Asset Ownership, Business Format and Market Structure of Online Retail Market

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The domestic online retail market consists of three different business models: independent retailer, merchant and marketplace. When we look at the growth process of these business models, some interesting characteristics are found; first, the average sales amount of the independent model has been decreasing steadily for several years, and second, the market share of the marketplace model shows a steady and significant growth. This paper investigates these characteristics with a formal theoretical model. Based on the asset ownership and business format, the model explicitly considers the retails' decision on the online retail business model. By introducing several parameters to affect the retailers' decision, we found that the model's prediction is consistent with the characteristics aforementioned.

Keywords: Online retail market, Marketplace, Business format, Asset ownership, Market structure

JEL Classification: D23, L81

I. Introduction

With the rapid and widespread adoption of the Internet and the Information Technology in both sellers and buyers, the domestic online retail market shows remarkable upturn recently. The market

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size is over 1 billion dollars and the number of online retailers is over 4,300 in 2005, which is 37% growth than that of a year earlier (KNSO 2006). Accordingly, the online retail market is in the third place among the major on/offline retail channels, behind the discount stores (2.4 billion dollars) and the department store (1.7 billion dollars). As a result, the online retail market not only becomes to play a significant role as a major retail channel domestically, but also influences the traditional channels in the pricing and merchandising, resulting fierce competition in the market as a whole (Kang and Ahn 2006).

If we focus on the online, the business models of rapidly increasing online retail market can be classified by three different ones: independent retailer, merchant and marketplace. The 'Independent Model' deals with a specific category of good(s) like DVD, books, clothes, and is usually operated by individuals or small enterprise. Instead of specializing specific category, the 'Merchant Model' often provides various products and contacts with the final consumers directly, which requires the retailers to stock the products and to take the liability of the transactions. In other words, it is like the online version of the traditional department store. Instead of contacting buyers directly and taking the liability, the 'Marketplace Model' provides the common shopping environments or infrastructure such as lists of sellers and products, common method of buyer's evaluation and payments, enabling many sellers and buyers to contact with each other with ease. The marketplace earns money as a form of the transaction fee usually from sellers, while the independent and merchant retailers get involved in the transaction and earn as a form of margin from selling to consumers.

Several interesting aspects are found, when we look at the domestic growth over time of these business models. First, the average sales amount of the independent model has been decreasing steadily over several years compared to other business models. It was about 10% of that of the merchant model in 2001, but it drops to 2.5% in 2006 Q3. Second, the market share of marketplace model shows significant growth. The proportion in market size of the marketplace reaches 30% currently.

This paper investigates these characteristics with a formal theoretical model. Based on the asset ownership and business format, the model explicitly considers the retailers' decision on the online retail business model. Furthermore the model introduces several parameters to affect the retailers' decision, of which movement is discussed and

found to be consistent explanations of the characteristics aforementioned.

In this paper, we start with the initial situation where there exist many independent retailers, who choose to remain or move to merchant or marketplace. Transforming herself to merchant requires both adopting another retailer's business format and giving up her ownership. On the other hand, transforming herself to marketplace requires adopting another retailer's business format without giving up her ownership. With several parameters, we solve the model and discuss the implications.

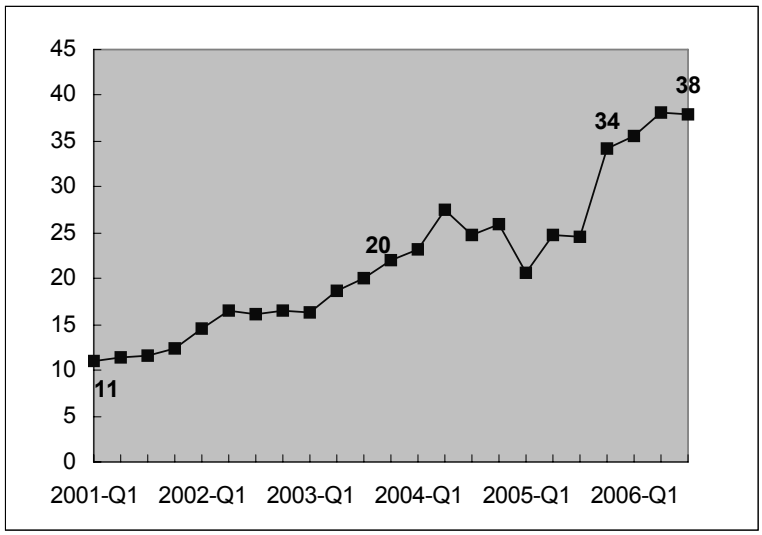
As Ellison and Ellison (2005) have noted by saying "there were also clearly relevant pricing and contracting issues that had not been thoroughly explored," the major contribution of this paper might be the explicit consideration of ownership, business format and contract in online retail market.

Our paper is organized as follows. The unique features of the domestic online retail market are discussed in Section II. We present the model taking explicit concerns on the asset ownership and business format and analyze it under various conditions in Section III. Section IV extends the model into contractible efforts case and the model implications are discussed in Section V. Section VI contains concluding remarks.

II. Several Features of the Online Retail Market in Korea

The online retail market in Korea is quite different with that of other countries, especially with U.S., in several aspects. These are the growth trends among business models, and the nature of competition in the online marketplace. When we look at the domestic growth over time of the business models of the online retail market, several interesting features are found. First, the average sales amount of the independent model has been decreasing steadily over several years compared to other business models. According to KNSO (2006), the average sales amount of the merchant model was about 10 times that of the independent model in 2001, but the proportion has risen to 20 in 2003 Q3, and 40 in 2006 Q3. That is, the relative significance of the independent model has been reducing. Figure 1 shows these characteristics.

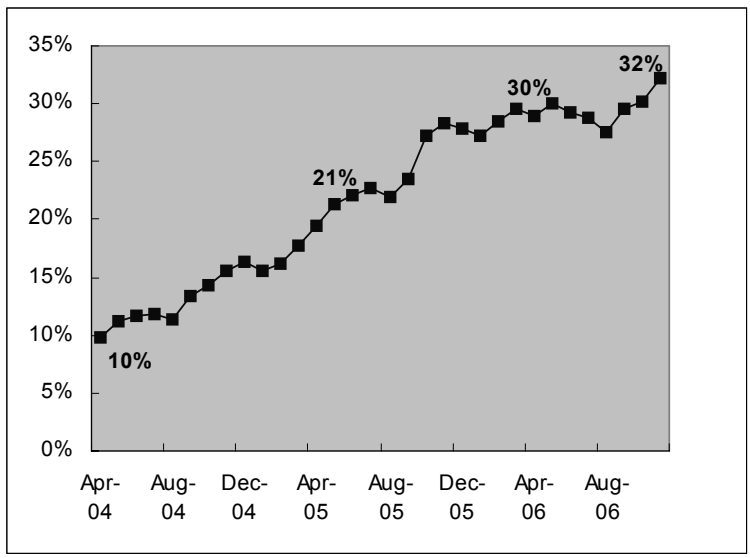
Second, the market share of marketplace model shows a significant growth. The proportion in market size of the marketplace was about



Source: KNSO statistical DB website (http://www.kosis.kr/).

FIGURE 1

RATIO OF AVERAGE SALES OF THE MERCHANT FOR INDEPENDENT MODEL



Source: KNSO statistical DB website (http://www.kosis.kr/).

FIGURE 2

PROPORTION OF MARKETPLACE IN MARKET SIZE

10% in 2004, but it became 20% in 2005 and reached 30% in 2006 (see Figure 2). In order to explain this phenomenon, we set up the formal model with asset ownership and business format in Section III.

III. The Model

A. Setup

In this model, we start with the initial situation where there exist many independent retailers. Their options are threefold; first, to remain as an independent retailer, second, to be part of a merchant, third, to participate in a marketplace as a seller. In terms of ownership and business format, the independent retailers would be interpreted as having the ownership of the firm and deciding the business format on their own. For the independent retailers to be the merchants, they should share the business format as well as the ownership, while the decision to join marketplace requires them to share only the business format. Among many independent retailers, we denote two retailers by A and B.

Suppose that retailer A develops a business format that raises the value of any individual establishment by K. We focus on the two decisions of retailer B. First, should B be part of a chain of A or not? That is, should the improved business format of A be used also at B? Second, who should own B? In particular, if A and B are part of a chain, should this chain consist of independently or commonly-owned retailers? If B becomes as part of chain of A without common ownership, we can interpret that B decides to be a seller in a marketplace. If B shares both ownership and business format, we can interpret that B decides to be a part of a merchant.

The payoff of B is denoted by V_1 if A's business format is used, and the payoff of B is denoted by V_2 if he remains independent retailer:

$$V_1 = K + v_1 e_1 \tag{1}$$

$$V_2 = v_1 e_1 + v_2 e_2 \tag{2}$$

The meanings of these equations are as follows. The relative payoff of using A's business format instead of independently operating

increases with the parameter K. B can increase his payoff with two different actions (or efforts) e_1 and e_2. Here, e_1 is the meaningful effort regardless of the business format used, while e_2 is productive only when the independent business format of B is used. Among other things, e_1 could include actions that enhance the retailer's reputation with its customers. In the context of online retailer, this could be effort that raises the customer trust in price, quality, and product information or cost reducing innovations that have industry-wide value. Thus we can refer e_1 as 'common effort.'

Meanwhile, e_2 consists of actions that increase B's value if B's business format is used, but not if A's format is used. Therefore e_2 includes activities such as lining up clients for such formats, and producing process or product innovations that are incompatible with A's format. Thus we can refer e_2 as 'specific effort.' Note that e_2 effort is productive conditional on B's format being used, but opportunistic conditional on A's. v_1 and v_2 are parameters specifying the marginal products of these efforts.

Furthermore we assume that e_1 and e_2 are non-contractible.[1] Non-contractible efforts mean that contracts on the efforts cannot be verifiable to outsiders, thus cannot be written and enforced. In general, if one party's efforts have a greater impact on the gains from trade, then the party should be given stronger incentives for those efforts. In the non-contractible efforts case, however, the concerned agents should choose their efforts simultaneously since efforts cannot be specified in the contract. For contractible efforts, stronger incentives can be written into the contract and they are determined in the contract, leading to an optimal outcome. Hence, determining the efficient pattern of asset ownership becomes important.

Next, B occurs the cost related to the efforts according to the Equation (3).

$$C=\frac{1}{2}(e_1)^2+\frac{1}{2}(e_2)^2 \tag{3}$$

The timing of the model is three-staged. In the first stage, B decides whether the business format of A is used or not, and whether ownership is shared or not if A's business format is used. In the

[1] This assumption on non-contactable efforts is mitigated in the later section.

second stage, B decides his efforts e_1 and e_2 to maximize his own payoff, conditional on the format and ownership decisions made in the first stage. In the final stage, A and B should split the integrated payoff.

With the timing we assumed, A and B should negotiate over the surplus in the third stage. However, since it is quite impossible to split the returns perfectly with non-contractible efforts, we assume the outcome of bargaining in the third stage is the Nash bargaining solution (Grossman and Hart 1986; Hart and Moore 1990; Hart 1995). When two players negotiate, the Nash bargaining solution is to split the extra surplus equally (Clemons and Kleindorfer 1992). Since the extra surplus is additional payoff compared to the outside option, we normalize A's outside option to zero, regardless of whether he owns B. B's outside option is V_2 if he owns B, and we assume that B's outside option is W (his wage in another job) if he does not own B.

B. Effort and Payoff under Various Asset Ownerships and Business Formats

In this part, we consider the level of efforts and payoffs under various structures of asset ownership and business format. First, let us see the case when B owns his firm and operates in his own business format. This means that B remains the independent model. In this case, he chooses e_1 and e_2 to maximize his net payoff in the following equation.

$$V_2 - C = v_1 e_1 + v_2 e_2 - \frac{1}{2}(e_1)^2 - \frac{1}{2}(e_2)^2 \tag{4}$$

The solutions of this problem are $e_1 = v_1$ and $e_2 = v_2$, which mean that the marginal products of the efforts (v_1, v_2) are equal to the marginal costs of the efforts (e_1, e_2). Without any bargaining, B chooses the privately optimal effort level.[2] Putting these efforts into the Equation (4), net payoff equals $v_1^2 + v_2^2/2$.

Second, let us see the case when B operates in his own business,

[2] Here, optimal level means effort level B chooses when all the efforts would be contractible. If all the efforts would be contractible, then B maximizes $V_2 - C$. The solutions are $e_1 = v_1$ and $e_2 = v_2$. Note also that they satisfy the usual condition that marginal productivity of effort equals marginal cost.

but A owns B. In this case, B maximizes the following.

$$\frac{V_2-W}{2}+W-C=\frac{V_2+W}{2}-C=\frac{1}{2}(v_1e_1+v_2e_2+W)-\frac{1}{2}(e_1)^2-\frac{1}{2}(e_2)^2 \quad (5)$$

The solutions of this problem are $e_1=v_1/2$ and $e_2=v_2/2$, and the resulting net payoff of B (V_2-C) is $3(v_1^2+v_2^2)/8$. In this case, B's efforts and payoff are always lower than the case when ownership and business format reside in B. The reason is that if B's format is used, the ownership of B also provides the incentive for efforts, while A's ownership discourages the payoff-increasing efforts of B. Thus we ignore this case.

Third, let us see the case when B owns his business, but A's format is used. As discussed above, we can interpret this case that B decides to be a seller in a marketplace. In this case, B maximizes the following.

$$\frac{V_1-V_2}{2}+V_2-C=\frac{V_1+V_2}{2}-C=\frac{1}{2}(2v_1e_1+v_2e_2+K)-\frac{1}{2}(e_1)^2-\frac{1}{2}(e_2)^2 \quad (6)$$

The solutions of this problem are $e_1=v_1$ and $e_2=v_2/2$, and the resulting net payoff of B is $K+v_1^2/2-v_2^2/8$. In this case, the common effort is the same as the case 1, but specific effort is lessened. The reason is that if B uses A's format, the specific effort affects the payoff less than the common effort.

Fourth, let us see the case when A owns B and A's business format is used. As discussed above, we can interpret this case that B decides to be a part of a merchant. In this case, B maximizes the following.

$$\frac{V_1-W}{2}+W-C=\frac{V_1+W}{2}-C=\frac{1}{2}(v_1e_1+K+W)-\frac{1}{2}(e_1)^2-\frac{1}{2}(e_2)^2 \quad (7)$$

The solutions of this problem are $e_1=v_1/2$ and $e_2=0$, and the resulting net payoff of B is $K+3v_1^2/8$. In this case, the specific effort becomes zero, since it is useless in the case of A's ownership and business format. These results are summarized in Table 1.

TABLE 1

EFFORT AND PAYOFF UNDER VARIOUS ASSET OWNERSHIPS AND BUSINESS FORMATS

		Business Format	
		A	B
Ownership	A	**(Merchant Model)** Efforts: $e_1=0.5v_1,\ e_2=0$ Net Payoff: $K+\frac{3v_1^2}{8}$	Efforts: $e_1=0.5v_1,\ e_2=0.5v_2$ Net Payoff: $\frac{3(v_1^2+v_2^2)}{8}$
	B	**(Marketplace Model)** Efforts: $e_1=v_1,\ e_2=0.5v_2$ Net Payoff: $K+\frac{v_1^2}{2}-\frac{v_2^2}{8}$	**(Independent Model)** Efforts: $e_1=v_1,\ e_2=v_2$ Net Payoff: $\frac{v_1^2+v_2^2}{2}$

C. Decision on the Ownership and Business Format

With the solutions and net payoffs described above, the decision on the ownership and business format can be seen in the Figure 3. The resulting ownership and business format depend on the parameters K, v_1 and v_2. Note that these parameters are the relative contribution to payoff of more productive business format, the marginal productivity of common effort and the specific effort, respectively. Below we will discuss the possible area of each business model with the movement of the parameters.

First, it is obvious that the increase in K leads to the rise of possibility of choosing the merchant or the marketplace model away from the independent model. With other parameters being constant, retailers will be placed up in the graph with the rise in K, which means the increased possibility of choosing the merchant or the marketplace model.

Second, when the marginal product of specific effort (v_2) is large enough, the retailer will be placed near the origin, meaning that the independent model is likely to be chosen. If the retailer's specific effort is quite contributory to the payoff, it is better to own his firm and use his own business format.

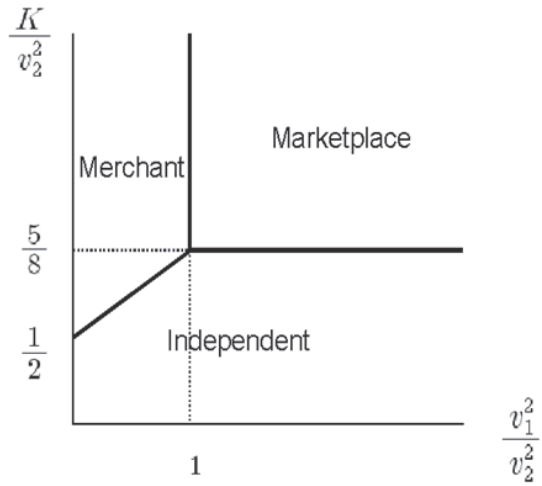


FIGURE 3
DECISION ON THE OWNERSHIP AND BUSINESS FORMAT

Third, when the marginal product of common effort (v_1) is larger than that of specific effort (v_2) with large enough K, the retailer will be placed at the northeast part in the graph, meaning that the marketplace model is likely to be chosen. From the solutions in the Table 1, we can see that the specific effort is useless and set to be zero in the merchant model, while the common effort is maximized in the marketplace model. Thus, if $v_1 < v_2$ is satisfied, the merchant model that minimizes the useless specific effort is preferred. But if $v_1 > v_2$ is satisfied, the marketplace model that maximizes the common effort is preferred.

IV. Extension into Contractible Efforts

Above we assume that retailers A and B negotiate over the ownership and business format, but they cannot contract over the common and specific efforts. That is, the efforts are non-contractible. In this section, we introduce contractible efforts. That is, the proportions of α_1 and α_2 among efforts e_1 and e_2 are still non-contractible, but the remaining proportions of $1-\alpha_1$ and $1-\alpha_2$ are contractible. With the value of $\alpha_1 = \alpha_2 = 1$, the analysis is completely the same as the above section.

TABLE 2

EFFORT AND PAYOFF UNDER VARIOUS ASSET OWNERSHIPS AND BUSINESS FORMATS (CONTRACTIBLE EFFORTS)

		Business Format	
		A	B
Ownership	A	**(Merchant Model)** Efforts: $e_1^N=0.5v_1,\ e_2^N=0$ $e_1^C=v_1,\ e_2^C=0$ Net Payoff: $K+\frac{v_1^2}{2}-\frac{\alpha_1 v_1^2}{8}$	
	B	**(Marketplace Model)** Efforts: $e_1^N=v_1,\ e_2^N=0.5v_2$ $e_1^C=v_1,\ e_2^C=0$ Net Payoff: $K+\frac{v_1^2}{2}-\frac{\alpha_2 v_2^2}{8}$	**(Independent Model)** Efforts: $e_1^N=v_1,\ e_2^N=v_2$ $e_1^C=v_1,\ e_2^C=v_2$ Net Payoff: $\frac{v_1^2+v_2^2}{2}$

With this change, the Equations (1) - (3) should be modified as follows.

$$V_1=K+v_1\{(1-\alpha_1)e_1^C+\alpha_1 e_1^N\} \tag{8}$$

$$V_2=v_1\{(1-\alpha_1)e_1^C+\alpha_1 e_1^N\}+v_2\{(1-\alpha_2)e_2^C+\alpha_2 e_2^N\} \tag{9}$$

$$C=\frac{1}{2}(1-\alpha_1)(e_1^C)^2+\frac{1}{2}\alpha_1(e_1^C)^2+\frac{1}{2}(1-\alpha_2)(e_2^N)^2+\frac{1}{2}\alpha_2(e_2^N)^2 \tag{10}$$

where e_1^C, e_2^C and e_1^N, e_2^N denote the contractible efforts and non-contractible efforts among e_1, e_2. The process for finding the non-contractible efforts is similar as above, while the contractible efforts are determined to maximize V_1-C and V_2-C respectively, since retailers maximize the integrated payoffs when efforts are contractible. The results are summarized in Table 2.

First, in the independent model, the retailer chooses the optimal levels in both common and specific efforts, which equalize the marginal products with the marginal costs of efforts. That is,

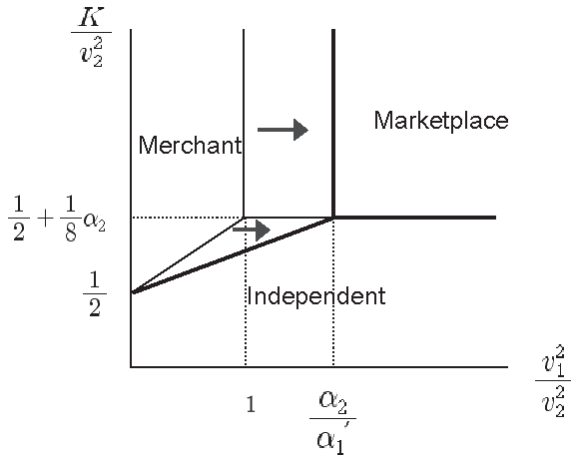


FIGURE 4
INCREASE IN CONTRACTIBILITY IN COMMON EFFORT

$(e_1^i,\ e_2^i)=(v_1,\ v_2)$, $i=N,\ C$. This is because the independent retailers don't have any relation with other retailers, thus putting his own efforts as large as possible regardless of contractibility of efforts.

Second, the level of contractible efforts and non-contractible efforts is different in the marketplace and merchant model. Note that retailers choose the same level of non-contractible efforts as before, and the specific efforts are not useful in improving payoff in the marketplace and merchant model. Since it is possible to contract some portion of efforts, the contract should make the useless effort minimized and the productive effort maximized. Thus the contractible common effort is set to be at the optimal level and the contractible specific effort is set to be zero.

Next, we will see the effect of changes in the proportion of contractibility. Figure 4 shows the effect of decreasing α_1, the fraction of retailer's effort that is non-contractible. Decreasing α_1 shifts the vertical line separating the merchant and marketplace to the right and flattens the diagonal that separates the merchant from completely independent. The shifts make the area for the merchant larger than before.

This can be explained as follows. When you choose the merchant model, it is optimal for the common efforts to be maximized, and for the specific efforts to be minimized. When contractibility in common

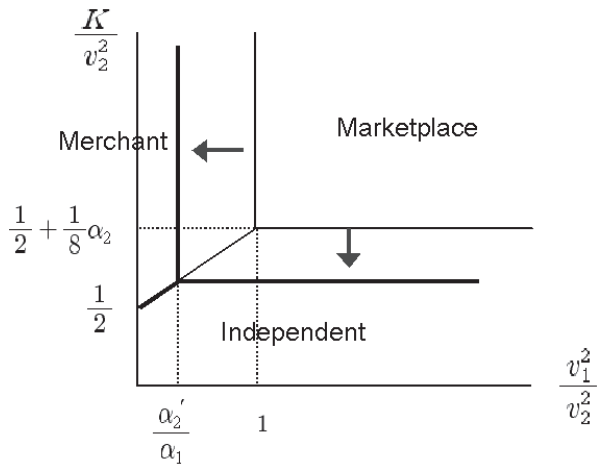


FIGURE 5
INCREASE IN CONTRACTIBILITY IN SPECIFIC EFFORT

effort is increased, we can see that the contractible common effort is raised compared to the non-contractible case with no change in specific effort. This leads to larger payoff in the merchant model. However, the common efforts are already set to be the optimal level in the independent and marketplace model, the increase in contractibility in common effort would not improve the payoff. Thus the payoff in the merchant model is increased relative to the independent and marketplace model when contractibility in common effort is increased.

Figure 5 shows the effect of decreasing α_2, the fraction of specific effort that is non-contractible. Decreasing α_2 shifts the border of marketplace down to the left, which means larger possibility of choosing the marketplace model.

The intuition behind this is similar as above. In the marketplace model, it is also optimal for the common efforts to be maximized, and for the specific efforts to be minimized. When contractibility in specific effort is increased, we can see that the contractible specific effort is lowered compared to the non-contractible case with no change in common effort. This leads to larger payoff in the marketplace model. However, the specific efforts are already set to be the optimal level in the independent and merchant model, the increase in contractibility in specific effort would not improve the payoff. Thus the payoff in the marketplace model is increased relative to the independent and

merchant model when contractibility in specific effort is increased.

V. Discussions

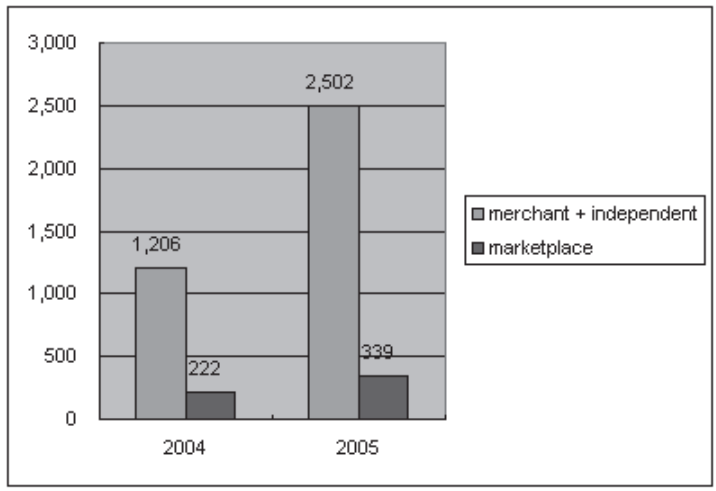
In this section, we explain two aforementioned characteristics of the domestic online retail market with the above model. When we apply above model to the domestic online retail market, the two characteristics (decrease of the independent model and rapid growth of the marketplace model) would be generated from several factors, that is, changes in parameters K, υ_1, υ_2, α_2.

Below we will address qualitatively that those parameters are changed consistently with the actual phenomena of the market. First, among other things, it is certain that network externality becomes stronger as online retail grows. Buyers have more benefit with various products and sellers, indicating more attractiveness to the merchant and marketplace model that shares the business format relative to the independent model. In the model this captures the increase in K.

Second, several mechanisms for increasing the productivity of common effort is found as online retail grows. Note that common effort is the actions that improve your payoff regardless of the business format adopted. One example is the widespread appearance of 'shopbots', which enable buyers to compare products and prices with very small search costs. The other is the activation of consumer community and evaluation. With these emerging mechanisms, the common effort that raises the customer trust in price, quality, and product information becomes more transparent and thus productive in the sense that it raises retailer's payoff. In the model this captures the increase in υ_1.

Third, the specific effort is meaningful when consumers are relatively inexperienced in the online transaction, so hard to find pertinent sellers or products. It is also productive when the online transactions are not standardized. With these circumstances, retailer's fruitful business efforts could be incompatible with others, making those as specific. However, the development and adoption of online transaction establish a standard in the payment or delivery, especially in the marketplace model. For example, the domestic credit card companies provide common environments in the payment of the online transaction, and almost every delivery companies provide tracking service. These make the productivity of specific effort decrease, which means lower υ_2.

Fourth, we can find some evidence that the contractibility of specific



Source: Lee (2006).

FIGURE 6
CONSUMER DAMAGE

effort is increased. If more specific effort is contractible, it is natural that we will see less the actions that harm the marketplace operator. In the early stage of marketplace, there are some sellers who take advantage of the marketplace and seek to increase its own profit. For example, there were some sellers that list products with their telephone number to contact consumers directly for avoidance of transaction fees. Some sellers intentionally present lower bid amount, but require extra payment for consumers actually to get the product. However, the marketplace itself endeavors to reduce such actions by rating the sellers with consumer evaluation and tough monitoring. As a result, the case of consumer damage in marketplace increase far less than other business formats. In 2005 when the growth of marketplace is visible, the number of consumer damage in the marketplace model is increased by 53%, while that in the independent and merchant model is increased by 107% (See Figure 6). Accordingly we can interpret these changes as the increase in contractibility of specific efforts.

VI. Conclusion

The rapidly increasing online retailers could be classified on their business models into three categories; independent, merchant and marketplace model. When we look at the domestic growth trend of these business models, interesting characteristics are found; first, the average sales amount of the independent model has been decreasing continuously, and second, the market share of marketplace model shows significant growth. At the same time, the domestic online retail marketplace has come to coexistence, which is qualitatively distinct from other countries' concentrated marketplace.

This paper investigates these characteristics with a formal theoretical model. Based on the asset ownership and business format, the model explicitly considers the retails' decision on the online retail business model. With qualitatively analyzing, the model's prediction is consistent with the characteristics aforementioned. As the domestic electronic commerce matures, the marginal productivity of common effort – effort which is valuable to both business formats – tends to increase and that of specific effort – effort which is valuable only when the independent business format is used – tends to decrease. With the rating of sellers by consumer evaluation and tough monitoring, specific efforts are more contractible. Changes of these parameters in the model consistently predict the domestic characteristics.

These results further raise more subtle research questions related to the generality of the 'coexistence away from concentration phenomenon' in the marketplace. On the one hand, the model indicate the potential growth path of online retail business model generally applicable to other economies as well as the domestic one, since we can easily predict similar changes in the parameters. But on the other hand, issues excluded in the model such as the weak incentive for differentiation strategies of marketplace operators might work against the 'coexistence away from concentration phenomenon' in the marketplace. Although coexistence and concentration in the online retail marketplace are interesting topic, this paper does not analyze these phenomena in depth. Thus this direction of research could be interesting in the future. Especially, the reason behind the unique domestic progress in the marketplace may well be sought for.

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