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Analysis of Price Dispersion in E-Market: A Case Study

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ABSTRACT

Some studies show that Internet markets are more efficient than conventional markets with respect to price levels, menu costs, and price elasticity, except substantial and persistent dispersion in prices on the Internet. Is price dispersion in Internet markets higher than that of conventional markets? This paper examines the nature of price competition in books among five online book-sellers in China, i.e. dangdang.com, joyo.com, bjbb.com, china-pub.com and welan.com. Unlike the researches before, we not only consider the products' prices, but also the whole price level. According to the investigations and analyses of 50 books price observations collected in August 2004, we conclude that the whole price dispersion in Internet markets is not higher than conventional markets, and high price dispersion on one sample is the results of firm's discrimination strategy. When the competition is very complete, the prices show a tendency to be consistent.

Keywords: E-Commerce, Price Dispersion, Internet Markets, Market Efficiency

1. INTRODUCTION

Electronic commerce is a significant force in the consumer economy. Consumers can now go online and comparison shop between hundreds of vendors with much less effort than in the physical world. One widely-reported prediction with respect to electronic commerce is that the availability of low-cost information on price — specifically the rise of comparison shopping agents — will lead all Internet retailers to charge the same price for mass-produced physical goods and that price will be approximately cost.^[1]

However, several studies have found that Internet markets are more efficient than conventional markets with respect to price levels, menu costs, and price elasticity, except substantial and persistent dispersion in prices on the Internet. This price dispersion was not consistent with Internet markets efficiency.

Is price dispersion in Internet markets truly higher than conventional markets? This paper approaches this question by investigating the price dispersion in Chinese electronic markets with examining the nature of price competition in books among five online book-sellers, i.e. dangdang.com, joyo.com, bjbb.com, china-pub.com and welan.com. In section 2 we discuss the researches of price dispersion in electronic markets. In section 3 we discuss the investigation in Chinese online book markets, and then in section 4 we compare it with traditional retail markets. In section 5 we discuss the phenomena of large price dispersion in online book

market and its competition, and then we present the basic results. In section 6 we conclude.

2. PRICE LEVEL AND PRICE DISPERSION IN ELECTRONIC MARKETS

An efficient market means in which consumers are susceptible to the changes of price, and product prices are susceptible to the changes of consumer demands, and operation costs of enterprise, product prices, marginal production costs and average production costs are equal. According this definition, the market efficiency can be measured by four parameters related to price: price level, price dispersion, menu cost, and price elasticity.

Generally, when consumers search costs decrease, product prices will decline and close to marginal cost. The less search costs, the lower price level, the less price dispersion, the higher market efficiency. According to the traditional economic view, by using search engine and electronic agent technology, consumers can search information of products more easily on the Internet, and compare the prices among many producers. Therefore, we would expect more violent competition and lower prices than in conventional channels. In addition, Internet is open to each enterprise, including big company and small firm, so it reduces enterprises' enter costs, and make the competition more intense.

Despite this presumption of increased competition, however, existing empirical works on the Internet have not been so supportive of the theory as one might expect. Because demand price elasticity and menu cost cannot be measured directly, existing work has mainly entailed collecting prices on and offline for a specific category such as books, and compared their price dispersion rate. Although the results from the works have not

conformed to the traditional views of reducing search costs. These studies have generally found large dispersion of prices online and prices either modestly lower or actually higher than their offline counterparts.^[2]

Early works yield conflicting results. Lee (1997) found that prices for second hand cars were higher on the Internet than in conventional channels. Brynjolfsson and Smith (2000) focused their research on the index of price level, price dispersion, and variety rate (menu cost) in online books and compact disks market for 1998-99. They found that Internet retailers had lower prices, smaller price adjustments, and larger or smaller price dispersion than conventional channels, depending on whether prices were weighted by proxies for market share. And their studies show that Internet retailer prices differ by an average of 33% for books and 25% for CDs, and some even reached 50%. Another study of interest is Clemons, Hitt, and Hann (1998) on the online travel industry. They found that online ticket agents engaged in significant product differentiation, i.e., agents responded to identical requests with different time/price pairs. Clay (2001) found that online bookstore had lower prices or the same, but had larger price dispersion.

Zhu^[3] proposed his interpretation frame on this paradox. He attributed the large price dispersion in E-markets to the weak position of consumer contrasted with the producer on deciding exchange prices. Although consumer can collect the information of retail price and related product prices, and have the decreasing tendency on prices, Zhu thought that E-markets reduce the search cost of online retailers at the same time. In his opinion, with lower search cost the online retailers can make a different price by customization and other strategies, to strengthen their market position and control consumer.

However, Zhu's theory lack evidences and is not appropriate in interpreting price dispersion, because on condition of complete competition, product prices of different companies tend to be consistent. Especially with improvement in their capability of obtaining information, they can respond to the market quickly. Zhu also did not explain how online environment improves enterprises' decision abilities, and enhances their price discrimination abilities.

3. INVESTIGATION OF PRICE DISPERSION IN ONLINE BOOKSTORES

In this paper, we will present the first empirical evidence on the impact of Internet competition on prices and dispersion offline. In this sense, our results are similar to the existing empirical works on search. By analyzing the data collected from five online bookstores, we are able to document the price level and price dispersion in Chinese electronic market. Moreover, unlike the researches before, we not only consider the products' prices, but also compare the whole price level.

We examine online bookstores because of the following three aspects: First, each book has fixed publishing price on it which we can see, though different retailers can sell with different prices. Second, Internet book retailers were the forerunner in electronic commerce, so the competition in this market is more complete than others. Third, other Internet retailing is not developed at present in Chinese.

Since Internet bubble had broken down in 2000, many online retailers disappeared. Nowadays, Internet book retailers have formed a big industry in China. The top 5 in total sale and sale categories are approximately Dangdang, Joyo, China-pub, Welan and Bertelsmann. There are many concrete bookstores engaged in online business, such as Shanghai book-city, Beijing book building. And some integration Internet retailers sale book, for example 8848.com.

We investigated the top four Internet book retailers and a mouse&brick bookstore: Dangdang, Joyo, China-pub, welan, and BJBB (Beijing Book Building) Online. Dangdang (www.dangdang.com) is one of the biggest and earliest online bookstores in China, which claims to be the biggest Chinese Internet mall in the world. Besides books Dangdang sells CD, VCD, DVD, software, magazines and general merchandises, and deals in C2C business. Nearly founded as early as Dangdang, Joyo (www.joyo.com) claims to be the biggest book and audio&video products mall on the Internet. Their business is similar to Dangdang, including books, music, video, etc., with the functions of community and personal auction. China-pub (www.china-pub.com) claims to be the most professional online bookstore in China, and mainly sells computer, communication, economics, management and foreign language books. Electronic books are its particular business. As a professional online bookstore Welan (www.welan.com) only sells books, and claims to be the most professional academic bookstore in China. Its primary business is restricted in Beijing. Bjbb Online (www.bjbb.com) is an Internet book retailer attached to BJBB.

We collected data from five companies mentioned above because of the following points. ① All of them except Welan are well known in China. ② All of their headquarters are in Beijing, and they have oriented the same client group in the same place. ③ All of them are professional in book retailing, and most of them sell more than 300 thousand kinds of books. ④ Except China-pub, others were founded at the end of 90s, and underwent the shock of Internet bubble break in 2000.

A data set of 50 popular books' prices collected in August 2004 in different fields was selected as samples to analyzing price dispersion phenomena. We chose popular books because most of them can be found in five online bookstores. Because of different operation strategies among five companies, if we select

professional books as samples, we cannot find them in all of bookstores, as a result, many data cannot be collected, and the data set will not be integrity, therefore we cannot analyze it.

Our sample books consist of three categories: economics, English learning and computer programming. One of rules to select book is popular we have mentioned before. Another rule is that selected book's prices distribute dispersal. We lean to select high price book, because consumers show different action in buying different price books. People do not hesitate in buying low price books even no discount. But if there is a large discount for higher price books, they maybe get a great customer value. Therefore, the average price of sample books is 48.2RMB.

In fact, because each bookstore differs from operation strategies, customer groups and professional fields, it is difficult to find fifty books which all five bookstores have and satisfy our standards. We had met many cases that cannot find in five bookstores at the same time when collecting data, for example, there is not the same edition of *Three Empire*, a famous classic novel came down from Ming dynasty.

Although Joyo claims to be the biggest book and audio&video products mall on the Internet, we find its book categories are fewest in five companies. Dangdang faces to the masses. China-pub faces to professionals in computer field, economics and management. Welan was founded by a few students of Tsinghua University in 1999, and mainly faces to students and teachers of university in Beijing.

Table 1 shows some index we obtained.

Table 1. Price comparison of five online bookstores

Index	Value
Max Discount (Off)	52%
Min Discount (Off)	0%
Average Discount (Off)	20%
Max Price Dispersion	46.2%
Min Price Dispersion	10%
Average Price Dispersion	15.2%

Where price dispersion p equals

$$p = \frac{\max\{i_t\} - \min\{i_t\}}{\max\{i_t\}} \times 100\% \quad (1)$$

and average price dispersion p_a equals

$$p_a = \frac{\max\{\sum i_t\} - \min\{\sum i_t\}}{\max\{\sum i_t\}} \times 100\% \quad (2)$$

We analyzed the data and worked out the following results:

- Big discount is given in some books. The biggest discount is 48%, and the average discount is 80%. It possibly relates with the samples we selected,

because some books, especially computer books, are expensive, and have a big discount space. Some books are sold with very low price because of sales promotion.

- There is high price dispersion in online book markets. Max price dispersion reaches 46.2%, and min price dispersion is 10%, and average price dispersion is 15.2%. The max price dispersion is possibly due to sales promotion. Our results showed difference with Brynjolfsson's studies^[5] which said average price dispersion was 33%.
- Compared with conventional bookstores, prices were lower in online bookstores. As a conventional bookstore, BJBB spreads their brand with starting online business and changed to a click-and mortar company. Other four bookstores are virtual company, and their average selling price is a little low.

However, after analyzing the data set we collected further, we find that the average price dispersion is only 6.8% if we remove the data of BJBB! This is an acceptable result which means the price dispersion of online market is not higher than conventional market.

4. FARTHER STUDIES: COMPETITION BETWEEN ONLINE BOOKSTORES AND OFFLINE BOOKSTORES

Some of the results above are consistent with researches before, such as there is large price dispersion of one product, and max price dispersion reaches more than 46%. Compared to 90% discount in conventional bookstores (except for special bookstore), online bookstores have a large space in making a price. All those data seem to support the theory that electronic market has not been exhibited more efficient than conventional market, though it would be.

Because there is not a reasonable interpretation as yet, we have to carry on our research in another method. We change our research focus on the competition between online bookstores and offline bookstores. We investigated five offline bookstores which are located at and near Tsinghua University. We selected them basing on the following two aspects. On one hand they open to the same client group — students and teachers on the campus and at other universities hereabout, so they were intensely in competition with Welan. On the other hand, we are familiar with the evolvement of competition between them.

The main promotion measure of online bookstore is discounting. Welan resorted to it to absorb clients when it was founded. At the beginning (1999) Welan sold English-studying books published by New Oriented School (those reference books have been very popular in Chinese students who want to pass the English

examinations such as TOEFL, GRE, IELTS, etc.) at a 79% discount, and it advertised widely. Soon (about 3~4 months after) the five conventional bookstores adjusted the same books' prices from 90% discount to 80% discount, and then fell to 79% discount. In fact the competition spread to the bookstores further.

The competition mentioned above could be regarded as a game between online bookstores and offline bookstores. Online bookstores were a new entrant who had to introduce some new measures on purpose to absorb clients. So Welan chose discount. As a virtual shop, online bookstores need not a physical place, and they have all advantages that a virtual company have contrasted with offline ones.

When Welan opened the five conventional bookstores had not minded the new entrant. But after they found their turnover fell and had lost some clients gradually, they had to act. Firstly they do not think that they had to make the price as low as their new rival because of their advantages, for example, clients can obtain books immediately, so they just give 80% discount. But they found the clients who came to rivals were not easy to return, even they adopted lower prices measure then before, and it is inadequate to win the competition. Finally, the five conventional bookstores reduced their prices as the same as Welan.

The brick-and-mortar rivals' action made Welan lose its price advantage, so Welan adopted measures to keep customers. They sold books with 75% discount. Here online bookstore's profit was close to offline bookstores, and the customers' number of two kinds of bookstore tended to be steady gradually. Therefore, the competition was in equilibrium.

The game process was shown in table 2 and figure 1.

Table 2. Payment matrix of online and offline bookstore

		Conventional bookstore	
		Falling price	Keeping
Internet bookstore	Falling price	1,1	2,0.5
	Keeping	0,1.5	0,3

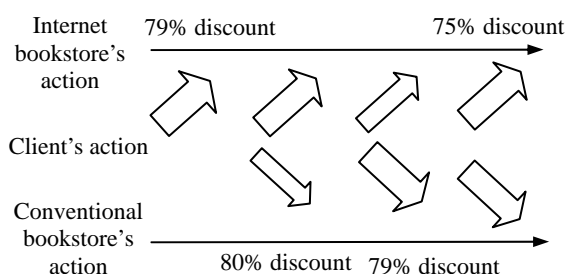


Figure 1. Competition between online and offline bookstore

From the investigation we conclude:

Under the competition in which client group overlaps and information transfers sufficiently, no matter what kind of bookstore, the price dispersion is low and prices will tend toward the same. It is consistent with the theory that Internet will improve market efficiency.

Consumer strength of bargaining is improved instead of declined as some researchers said. Decision capacities of enterprise are enhanced too, but not cost consumer's bargaining strength.

5. PRICE DISPERSION, COMPETITION IN ONLINE BOOKSTORES

With further analysis, we find that on condition sufficient competition price will trend to the sameness quickly. Our results differ from the former researchers' conclusion that the price dispersion of online book market is larger than offline. But our results based on different backgrounds of bookstores: we investigate the bookstores which have the same client group — they are similar in consumed level, knowledge level, reading taste, etc.

Therefore, we conclude that why there is high price dispersion that former researchers found due to the following points:

- Different Internet bookstore can carry on their price discrimination because of different client groups.
- Because of cost advantage Internet bookstore have a large spare in making a price, so there is big price dispersion.

Few consumers only buy one book once. For those consumers whatever bookstore is the same, and they tend to choose the cheapest one. However, for those consumers who need more than three books in several categories, it is difficult to choose bookstore (only consider price factor) because different bookstore have different promotion strategies. For example, Dangdang resort to using a very low price in best seller as a method to attract consumers, and as a professional bookstore the discrimination strategy of Welan is giving big discount for all. When books a consumer wants to buy include some best sellers and catena, he will find some of them should buy from Dangdang but others should from Welan, and if he selects the two it will take him more time and more delivery cost. It is very difficult to decide which bookstore he prefers.

So we attribute the price dispersion of online book markets to different client groups (purchasing power, knowledge level, professional background, etc.) and the

relationship between different books (many people have a few kind of reading taste)

6. CONCLUSION

In this paper we have examined some Internet bookstores in Aug 2004 and reviewed the competition between *welan.com* and some conventional bookstores from 1999 to 2000. We find that the phenomena that price dispersion of Internet markets is higher than conventional markets only exist in one book or single product instead of integer, and due to the discrimination strategies of enterprise. On the contrary, the whole price dispersion is not high, and on condition of sufficient competition different companies' prices tend to be the same. The data also show, consistent with the theory, that the efficiency of online markets is higher than conventional markets.

Another study of the competition between a virtual company and some conventional shops from 1999 to 2000 indicates that competitors adjusted their prices following the virtual shop. The results reveal that Internet market enhances the competition because information can be gotten easily.

Certainly, our studies are insufficient. We have only investigated five typical Internet bookstores and selected samples purposefully. In fact, we should consider consumer purchasing power, motivation, and

other consumer's characteristic, as well as market development, and enterprise's relative business, etc., which will infect our results.

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