 8,947 auctions and 2,748 fixed price transactions.

Referring to previous studies (e.g., Guide and Li, 2010; Neto et al., 2016), customers' WTP in this study is measured by the transaction price plus the shipping costs. Then, following procedures used in previous studies (e.g., Hodge and Austin, 2004), outliers are removed with the following procedure. Regarding the dependent variable WTP, its IQR (inter quartile range, which is 3^{rd} quartile minus 1^{st} quartile) is first calculated. The lower bound for outlier removal is set as 1^{st} quartile minus $1.5\times$IQR. The upper bound is set as 3^{rd} quartile plus $1.5\times$ IQR. Observations were removed if their WTP values fall below the lower bound or exceed the upper bound. As a result, our datasets contain 8,719 auctions and 2,526 fixed price transactions. It is observed that the majority of iPads auctioned on eBay are used ones (93.1% in auction dataset and 88.4% in fixed price dataset). Therefore, we

randomly sampled a subset of observations with used product condition to match the similar proportion of product conditions as in Neto et al. (2016) study. This finally results in 3,002 auctions, and 1,657 fixed price transactions.

The number of observations of products under various conditions and the corresponding average WTP (transaction price plus shipping costs) are listed in Table 1. From Table 1, it is noticed that the average WTP of the products under each condition is significantly higher in the auction dataset than that in the fixed price dataset.

Table 1: Summary of Observations of Products with Various Conditions

	Auctions			Fixed Price Transactions		
Product Condition	**No. of Obs.**	**Avg. WTP**	**Standard Deviation**	**No. of Obs.**	**Avg. WTP**	**Standard Deviation**
New	124	$153.41	29.45	46	$137.29[a]***	27.14
Manufacturer Remanufactured	166	$130.40	21.23	65	$118.68[a]***	22.74
Seller Remanufactured	311	$129.34	22.97	181	$111.46[a]***	21.39
Used	2401	$125.19	26.72	1365	$103.20[a]***	24.45

*a: mean difference of average WTP of each product condition between auctions and fixed price transactions; *p<0.1, **p<0.05, ***p<0.01.*

4.3 Measurements

4.3.1 E-services Variables

We study seven main e-services by collecting the corresponding variables from eBay covering all four transaction phases in online shopping. Referring to previous studies (e.g., Xu et al., 2017), we focus on studying one or more typical e-services in each online transaction phase in order to provide a snapshot of the impact of e-services in each online transaction phase on customers' WTP.

The information search e-services mainly refer to posting product information and seller information. During the online shopping process, customers need to make two main decisions: product selection (Senecal and Nantel, 2004) and seller selection (Pavlou and Dimoka, 2006). Thus, posting product and seller information can be considered as the main e-services in information phase.

Product related information mainly refers product condition information and product non-condition information. For production conditions, we use *New* to indicate the production condition is new; *ManuRefurb* as

manufacturer remanufactured; and *SellerRefurb* as seller remanufactured. All three variables are dummy variables. If all three dummy variables equal 0, it indicates the product condition as *Used*.

Product non-condition information refers to the number of pictures posted by online sellers on the product website on eBay. *PictureNumber* is a non-negative integer showing the number of pictures posted by the online seller. One of the significant disadvantages of online shopping compared with brick-and-mortar store shopping is the higher perceived risk due to the physical distance between online sellers and buyers (Nepomuceno et al., 2014). Posting product pictures online can present the product features visually and reduce the online products' perceived risk (Neto et al., 2016).

Seller information mainly refers to online seller's service failure and tenure. Service failure is measured by the number of customer negative and neutral feedbacks received within the past 30 days. Service failures generate negative electronic word-of-mouth (eWOM) effect, which results in the complaint and switching behaviors of online customers (Gu and Ye, 2014). Referred to the previous studies (e.g., Neto et al., 2016), the number of neutral and negative feedbacks is used to measure seller's service failure.

Following previous studies (e.g., Subramanian and Subramanyam, 2012; Pang et al., 2015; Neto et al., 2016), we use the absolute number of neutral and negative feedbacks, instead of the proportion of neutral and negative feedbacks in all feedbacks, as the measure of service failure in this study. There are two main reasons for this choice. First, the proportion of neutral and negative feedback in all feedback can be misleading sometimes. For example, a low or even zero percentage of negative feedback can be misleading for a good reputation only because of low number of transactions. Small number of initial customers might not represent a long-term trend (Xu et al., 2017). Second, the absolute number of neutral and negative feedback reflects the mechanism of long-term accumulation of customer feedback, which reflects the mechanism of long-term accumulation of online seller's goodwill and reputation (El Ouardighi and Pasin, 2006; Xu et al., 2017). Referring to previous studies (e.g., Neto et al., 2016), we consider both the neutral and negative feedback as negative since customers are not satisfied with their online shopping experience, showing online sellers' service failures, which generate negative eWOM and arouse negative perception for future customers during the information search process (Gu and Ye, 2014).

In addition, this study focuses on negative customer feedback, instead of positive feedback, because previous studies found the detrimental impacts of negative customer feedbacks on sellers' reputation are more prominent than the favorable impacts of positive feedbacks (Eberle et al., 2013). Negative feedbacks can be more salient and potent to influence online customer purchase behavior compared with positive feedbacks due to the damaged reputation of online sellers, generated perceived risk, and lowered performance of customer relationship management (Chevalier and Mayzlin, 2006; Cui et al., 2010; De Maeyer, 2012). Observing the skewness of variables of number of seller's service failure, we use the natural logarithm of this variable in our regression models.

Online seller's *Tenure* is measured by number of days since the online seller is registered on eBay. Longer tenure may indicate a better reputation, which in turn reduces customer perceived risk and enhance customer positive perception (Xu et al., 2017). In our study, online seller's tenure is selected in both types of transactions as in previous studies (e.g., Thirumalai and Sinha, 2011).

The agreement e-service mainly refers to *autopay* in this paper. *AutoPay* is a dummy variable that indicates whether the seller requires immediate payment via PayPal when the product is purchased. Convenience and security are among the most influential factors of customer perception in the agreement phase (Xu et al., 2017). *AutoPay* provides a secured, efficient, and time-saving payment option for online customers' transaction, and thus enhance transaction convenience. In addition, *AutoPay* has the function of transaction fraud prevention, which reduces transaction risks and enhances the transaction security. Since *AutoPay* facilitates the transaction convenience and reduce transaction risks (Chen and Nunez, 2011), it provides a snapshot of the e-services in the agreement phase.

The fulfillment e-service mainly refer to *ExpeditedShipping*, which is a dummy variable that represents whether the online seller offers expedited shipping option. One of the significant differences between online and brick-and-mortar store shopping is the separated process of ordering and acquisition. The time gap between these two processes is decided by the fulfillment performance, which is mainly influenced by the delivery time. Expedited shipping offers better performances in both delivery speed and security as the two most important

dimensions of shipping performance (Hu and Munson, 2007). Thus, expedited shipping reflects the e-service quality of online sellers in the fulfillment phase to a large extent.

The after-sales e-service mainly refers to return allowance. *Return* is a dummy variable that indicates whether refund option is provided by the seller. Product return and cash/credit refund is among the most important after-sales services (Petersen and Kumar, 2015; Heim and Field, 2007). Providing refund opportunities is an efficient approach to manage return process, implement service recovery strategies, and reduce customer perceived risk (Mollenkopf et al., 2007). Thus, the variable of *return* reflects this important e-service valued by customers in the after-sales phase.

4.3.2 Control Variable and Dependent Variable

In auctions on eBay.com, customers are able to observe the number of bids in real time when they browse the listings. Notice that the number of bids can influence the final auction price (Harstad et al., 1990) due to customers' repeated bidding behaviors because of the endowment and opponent effect (Heyman et al., 2004), and new customers' herding effect because of more existing bidders (Simonsohn and Ariely, 2008). Thus, we consider *BidCount* as a control variable in our auction study. Observing the skewness of *BidCount*, we use its natural logarithm in our regression model.

The dependent variable *WTP* is a positive numeric variable that captures customer's WTP, which is the total price paid by online customers for the product. The total price is computed by adding the shipping service costs to the transaction price of the product in the auctions/fixed price transactions. The variables in both types of transactions are summarized in Table 2.

Table 2: Summary of Variables

Category	**Variable**
Information phase	
Posting Product Condition Information	New, Manufacturer Remanufactured, Seller Remanufactured, Used
Posting Product Non-condition information	Picture Number
Posting Seller Information	Service Failure, Seller Tenure
Agreement phase	Autopay
Fulfillment phase	Expedited Shipping
After-sales phase	Return
Control Variables	Bid Count*
Dependent Variable	Customers' WTP

** The control variable of bid count is only included in auction transactions.*

5. Model and Analysis

Based on the description of variable measurements, the empirical model of auctions in our study is presented in model (1), and the model of fixed price transactions is presented in model (2). The only difference between model (1) and (2) is that the control variable of *Bid Count* is removed from model (2) since fixed price transactions do not allow bidding.

The descriptive statistics of all variables used in model (1) and model (2) are summarized in Table 3a and Table 3b respectively.

$$f(WTP) = \alpha_0 + \alpha_1(Condition{=}NEW) + \alpha_2(Condition{=}MANUREFURB) + \alpha_3(Condition{=}SELLERREFURB) + \alpha_4(PictureNumber) + \alpha_5(ServiceFailure) + \alpha_6(Tenure) + \alpha_7(AutoPay) + \alpha_8(ExpeditedShipping) + \alpha_9(Return) + \alpha_{10}(BidCount) \quad \text{Model (1)}$$

$$f(WTP) = \alpha_0 + \alpha_1(Condition{=}NEW) + \alpha_2(Condition{=}MANUREFURB) + \alpha_3(Condition{=}SELLERREFURB) + \alpha_4(PictureNumber) + \alpha_5(ServiceFailure) + \alpha_6(Tenure) + \alpha_7(AutoPay) + \alpha_8(ExpeditedShipping) + \alpha_9(Return) \quad \text{Model (2)}$$

Table 3a: Descriptive Statistics of all Variables in Auction Transactions

Variable	Mean	Median	St. Dev.	Min.	Max.
Condition=NEW	0.04	0.00	0.20	0.00	1.00
Condition=MANUREFURB	0.06	0.00	0.23	0.00	1.00
Condition=SELLERREFURB	0.10	0.00	0.31	0.00	1.00
PictureNumber	4.80	4.00	3.06	0.00	12.00
ServiceFailure	0.32	0.00	0.76	0.00	4.77
Tenure	3282.20	3541.50	2012.33	0.00	6955.00
AutoPay	0.09	0.00	0.28	0.00	1.00
ExpeditedShipping	0.73	1.00	0.45	0.00	1.00
Return	0.22	0.00	0.41	0.00	1.00
BidCount	2.02	2.30	1.26	0.00	4.41
WTP	127.08	128.10	26.81	50.00	202.15

Table 3b: Descriptive Statistics of all Variables in Fixed Price Transactions

Variable	Mean	Median	St. Dev.	Min.	Max.
Condition=NEW	0.03	0.00	0.16	0.00	1.00
Condition=MANUREFURB	0.04	0.00	0.19	0.00	1.00
Condition=SELLERREFURB	0.11	0.00	0.31	0.00	1.00

PictureNumber	5.25	5.00	3.31	0.00	12.00
ServiceFailure	0.57	0.00	0.93	0.00	5.11
Tenure	3068.25	2930.00	1992.46	0.00	7045.00
AutoPay	0.50	0.00	0.50	0.00	1.00
ExpeditedShipping	0.70	1.00	0.46	0.00	1.00
Return	0.17	0.00	0.37	0.00	1.00
WTP	105.65	103.04	25.01	39.99	177.40

For investigating the possible multicollinearity among independent variables, Variance Inflation Factors (VIF) are computed for auctions (Table 4a) and fixed price transactions (Table 4b), where the independent variable on the left hand side in each row is regressed on all other independent variables in the same model. VIF is a useful indicator of linear correlation between independent variables, and multicollinearity is generally not considered to be present if all VIFs are below 10 (Wooldridge 2015; Neto et al., 2016). As demonstrated by Table 4a and Table 4b, all VIFs are far less than 10, indicating no sign of significant multicollinearity between independent variables in our regression models. In addition, we use heteroscedasticity-consistent standard error estimator to avoid inefficient standard error estimates when heteroscedasticity is present (e.g., Cribari-Neto, 2004; Hayes and Cai, 2007).

Table 5 presents the regression results of auction and fixed price transactions. From Table 5, we can find posting product conditions and online seller information significantly influence customers' WTP in both types of transactions. Comparatively, the impact of e-services on customers' WTP is higher in auctions than fixed price transactions, as shown by the results that e-services in all four transaction phases significantly influence customers' WTP in auctions.

Table 4a: VIF between all Independent Variables in Auction Transactions

	Condition=NEW	*Condition=MANUREFUB*	*Condition=SELLERREFURB*	*Pictures Number*	*Service Failure*	*Tenure*	*AutoPay*	*Expedited Shipping*	*Return*	*Bid Count*
Condition=NEW	---	1.308	1.059	1.060	1.450	1.102	1.029	1.060	1.226	1.084
Condition=MANUREFUB	1.046	---	1.058	1.070	1.231	1.129	1.030	1.033	1.210	1.081
Condition=SELLERREFURB	1.038	1.299	---	1.070	1.449	1.095	1.030	1.057	1.218	1.075
PictureNumber	1.037	1.310	1.068	---	1.433	1.129	1.030	1.053	1.191	1.074

ServiceFailure	1.047	1.113	1.068	1.058	---	1.093	1.024	1.041	1.126	1.083
Tenure	1.023	1.310	1.036	1.070	1.403	---	1.030	1.055	1.214	1.069
AutoPay	1.046	1.311	1.068	1.071	1.441	1.129	---	1.060	1.225	1.068
ExpeditedShipping	1.047	1.276	1.064	1.063	1.422	1.123	1.029	---	1.226	1.084
Return	1.047	1.293	1.061	1.039	1.331	1.117	1.029	1.061	---	1.076
BidCount	1.047	1.306	1.058	1.060	1.448	1.113	1.015	1.060	1.218	---

Table 4b: VIF between all Independent Variables in Fixed Price Transactions

	Condition=NEW	*Condition=MANUREFUB*	*Condition=SELLERREFURB*	*PictureNumber*	*ServiceFailure*	*Tenure*	*AutoPay*	*ExpeditedShipping*	*Return*
Condition=NEW	---	1.035	1.032	1.032	1.165	1.012	1.150	1.056	1.049
Condition=MANUREFUB	1.021	---	1.030	1.021	1.164	1.018	1.150	1.052	1.041
Condition=SELLERREFURB	1.019	1.030	---	1.024	1.166	1.023	1.140	1.057	1.042
PictureNumber	1.021	1.024	1.026	---	1.166	1.020	1.150	1.056	1.041
ServiceFailure	1.023	1.036	1.037	1.034	---	1.020	1.047	1.035	1.039
Tenure	1.014	1.034	1.038	1.032	1.164	---	1.149	1.057	1.052
AutoPay	1.024	1.038	1.028	1.035	1.063	1.021	---	1.042	1.050
ExpeditedShipping	1.024	1.034	1.038	1.034	1.143	1.023	1.135	---	1.049
Return	1.021	1.026	1.027	1.023	1.152	1.022	1.148	1.053	---

Table 5: Results of Heteroscedasticity-Consistent OLS Regression in Auctions and Fixed Price Transactions

		Auctions		*Fixed Price Transactions*	
		Dependent variable: *WTP* (N = 3002)		Dependent variable: *WTP* (N = 1657)	
Variable	Coefficient Parameter	Coefficient Estimates	Standard Errors	Coefficient Estimates	Standard Errors
(Intercept)	α_0	112.017***	1.632	101.566***	1.975
Condition=NEW	α_1	29.906***	2.709	34.364***	4.337
Condition=MANUREFURB	α_2	12.370***	2.332	16.643***	3.135
Condition=SELLERREFURB	α_3	3.487**	1.448	7.732***	1.770
PictureNumber	α_4	0.554***	0.159	-0.016	0.180
ServiceFailure	α_5	-7.940***	0.745	-4.192***	0.666
Tenure	α_6	0.001***	0.001	0.001***	0.000
AutoPay	α_7	6.206***	1.554	1.455	1.297
ExpeditedShipping	α_8	2.351**	1.048	-1.016	1.337
Return	α_9	2.584**	1.211	0.750	1.715
BidCount	α_{10}	3.689***	0.391	N/A	N/A
Model Fit		F=38.346***		F=20.312***	

*p<0.1; **p<0.05; ***p<0.01

6. Discussions

6.1 Information Phase

Our results support H1a. Information phase is identified as one of the most influential phases for customers' WTP. In both auctions and fixed price transactions, the results show that product conditions have significant influence on customers' WTP, with new condition the highest, remanufactured condition following, and used condition the lowest. Although some used and remanufactured products have equivalent functions as new ones, most customers still perceive them differently (Wang and Hazen, 2016). In addition, customers show more desirability for remanufactured products compared with used ones (Neto et al., 2016), and thus have a higher WTP for the remanufactured products compared with used ones. Moreover, the results show that customers have higher WTP for manufacturer remanufactured products than seller remanufactured products due to higher perceived quality, less uncertainty, and customers' higher trust toward Original Equipment Manufacturer (OEM) or authorized third party manufacturers (Subramanian and Subramanyam, 2012).

Our results partially support H1b. In auctions, posting more pictures about products significantly improves customers' WTP, indicating that pictures efficiently enhances the customers' familiarity with the product through more visualization details (Resnick et al., 2006), and therefore, reduces the perceived risk (Neto et al., 2016). Posting more pictures can also help online sellers customize online shop websites and enhance perceived quality, which facilitates customers' online information searching and therefore enhances their purchasing intention and perception toward the products (Thirumalai and Sinha, 2011; Wells et al., 2011). However, our results suggest that in fixed price transactions, posting more pictures doesn't significantly increase customers' WTP. This observation possibly comes from the fact that the variability of perceived quality of products in fixed price transactions are less compared with that in auctions, in which most of the products are sold in single unit and have unique characteristics (Wang et al., 2008). Thus, customers in fixed price transactions, compared with in auctions, have less motivation to view more product pictures to reduce the perceived risk of high quality variability. In addition, compared with fixed price transactions, customers show more participation and involvement in auctions in terms of the time and efforts spending on the website (Berry et al., 2002).

Exploring more from the website such as viewing the product pictures in auctions can provide more hedonic benefits for customers' online shopping experience, which mainly comes from the excitement and enjoyment of product and website exploration, and high involvement of the online transaction process (Standifird et al., 2005). This provides more motivations for customers in auctions to explore more product pictures compared in fixed price transactions, and results in higher WTP in auctions.

Our results support H1c. It is found that both e-services revealing online seller's information: customers' negative feedback and online seller's tenure, significant influence customers' WTP in both auctions and fixed price transactions. The results show that the number of neutral and negative feedback negatively influences customers' WTP. Customer ratings are an intangible asset for online sellers, and are often accumulated through long-term, and therefore demonstrate online sellers' goodwill and reputation (Marinelli, 2007). The neutral and negative feedback reflects the perceived quality of products and services that is below customer expectation, and therefore generates customer dissatisfaction (Xu and Li, 2016). Online sellers' product and service failures have serious results such as customers' negative word-of-mouth influencing future customer purchase intention and behavior, customer switching, and losing significant demand (Holloway and Beatty, 2003). The neutral and negative feedback also increases perceived risk of online shopping, which already lacks many essential elements of interactions between sellers and customers compared with brick-and-mortar store shopping (Holloway and Beatty, 2003). Therefore, the neutral and negative feedback reduces customers' WTP. In addition, online seller's tenure positively influences customers' WTP. Longer tenure accumulates the goodwill and reputation of online sellers as an intangible asset, which positively influence customers' perception toward the online seller and its products (Xu et al., 2017). Posting tenure information showing the relatively long online shop history enhances customer trust toward the online sellers, and reduces their perceived risk of online shopping (Jarvenpaa et al., 1999). Thus, customers' WTP increases.

6.2 Agreement Phase

Our results partially support H2. In auctions, autopay significantly increases customers' WTP; while in fixed price transactions, autopay does not seem to have a significant influence. This can be explained by two main reasons: customers' higher perceived risk and less transaction convenience in auctions.

Compared with fixed price transactions, customers show higher perceived risk in the auctions due to the following reasons. First, the variability of perceived quality of auction product is relatively higher (Wang et al., 2008) since products in auctions are unique, and are sold only once. Second, more customers gather during the auction period (Wang et al., 2008), which makes the retailer-customer relationship more complex. Third, risk seeking customers prefers auctions while risk averse customers prefer fixed price transactions (Budish and Takeyama, 2001). This strengthens the potential risk in auctions. Due to the above reasons of higher perceived risk in auctions, customers demand more transaction security (Park and Kim, 2003), which is provided by autopay mainly due to its fraud transaction prevention function.

In addition, transaction convenience is one of the key factors influencing customer perception toward the products and their online shopping experience (Thirumalai and Sinha, 2011). Compared with fixed price transactions, auctions have less transaction convenience, which is measured by customers' higher perceived time and effort expenditures to make a transaction in auction (Berry et al., 2002). Thus, the less transaction convenience of auction environment increases the transaction and participation cost of customer online shopping, which arouses their higher need to reduce the transaction cost through an easier and time saving transaction option with high security such as autopay. Therefore, the role of autopay in enhancing the convenience of transaction is more significant in auction environment, which enhances customers' utility and WTP. Comparing with auctions, fixed price transactions have less perceived risk and higher transaction convenience, and thus reduces customers' motivation to seek additional payment options. Thus, autopay has more significantly role in customers' WTP in auctions compared with fixed price transactions.

6.3 Fulfillment Phase

Our results partially support H3. In auctions, expedited shipping positively enhances WTP. This supports the findings from previous studies (e.g., Finch, 2007) that e-service of fast shipping in auctions is highly expected and its performance is highly valued by customers. Results also suggest expedited shipping does not have significant influence on customers' WTP in fixed price transactions. These might be mainly due to three reasons. First, compared with fixed price transactions, customers involved in auctions have higher participation cost, which mainly refers to the direct time costs and opportunity costs associated with waiting for the auction to close (Wang

et al., 2008). Therefore, customers in auctions have higher demands on e-services that can reduce their waiting time to acquire the products after auction ends. Expedited shipping can efficiently reduce the time gap between ordering and acquisition, and thus enhance customers' WTP in auctions.

Second, more customer impatience, which refers to the notion that customers want their products in a shorter span of time than others (Mathews, 2004), is generated due to the longer waiting time to complete the transaction in auctions. Thus, customers' utility in auctions is discounted by the longer waiting time and higher impatience, which demands their higher motivation to seek e-services such as expedited shipping to reduce the waiting time and alleviate their impatience to acquire products; and enhance their utility and WTP (Mathews, 2004).

Lastly, customers participating in auctions value more about the hedonic values of the online shopping experiences, as indicated by more enjoyment and excitements, due to the auction transaction environments can enhance customer involvements in transactions and interactions with online seller and other online customers (Lee et al., 2009). Expedited shipping can even enhance the hedonic values because it fulfills customers' strong eager to acquire the products (Xu et al., 2017). Thus, expedited shipping is valued more by customers in auctions.

6.4 After-Sales Phase

Our results partially support H4. In auctions, flexible return policy enhances customers' willingness to pay. Return policy is one of the most common communication topics between customers and online sellers, and flexible return policy strengthens the relationship between customers and online sellers, and enhances customers' trust toward online sellers, which increases their purchasing intention (Chiu et al., 2010). Flexible return policy serves as service recovery actions, enhances products' perceived quality and customer utility, and saves customers' time due to the less need of searching for other products (Wood, 2001). Our results also suggest returns do not have significant impact on customers' WTP in fixed price transactions. This might be due to three main reasons. First, providing return and refund opportunities can efficiently reduce the perceived risk in the online shopping environment (Griffis et al., 2012). Due to the higher perceived quality variation in auctions because most of the products are sold in single unit and have unique characteristics (Wang et al., 2008), customers' perceived risk is

higher than that in fixed price transactions. This increases the demand of customers in auctions to seek return and refund opportunities to reduce the higher perceived risk.

Second, according to market signal theory (Kelley, 1988), retail price conveys and signal product quality information to customers (Wolinsky, 1983). Thus, customers in fixed price transactions can perceive product quality easier and with more accuracy compared with customers in auctions, where the final transaction price cannot be revealed until the transaction closes (Wang et al., 2008). In this way, customers in auctions value more about return and refund opportunities to trust the online seller and enhance their perceived product quality (Xu et al., 2017). In addition, due to the variation of final transaction price, payment-variation related risks are higher in the auction environment (Leszczyc et al., 2009), which amplifies the role of flexible return policy in customers' WTP in auctions.

Third, customers in auctions show more impulsive buying behavior, which refers to customers' buying behavior with no advanced plans, and with the purchasing decision made in a short time span (Dawson and Kim, 2009) than fixed price transactions (Becherer and Halstead, 2004). Two main reasons exist. First, auction environments can generate online customers' positive emotion, as indicated by the enjoyment and excitement of highly involvements in the online transactions, which leads to impulsive buying behaviors (Verhagen and van Dolen, 2011). Second, many bidders participate in auctions during the last minutes, which makes them engage in impulsive shopping (Angst et al., 2008). The impulsive shopping behaviors generate more intention for product return after purchasing due to customers' unplanned purchase and the change of emotion and perception toward the product and shopping experience (Koufaris, 2002). Thus, with the stronger impulsive buying behavior in the auction environment, customers value more for return and refund opportunities.

6.5 Effect of Control Variable

Our results suggest that the bid count positively influence customers' WTP. Bid count shows the number of customers interested in buying the product with commitment, and therefore indicates the perceived quality of the product, the reputation of online sellers, and the number of loyal customers (Jank and Yahav, 2009). In addition, higher bid counts cause certain bidders to pay a higher price than the bidders' initial price expectation, and enhances customers' final WTP (Standifird, 2001). Lastly, higher bid counts indicate more bidders involving in

the last minutes' bidding, which shows their impulsive buying behavior and thus increases customers' WTP (Vohs and Faber, 2007).

7. Theoretical and Managerial Implications

7.1 Theoretical Implications

Our study is one of the first few papers using the framework of online transaction phases (Bauer et al., 2006) to examine the impact of online sellers' e-services offerings on customers' WTP for products with various conditions. The results indicate that the role of e-service offerings in influencing customer purchasing behavior is different in auctions and fixed price transactions. This supports the transaction cost theory, which describes customers' participation cost in entering a market and finish the transactions (Williamson, 1989). Due to customers' higher transaction cost in auctions, as measured by higher participation efforts and longer time spent in the transaction process, customers expect more e-services to facilitate their transaction process and reduce transaction costs. Therefore, online sellers' e-service offerings influence customers' WTP in all four online transaction phases in auctions.

In both of auctions and fixed price transactions, e-service offerings in information phase significantly influence customers' WTP. This supports market signal theory (Kelley, 1988). The information about products and sellers serves as a market signal conveying to online customers about the quality of products and the reputation of online sellers, which reduces the perceived risk of online shopping, enhances customer trust to online sellers, and increases their WTP.

In addition, our results show that customers have the highest WTP on new products, with manufacturer and seller remanufactured products following, and with the lowest WTP on used ones. This supports the utility theory (Fishburn, 1970). Customers are willing to pay a premium on products with higher perceived quality and utility (Xu and Gursoy, 2015). Moreover, our study confirms the role of remanufacturer identity in influencing customers' WTP (Subramanian and Subramanyam, 2012). Compared with seller-remanufactured products, customers would like to pay a premium for remanufactured products from OEM. Furthermore, examining customer purchase behavior toward remanufactured products enriches the framework of CLSC management revealing online sellers' remarketing and reselling strategy of remanufactured products.

7.2 Managerial Implications

Our study reveals the role of e-service offerings in reducing perceived risk of online shopping and customers' participation and transaction cost, enhancing customer trust and perceived quality of products, and resulting in the enhanced purchase intention and WTP. In detail, our study emphasizes the significant role of e-service offerings in the information search phase in influencing customers' WTP. These e-service offerings include posting product information and online seller's information. Although online shopping provides convenience with easier comparison, higher perceived risk exists due to the physical distance between customers and online sellers. Posting more information about the product and the online seller can help customers gain familiarity toward the product and build trust with the online seller.

The e-service offering of posting product condition information significantly influences customer perception and purchase behavior. Although some remanufactured products might have similar quality and functions as used products, customers still have a higher perceived quality toward remanufactured product (Neto et al., 2016). Since customers would like to pay a premium for remanufactured products compared with used products, online sellers can take efforts to refurbish the used products and ask for a higher market price. In addition, findings in this study suggest that customers would like to pay a premium for manufacturer remanufactured products. This provides the implications for OEM businesses implementing B2C transactions or online sellers selling OEM or authorized third-party remanufactured products. Clearly explaining the remanufactured products information online, especially the identity and certification of remanufacturers, can influence customers' WTP. For example, nowadays many OEMs and online stores use their own B2C websites selling remanufactured products such as KitchenAid mixers and Vitamix blenders. Vitamix clearly title their remanufactured products as *certified* reconditioned/remanufactured/refurbished products. Further description on certified remanufacturing process is even more beneficial to enhance customers' purchasing behavior. For example, "all recondition Vitamix blenders are built by hand in the USA, certified via rigorous, 17-point inspection process".

In addition, findings in our study suggest that posting information about online sellers increases customers' WTP. The reputation of online sellers significant influences customers' trust, which influences their

purchase intention (Chiu et al., 2010). In our study, the results show that posting customer feedback and seller's tenure information influence customers' WTP. Online sellers should make their efforts to earn more positive feedback and reduce the number of neutral or negative feedback. Positing positive customer feedback, implementing service recovery actions such as prompt responses to service failures and commitment to correction toward negative customer feedback (Gu and Ye, 2014), and releasing and posting the information showing long period of online store's tenure (e.g., by describing the open date of online shop and the long period of online shop operating process) can increase customer positive perception and generate customers' positive eWOM effects, which influence future customers' purchase intention and behavior (Cheung et al., 2008).

Furthermore, findings in our study suggest the types of transactions influence the role of e-service offerings in customers' WTP. Compared with fixed price transactions, online sellers using auctions should provide more e-services in each of the four transaction phases. In the information phase, in addition to providing information about product condition and online seller's information, posting more visualized information about products such as pictures, images, and demo videos enhances customers' purchase intention. For example, iRobot, which sells its automatic vacuum cleaning, mopping, and outdoor maintenance machines, posts pictures and demo videos for each product detailing the offered functions. In addition, posting advanced pictures and allowing customers to zoom-in for details, or rotate 360-degree would be even more beneficial to enhance customer perception and purchase intention. In the agreement phase, providing autopay and other similar forms of payment can make the transaction more convenient and secure (Chen and Nunez, 2011). In addition, providing customized transaction options such as cash on delivery and quick pay function through banking account can further enhance customer transaction satisfaction (Thirumalai and Sinha, 2011). In the fulfillment phase, providing e-services to reduce the time gap between purchase and acquisition through faster handing and delivery time, and providing more delivery options can enhance customers' perception. In the after-sales phase, offering more flexible return and refund opportunities can build customer trust to online sellers, enhance product perceived quality, and serve as a service failure recovery action to enhance customers' WTP and keep customers retention (Pang et al., 2015).

The main reason of more significant role of e-services offerings in each phase in customers WTP in auctions compared with fixed price transactions might be customers' desire in auctions to reduce the perceived

risk caused by the large variability of perceived quality in a more uncertain transaction environment (Wang et al., 2008). It might be also because the higher need of e-service offerings to reduce transaction cost and enhance transaction convenience in auctions (Berry et al., 2002). Thus, online sellers' e-services and efforts on reducing perceived risk of online shopping (e.g., e-services in information and after-sales phase) and facilitating the transaction (e.g., e-services in agreement and fulfillment phase) are especially appreciative in auctions.

In addition to eBay, many other C2C websites (e.g., Taobao.com, a leading C2C website in China) also provide the options for online sellers to choose between auction and fixed price transaction. Although the cost of e-service offerings cannot be ignored, the findings in our study suggest that customers are willing to pay extra for products in various conditions sold by online sellers using auction. This confirms the findings in previous studies about difference between auctions and fixed price transactions. Due to the endowment and opponent effect (Heyman et al., 2004), repeated biding behavior, and herding effect (Simonsohn and Ariely, 2008), online sellers can extract higher profit by using auctions than fixed price transactions (Wang et al., 2008), and thus can potentially outweigh the cost of e-service offerings.

Lastly, findings in this study suggest that the bid count positively influences customers' WTP in auctions. Thus, online sellers' promotional actions to increase bid counts during the auction process such as increasing the clickstream of its online store website by setting a lower starting price, cooperative advertising with online website platform, and enhancing its ranking position on the website through enhanced customer ratings and popularity (Guo et al., 2013) are beneficial to enhance customers' WTP.

8. Conclusions and Extensions

8.1 Conclusions

Using the data from eBay.com, we examined the e-service offerings of all four online transaction phases, which include information, agreement, fulfillment, and after-sales phases on customers' WTP in auctions and fixed price transactions. We find e-service offerings in information phase, in terms of posting product condition information and online seller information, are most influential toward customers' WTP in both auctions and fixed price transactions. In addition, providing e-services in auctions has higher positive influence on customers' WTP, as shown by the findings that e-services in all four online transaction phases significantly influence customers' WTP

in auctions. Furthermore, we find transaction process such as bid count is also an influential factor of customers' WTP in auctions.

Moreover, we find that in both types of transactions, compared to used products, customers are willing to pay a premium for seller remanufactured products, and even more for manufacturer remanufactured products and new products. This shows both product conditions and identities of the remanufacturer influence customers' WTP. Compared with other remanufacturers, customers have higher trust toward original equipment manufacturer (OEM), and therefore are willing to pay a premium.

8.2 Extensions

A few potential extensions exist following this research. First, our study uses iPad as the product to test our hypotheses. Although iPad has the advantage of standard quality among all online sellers, more types of products can be tested in future research. For example, customers' WTP for remanufactured products across different industries can be examined and compared. Second, more variables in each of the transaction phase can be studied. Given the data availability of eBay and avoidance of multicollinearity among variables, we select the variables that represent the core e-services in each transaction phase. It provides a snapshot of the roles of e-services in each transaction phase. However, more variables showing different e-services in other forms of e-commerce such as B2C and B2B can be studied. The role of customized e-services can also be explored. Third, the role of e-services in influencing WTP might be moderated by customer demographics and product categories (e.g., utilitarian products versus hedonic products; or products with various perceived risk levels). Thus, investigating the role of various e-services in customers' purchase intention and behavior with various demographics can be another extension. Lastly, customers' perception toward remanufactured products in online shopping environment and brick-and-mortar store shopping environment may also be compared. This explores the role of various transaction processes and environments in customers' purchase intention of remanufactured products.

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Highlights

- Customers show different willingness to pay for products with various conditions.
- E-services in four online transaction phases impact customers' willingness to pay.
- Transaction environment influences the role of e-services in willingness to pay.