

Heterogeneous Firms and the Development of Marketplaces in Chinese Dual Economy

Ke Ding*, Toshitaka Gokan[†], and Xiwei Zhu[‡]

March 15, 2015

Abstract

In this paper, we explain when traditional marketplaces and modern distribution channels coexist under the operation by heterogeneous firms. It is shown that the coexistence of firms in traditional marketplaces and firms with modern distribution channels improve welfare comparing with the case when no marketplace exists. Furthermore, it is shown that the lower transaction or fixed costs in marketplaces result in larger marketplaces and improve welfare.

Keywords: heterogeneous firms; marketplace

1 Introduction

Many types of distribution channels exist in developing countries. Marketplaces have played an important role in Chinese domestic distribution. As Table 1 suggests, the share of 100 million yuan markets in Chinese total domestic sales roughly exceeded 30 percent in the second half of 2000s.¹ Taking account of the fact that there are more than 50

*Institute of Developing Economies - Japan External Trade Organization (IDE-JETRO), Japan. E-mail: Ke_Ding@ide.go.jp

[†]Institute of Developing Economies - Japan External Trade Organization (IDE-JETRO), Japan. E-mail: Toshitaka_Gokan@ide.go.jp

[‡]Corresponding Author: Center for Research of Private Economy, Zhejiang University, #38 Zheda Road, Hangzhou 310027, P. R. China. E-mail: xwzhu@zju.edu.cn

¹It is difficult to precisely measure the exact position of marketplaces within Chinese domestic market at the present stage. In China, the statistical index that represents the total scale of distribution is Total Commodity Sales. The statistical index that represents the retail scale is Total Retail Sales of Social

000 marketplaces where transaction volume falls below 100 million yuan, we can infer that marketplaces are the most important system in Chinese domestic distribution. Since 2010, this share began to sharply shrink, which declined from 28 percent to 21 percent within a mere of four years.² This is because e-commerce began to explosively expand from this year. On the other hand, the total number of firms in China increased almost two times between 2005 and 2013. For simplicity, we deal with two distribution channels: traditional marketplaces and modern distribution channels in this paper.

The coexistence of marketplaces and modern distribution channels may be related with the difference of productivity among firms. In general, small less productive firms are highly dependent on marketplaces. They rarely bear on fixed costs of marketing and make use of marketplaces as a shared marketing channel. Infringement of Intellectual property is more common. Firms always copy from their competitors. In order to differentiate their products, which is merely horizontally differentiated goods, firms have to pay more money to develop new products continuously. Therefore, transaction costs for these less productive firms are large. On the other hand, some large productive firms usually reduce their dependence on marketplaces by constructing a sales network themselves, starting the brand strategy, or by strengthening the R&D activities. They pay more attention to protection of intellectual property and transaction costs for these firms are thus smaller. A good example is narrow fabric firms in Yiwu China Commodity City. In Table 2, ISO certificate can be regarded as an indicator of productivity of each firm. From this table, we can confirm that the more productive a firm, the less dependent on Yiwu Marketplace, the higher the fixed costs it bear on. In opposite, the less productive a firm, the more dependent on Yiwu Marketplace, the lower the fixed costs it bear on.

In order to support the efforts made by firms to differentiate their products, local governments have played an important role in reducing transaction costs. Taking example of Yiwu, it is undeniable that intellectual property protection remain a serious problem in this market. However, compared to early days, Yiwu Market has made a great progress

Consumer Goods. However, both of these indices are created based on the data of so-called Enterprises above a Certain Amount (whose total sales exceed 20 million yuan per year in the case of wholesale, and 5 million yuan in the case of retail). On the other hand, only the data on marketplaces where the transaction volume exceeds 100 million yuan (100 million yuan markets) has been published. In 2008, the number of marketplaces that handled consumer goods amounted to 61 535. However, the number of 100 million yuan markets (including both the marketplaces that handle consumer goods and industrial goods) was a mere of 4567 (China Statistical Yearbook 2009).

²As a new sales channel, E-commerce increased fixed cost for firms making use of marketplaces, while highly reducing fixed cost for firms mainly dependent on its own sales channel.

thus far (Ding 2012: Chapter 4). It has been Administration for Industry and Commerce (AIC) that has mainly taken charge of measures to reduce transaction costs. Early on, AIC laid stress on improving quality control and trademark awareness of booth-keepers. The AIC staff informed booth-keepers about what trademarks are and how to judge whether a trademark is genuine or counterfeit. The AIC began to seriously work on this issue from the mid-1990s, which established the Association for Preserving Brand-name Products. Table 3 shows the achievements of this association for cracking down on imitation goods. As it suggests, the work of the association has had a sound effect. Although the number of member companies increased between 1996 and 2007, annual caseloads and amounts of money involved in the counterfeit goods have constantly decreased. In 1998, the Yiwu government formally began to formulate a strategy known as “Zhiliang Lishi, Xingyu Xingshi” (Quality is the foundation of the city, credibility facilitates the development of the city). Based on this strategy, the Yiwu AIC took various measures to raise the credibility of market transactions. Of these, a typical measure is a campaign called “Chuangjian Xinyong Shifan Shichang” (Establishing Credibility as an Exemplary Market), which began from 2004. During this campaign, the AIC established a credit monitoring appraisal system, introducing a system of 24 standards in seven classifications for appraising Credit Booths. It also established a brand-name goods inquiry system.

As marketplaces are a shared marketing channel for each firms, fixed costs for entering marketplaces are originally lower than that in modern distribution channels. In addition to this, local governments have played an important role in reducing fixed costs for entering marketplaces (Ding 2012, Chapter 4). For example, in Yiwu market, local government continuously expanded or relocated the transaction building along with the expansion of transactions in the market. It also took flexible measures in allocating the rights of use of the booths. The Yiwu AIC firstly allowed resale of the use rights or subleasing of booths in 1993, provided the booth-keepers paid 2000 Yuan for market construction fees for each occurrence of this kind of activity. In this year, the Yiwu AIC also allowed several booth-keepers to share one booth simultaneously. As a result, in mid-2000s, the use rights of more than half of Yiwu Market’s booths have been transferred to other persons. It is clear that these regulations have highly reduced the fixed cost for entering Yiwu Market.

Our purpose is to clarify the importance of the existence of marketplaces, dealing with welfare analysis, and to explain the impact of lowering transaction costs and fixed costs on the formation of marketplaces and social welfare. As we explained above, we regard that transaction costs contain the cost to respond the problem on intellectual property protection. Our interests are whether the prosperity of marketplaces and welfare

improvements result from intellectual property protection.

The paper is organized as follows. Section 2 explains our model and the condition when marketplaces and modern distribution channels coexist. Our model is built on Melitz (2003). Section 3 and 4 deal with comparative analysis and welfare analysis, respectively. Section 5 concludes by discussing the meaning of derived results.

2 Model

There is one country that uses labor to produce goods. One sector produces a homogeneous good with one unit of labor per unit output, while the other sector (M-sector) produces a continuum of varieties with using increasing returns to scale technology under Dixit-Stiglitz(1977) monopolistic competition. The income of the country is given as E .

Following Melitz (2003), differentiated products by M-sector are produced by firms which bear the fixed costs f_E to enter the industry and to create a unit of capital. Inter temporal discounting of capital is ignored but firms die according to a Poisson process with the hazard rate δ . After sinking this cost, an entrant then draws an efficiency coefficient a from the distribution $G[a]$, which has positive probability for $a \in [0, a_0]$, $a_0 = 1$.

Upon observing this draw, a firm may decide not only to exit and not produce, but also to use marketplaces, which is indexed as i in the below or to use modern distribution channels instead of marketplaces, which is indexed as j in the below. We suppose that the firms in marketplaces enjoy low fixed costs F_i , whereas firms with modern distribution channels bear higher fixed costs, F_j . These fixed costs are measured in labor units. The firms in marketplaces bear higher marginal costs (transaction costs), τ_i , whereas the firms with modern distribution channels enjoy lower marginal costs (transaction costs), $\tau_j > \tau_i$, which express negative externalities in marketplaces. Finally, firms choose prices.

We obtain prices as usual, $p_i(a) = a\tau_i/(1 - 1/\sigma)$. Substituting this price into profit function and setting $\pi_i(a) = \pi_j(a)$ yields productivity a^* which is indifferent whether firms use marketplaces or not:

$$a^* = \frac{(\sigma - 1)P_M}{\sigma} \left[\frac{(\phi_i - \phi_j)E}{(F_i - F_j)\sigma} \right]^{\frac{1}{\sigma-1}} \quad (1)$$

where $\phi_i \equiv \tau_i^{1-\sigma}$ and $\phi_j \equiv \tau_j^{1-\sigma}$. Since $\phi_i > \phi_j$ and $F_i > F_j$, we obtain $\pi_i(a) > \pi_j(a)$ if $a < a^*$. Thus, firms with a choose to entry market i iff $a < a^*$. Likewise, we obtain $\pi_i(a) < \pi_j(a)$ if $a > a^*$. Thus, firms with a choose to entry market j iff $a > a^*$. Setting $\pi_j(a_D) = 0$, the zero cutoff profit condition yields productivity a_D which is indifferent

whether firms exit and not produce or not:

$$a_D = \frac{(\sigma - 1)P_M}{\sigma} \left(\frac{\phi_j E}{\sigma F_j} \right)^{\frac{1}{\sigma-1}} \quad (2)$$

The price index is expressed as

$$P_M^{1-\sigma} = N_i \int_0^{a^*} \left(\frac{\sigma}{\sigma-1} a \tau_i \right)^{1-\sigma} dG(a|a_D) + N_j \int_{a^*}^{a_D} \left(\frac{\sigma}{\sigma-1} a \tau_j \right)^{1-\sigma} dG(a|a_D)$$

where $N_i = \left(\frac{a^*}{a_D} \right)^\rho M = \Lambda^\rho M$, $N_j = \left[1 - \left(\frac{a^*}{a_D} \right)^\rho \right] M = (1 - \Lambda^\rho) M$ and $a^*/a_D \equiv \Lambda$. Using (1) and (2), we obtain:

$$\frac{a^*}{a_D} = \left[\frac{(\phi_i - \phi_j) F_j}{\phi_j (F_i - F_j)} \right]^{\frac{1}{\sigma-1}} \equiv \Lambda$$

Thus, price index can be expressed as:

$$P_M^{1-\sigma} = \frac{\rho \left(\frac{\sigma}{\sigma-1} \right)^{1-\sigma} M}{(1 + \rho - \sigma) a_D^\rho} \left[\Lambda^\rho \phi_i a^{*1+\rho-\sigma} + (1 - \Lambda^\rho) \phi_j \left(a_D^{1+\rho-\sigma} - a^{*1+\rho-\sigma} \right) \right] \quad (3)$$

Substituting (1) and (2) into (3), we have

$$M^* = \frac{(1 + \rho - \sigma) E}{\rho \sigma F_j \left[\Lambda^\rho \Lambda^{1+\rho-\sigma} \phi_i / \phi_j + (1 - \Lambda^\rho) (1 - \Lambda^{1+\rho-\sigma}) \right]}$$

The number of firms when only marketplaces exist is $M_j^o = \frac{(1+\rho-\sigma)E}{\rho\sigma F_j}$. If $\Lambda = 0$, we have $M^* = M_j^o$. Since $\phi_i/\phi_j > 1$, we obtain $M^* < M_j^o$ if $\Lambda \in (0, 1)$. Whereas, if $\Lambda = 1$, we obtain $(\phi_i - \phi_j) F_j / \phi_j (F_i - F_j) = 1 \Leftrightarrow \phi_i F_j = \phi_j F_i$, and $M^* = M_i^o = \frac{(1+\rho-\sigma)E}{\rho\sigma F_i}$, where M_i^o expresses the number of firms when there is no marketplace. Since $\phi_i/\phi_j > 1$, we obtain $M^* > M_i^o$ if $\Lambda \in (0, 1)$. In other words, *the existence of marketplaces results in more varieties in the economy*.

Free entry condition is expressed as:

$$F_e = \frac{1}{\delta} \left\{ \int_0^{a^*} \left[\frac{E}{\sigma} \left(\frac{\sigma-1}{\sigma} \frac{a \tau_i}{P_M} \right)^{1-\sigma} - F_i \right] dG(a|a_D) + \int_{a^*}^{a_D} \left[\frac{E}{\sigma} \left(\frac{\sigma-1}{\sigma} \frac{a \tau_j}{P_M} \right)^{1-\sigma} - F_j \right] dG(a|a_D) \right\}$$

Substituting (1) and (2) into free entry condition yields the equilibrium value of zero cut-off profit condition:

$$a_D = \left[\frac{\delta(1 + \rho - \sigma) F_e}{(\sigma - 1) \tilde{F}} \right]^{\frac{1}{\rho}}$$

where $\tilde{F} \equiv \Lambda^\rho F_i + (1 - \Lambda^\rho)F_j$. Since $F_j < \tilde{F} < F_i$, we find $a_{Di} < a_D < a_{Dj}$. In other words, *less productive firms who exit if no marketplace exists can survive if marketplaces exist.*

Since (i) $\Lambda < 1 \Leftrightarrow \phi_i F_j < \phi_j F_i$ and (ii) $\phi_i > \phi_j$ and $F_i > F_j \Rightarrow \Lambda > 0$, we obtain the following proposition:

Proposition 1 *Marketplaces and modern distribution channels coexist if*

$$1 < \frac{\phi_i}{\phi_j} < \frac{F_i}{F_j}.$$

This condition suggests that the importance of lower fixed costs in marketplaces for marketplaces and modern distribution channels to coexist.

3 Comparative Analysis

We examine the impact of transaction costs or fixed costs in marketplaces on the threshold value of productivity a_D and a^* .

We obtain $\frac{\partial a_D}{\partial \phi_j} = \frac{a_D \Lambda^\rho}{\sigma-1} \frac{F_i - F_j}{\tilde{F}} \frac{\phi_i}{(\phi_i - \phi_j)\phi_j} > 0$. That is, zero profit cutoff condition a_D increases in the decrease of transaction costs because firms in marketplaces benefits from lower marginal cost. Less productive firm which exits from marketplaces can survive in marketplaces now. Then, we obtain $\frac{\partial a^*}{\partial \phi_j} = -\frac{a_D \Lambda}{\sigma-1} \frac{\phi_i}{(\phi_i - \phi_j)\phi_j} \frac{F_j}{F} < 0$, which means that the threshold value between marketplaces and modern distribution channels decrease in the decrease of transaction costs. This is because firms in marketplaces benefit from cost advantage to the firms with modern distribution channels. Thus, *the range of productivity of firms in marketplaces becomes wider when transaction costs in marketplaces decrease.*

On the fixed costs, we obtain $\frac{\partial a_D}{\partial F_j} = -\frac{a_D}{\rho \tilde{F}} \left(\frac{\rho}{\sigma-1} \Lambda^\rho \frac{F_i}{F_j} + 1 - \Lambda^\rho \right) < 0$, which means that the zero profit cutoff condition increases in fixed costs in marketplaces because of selection effect. Then, we obtain $\frac{\partial a^*}{\partial F_j} = \frac{a_D \Lambda}{\sigma-1} \frac{(\rho+1-\sigma)(F_i - F_j)(1-\Lambda^\rho) + \rho F_i \tilde{F}}{F_j (F_i - F_j) \rho \tilde{F}} > 0$, which means that the threshold value between firms in marketplaces and firms in modern distribution channels increases in fixed costs in marketplaces. This is because firms in marketplaces benefit from cost advantage to the firms with modern distribution channels. Thus, *the range of productivity of firms in marketplaces becomes wider when fixed costs in marketplaces decrease.*

4 Welfare Analysis

We compare welfare under the coexistence of marketplaces and modern distribution channels with welfare under no existence of marketplaces. Welfare under the coexistence of marketplaces and modern distribution channels is expressed as

$$W^{\sigma-1} = \frac{E\phi_j\rho^{\sigma-1}}{\sigma F_j} \left[\frac{\delta(1+\rho-\sigma)F_e}{(\sigma-1)\tilde{F}} \right]^{\frac{-(\sigma-1)}{\rho}}$$

whereas welfare under no existence of marketplaces is expressed as

$$W_i^{\sigma-1} = \frac{Ea_{Di}^{-(\sigma-1)}\phi_i\rho^{\sigma-1}}{\sigma F_i}$$

Comparing two cases, we obtain

$$\frac{W^{\sigma-1}}{W_i^{\sigma-1}} = \frac{a_{Di}^{\sigma-1}\phi_j F_i}{a_D^{\sigma-1}\phi_i F_j} \geq 1 \Leftrightarrow \frac{\phi_j F_i}{\phi_i F_j} \geq \left[\frac{F_i}{\tilde{F}} \right]^{\frac{\sigma-1}{\rho}}$$

Since $F_i > \tilde{F}$ and $\phi_j F_i > \phi_i F_j$, we find that the both sides of the last inequality is more than 1. The left-hand side of the inequality is related with the number of varieties and the other side is related with selling costs. Since the difficulty to obtain analytical results, we rely on the numerical analysis. Setting $(\sigma-1)/\rho = 0.2$, we obtain contour lines on $W^{\sigma-1}/W_i^{\sigma-1}$ as in Figure 1. Our focus is limited on the domain which is above the line between origin and $(F_j/F_i, \phi_j/\phi_i) = (1, 1)$ from Proposition 1. Figure 1 shows $W > W_i$ in the domain. This suggests that *the existence of firms in marketplaces provides more varieties in the economy, which increases welfare*. Since the light color shows higher value of $W^{\sigma-1}/W_i^{\sigma-1}$, we find that $W^{\sigma-1}/W_i^{\sigma-1}$ increases in the decrease of transaction costs or fixed costs in marketplaces. Since $W_i^{\sigma-1}$ does not depend on transaction costs and fixed costs in marketplaces, we find that *the lower transaction or fixed costs in marketplaces improve welfare when marketplaces and modern distribution channels coexist*.

5 Conclusion

We found the coexistence of traditional marketplaces and modern distribution channels under lower fixed costs in marketplaces. It was shown that marketplaces become larger when transaction costs and fixed costs are lower. From numerical analysis, we found that the coexistence of traditional marketplaces and modern distribution channels improves welfare comparing with the case when no marketplace exists. Furthermore, we found

that the lower transaction costs or fixed costs in marketplaces improve welfare when marketplaces and modern distribution channels coexist. These results are obtained due to the increase in varieties in the economy. Since transaction costs can be regarded as the protection costs of intellectual property right, the results mean that the protection of intellectual property right leads to more firms and more varieties in marketplaces and in the economy, which improves welfare.

References

Ding, Ke. 2012. *Market Platforms, Industrial Clusters and Small Business Dynamics: Specialized Markets in China*, Cheltenham: Edward Elgar.

Dixit, Avinash K. and Stiglitz, Joseph(1977) “Monopolistic Competition and Product Variety,” *The American Economic Review* 67(3), 297308.

Fah, Daniel. 2008. *Markets, Value Chains and Upgrading in Developing Industrial Clusters: A Case Study of the Narrow Fabric Industry in Yiwu, Zhejiang Province, P. R. C.*, Master Thesis, University of Zurich.

Melitz, M. J. (2003) “The impact of trade on intra-industry reallocations and aggregate industry productivity,” *Econometrica* 71, 16951725.

Table 1 Share of various distribution systems in China's domestic distribution

	Total domestic sales (100 million yuan)	Share of 100 million yuan markets	Share of Retail Chain Stores	Others	Number of Firms(10 thousands)
2005	84 658.2	35%	15%	50%	3320.79
2006	100 485.0	37%	15%	48%	3514.68
2007	121 586.4	36%	10%	54%	3705.5
2008	194 392.3	27%	11%	62%	3888.79
2009	189 992.1	31%	12%	57%	5009.9
2010	262210.9	28%	10%	62%	4627.27
2011	342730.9	24%	10%	66%	5061.76
2012	390527.9	24%	9%	67%	5494.77
2013	474151.2	21%	8%	71%	6062.38

Note: Total domestic sales = Total commodity sales – export.

Source: China Statistical Yearbook, various years. Number of firms: www.saic.gov.cn/zwgk/tjzl, accessed March 5, 2015.

Table 2 Firms in the Yiwu narrow fabric cluster

Type of firm	Number of firms	Share of production volume in the cluster	Number of machines	Yiwu Market Sales Share	ISO-Certificate
Workshops	200	12%	1-19	57%(20)	0%(20)
Factories	50	12%	20-100	56%(10)	33%(10)
Companies	30	76%	Over 100	32%(15)	90%(15)

Source: Author compiled based on data of Fah (2008, Sections 9.1, 9.2, Table 9-5, 9-10).

Note: () refers to the number of firm sample.

Table 3 Achievements of the Association for Preserving Brand-name Products for Cracking Down on Imitation Goods

Year	No. of Members	Number of Cases	Value of Imitation Goods (10,000 Yuan)
1996	80	352	985
2001	142	272	735
Annual average between 2002 and April 2007*	156**	180	507

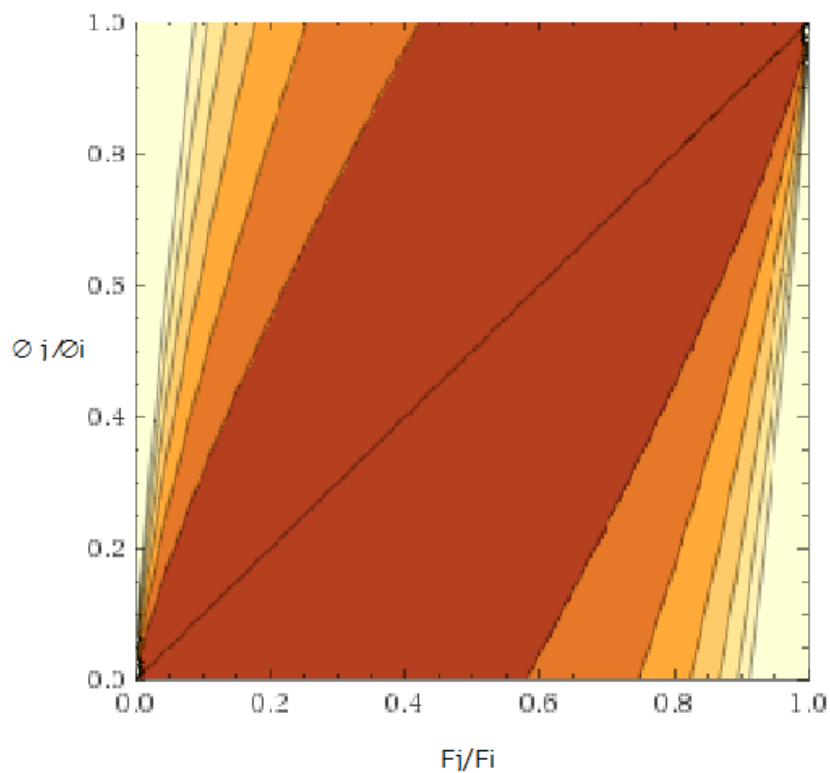
Sources: Ding (2012)

Notes:

* 2007 is counted as one-third of a year;

** No. of members at the end of 2007.

Figure 1 Contour lines on welfare of two cases: no marketplaces and the coexistence of marketplaces and modern distribution channels



Sources: Authors