1. An analytical framework for the vigorous entry and low price phenomenon

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INTRODUCTION

This chapter presents a framework for analyzing the vigorous entry and low price phenomenon found in Chinese industries. We will attempt to extract common themes and logic from research undertaken by a variety of observers of Chinese industry. In particular, we focus on the links between the vigorous entry and low product price phenomenon we have seen in the introduction and vertically disintegrated transactions. As already discussed in Section 1.2.1 of the Introduction, the legacy of technology since the planned economy era, the huge domestic market, technology transfer from abroad and foreign direct investment (FDI) are important factors and preconditions for industrial development. As voluminous monographs on industrial research have pointed out, the vigorous entry and low price phenomenon, based on these preconditions, dominates the behavior of domestic firms. This chapter will concentrate on presenting an explanation of the mechanism of appearance of the vigorous entry and low price phenomenon. The domain of operation that a firm enters forms a part of a value chain for a particular industry. Chinese firms often subdivide this domain into narrower sections to aid entry into the market. Chinese companies sometimes even subdivide domains that are usually regarded as being dealt with by a single firm. We call this phenomenon vertical disintegration. In order to consider why and how vertical disintegration takes place, in Section 1.1 we first review the literature related to vertical integration, the opposite of vertical disintegration. The topic of vertical integration is covered by a broad range of literature, including both theoretical and empirical studies.

Section 1.2 presents a theoretical analysis related to the vigorous entry and low price phenomenon. We start from a theory on entry and exit in industrial organization theory in order to examine the underlying logic
and understand the phenomenon. The relationships between the vigorous entry and low price phenomenon, perfect competition market theory, and recent analyses of exit and entry theory are then explored with regard to inter-firm relationships. Section 1.3 argues a relationship between the vigorous entry and low price phenomenon and the competitive market. The appendix to this chapter provides a simple theoretical model as a basis for arguments in Section 1.2.

1.1 LITERATURE REVIEW

1.1.1 Vertical Integration and Vertical Disintegration

This book is inspired by many previous studies of Chinese industry. We begin our arguments with the concept of vertical disintegration, as described by Marukawa (2007), also taking inspiration from the idea of “pseudo-open architecture,” formulated by Fujimoto and Shintaku (2005). In a series of management studies focusing on technical architecture, Fujimoto and Shintaku (2005) arrived at the idea of pseudo-open architecture through precise observations of the two-wheel vehicle industry in China.

Our aim here is to examine how vertical disintegration is related to low concentrated market structures and to explore whether the phenomena co-exist. First, we need to clarify what the terms vertical integration and vertical disintegration refer to. As an example, consider any particular industry with some firms supplying raw materials to other companies, which then, in turn, produce components. The components suppliers sell their products to assemblers, and the assemblers sell to distributors, at which point the end product (or service) will reach the customers. This value chain consists of a number of technically separate domains. If these separable modes are operated by different independent firms, then this division of labor is known as vertical disintegration or vertical split (axis 1). If these domains are operated by one firm, we call this phenomenon vertical integration. When we examine these inter- or intra-firm transactions, we need to observe what kinds of goods are transacted and, at the same time, what kind of services, functions or divisions of labor are associated with them.1

Another approach to evaluation that might need to be used concerns the open or closed nature of transactions (axis 2). Take an example of a firm that produces a key component. If the firm sells its products to any assembler, or even to companies in competition with it, then we call it an open transaction. If the products are only sold to a limited list of assemblers then we say that the transaction is closed.2
1.1.2 Inferences in Industrial Research

Why do Chinese firms prefer to be vertically disintegrated? What are the principle causes? We will begin by reviewing Chinese industrial research with regard to these questions. Marukawa (2007) describes the advantage of vertical disintegration as follows: “Generally speaking, the latter [vertical disintegration] is more economical. This is because the production of intermediate goods tends to enjoy economies of scale as the suppliers focusing on the production of intermediate goods can sell their products to multiple assemblers.” (Marukawa 2007: 50).

The architecture perspective focuses on the design information that is embodied in the product. Architecture refers to the basic design concept of dividing a product into components or modules, allocating production functions to each component, and, finally, addressing how to design and adjust the interface between the components. The interface is the junction for the input and output of information or energy, which represents the architecture of products. When the components are “modularized,” and the interfaces between the components, or modules, are standardized, a firm can assemble products by collecting and simply assembling the standardized components. Architecture in this context is called “modular architecture.” An alternative form of architecture is described as “integral architecture.” The related parts of integral architecture need further interactive adjustment, or optimization, when the products are assembled (Fujimoto and Shintaku 2005: 3–4).

According to the definition above, we can imagine that modular architecture fits well with vertically disintegrated transactions. Research on Chinese industries from an architecture perspective repeatedly finds that modularity is a characteristic of Chinese industries (Fujimoto and Shintaku 2005; Shintaku and Amano 2009). The research concentrated more on analysing the results of modularization, or vertically disintegrated transactions, rather than examining why the modularity occurs. If design architecture is modular, for example, research showed that the architecture constrains the flexibility to differentiate products (Ge and Fujimoto 2005; Otahara and Sugiyama 2005). Ge and Fujimoto (2005) indicated that the architecture of the two-wheel vehicle industry in Chinese firms is “pseudo-open architecture.” They argue that because of this architecture, Chinese assemblers lose the incentive to improve their technology and their capabilities, and, as a result, their existing technology becomes locked in place. They claim that this technological lock-in is an unfortunate consequence of vertical disintegration.

However, as will be discussed in Chapter 3, the technological lock-in of assemblers has not necessarily hindered industrial development. On
the contrary, assemblers have been able to buy in new technology. The remarkable development of the *shanzhai* (or guerilla) cell phone industry in the 2000s owes its success in large part to the technological platform and transaction platform, detailed in Chapter 4.

1.1.3 Theory of Vertical Integration

Why would a firm produce some materials or services themselves while another firm buys them in? This “make or buy” problem has been a major research topic in the field of microeconomics. This area of research originated from the concept of “transaction cost,” that was proposed by Ronald Coase (1937). He claimed that “it is costly to use the price mechanism,” and called the cost the “transaction cost.” Furthermore, he pointed out that when the transaction cost is too large, the firm will be reorganized or some other function integrated into it. As a result, vertical integration takes place because the transaction cost is higher than the cost of integration.

How does the literature address the reasons for the invocation of vertical integration or the internalization of transactions? Oliver E. Williamson began investigating this to address the question of whether vertical integration is anti-competitive or not. The main reason for invoking vertical integration is not economy in terms of technology, but to control the incentive problem. Specifically, Williamson wrote that “fiat is frequently a more efficient way to settle minor conflicts than haggling or litigation” (Williamson, 1971: 114).

In addition to this, vertical integration may take place when transaction-specific investment benefits both buyer and supplier. The buyer and seller start to negotiate their transaction and find a need for transaction-specific investment. If this investment is executed, the suppliers’ specific investment becomes sunk and buyers benefit from a quasi-rent accruing from the transaction. As a result both buyer and seller may be locked in. This duo-monopolistic relationship may induce rent seeking on both sides, or result in both parties giving up further efforts to realize a larger value. Williamson claims that authority within an organization is effective in preventing these moral hazard-type inefficiencies (Williamson 1971, 1975). Lafontaine and Slade (2007) surveyed the empirical literature on vertical integration and firm boundaries.

In addition to fiat or authority within organization, other factors such as ownership, configuration of decision or residuary claim rights, cash flow rights, and firm boundaries can also control *ex post* inefficiency. This idea is called the “property right approach” (Grossman and Hart 1986, Hart 1995). The literature suggests that vertical integration may take place
in order to control the incentives of stakeholders and to resolve *ex post* inefficiency.

One aim of this book is to understand the principle behind the situation in Chinese industry. This motive compels us to apply reverse logic to the economics of these organizations. However, this will not be sufficient to explain the situation. Risk and incentives are the ultimate sources of problems that result in vertical integration or contract design. Due to the incomplete nature of contracts, vertical integration is superior when conflicts develop. Therefore, it might be concluded that vertical disintegration will take place when risk and incentive problems are resolved. However, that may not be true. In order to understand why vertical disintegration is found in a variety of Chinese industries we need to clarify the underlying factors.

### 1.1.4 Vigorous Entry in Industrial Dynamics Literature

In other literature, a field called industrial dynamics is also related to the vigorous entry phenomenon. A substantial entry into an industry will lead to an explosive increase in production volume and a reduction in end price. This will aid the spread of the product within society.

Industrial dynamics literature has accumulated a large volume of research on the relationship between vigorous entry and the growth of the industry. Most influential research has pointed out that vigorous entry will improve productivity and lead to innovation, thereby contributing to the growth of the industry. For example, Schumpeter (1934, 1942) notes that incumbent firms in an industry tend to be less efficient in terms of innovation; newly entered firms are more innovative. As a result of market competition, inefficient firms are screened out, so that innovation and efficiency progress in an industry as a whole. According to Schumpeter (1934, 1942), vigorous entry is a means of driving innovation in society. Nelson and Winter (1978) confirmed this proposition in their review of the data. A new entrant is more productive than incumbent firms, with vigorous entry contributing to improved productivity within the industry. Igami (2013), using a rigorous structural estimation method, also confirmed that incumbent firms are faced with low productivity in innovation.

In the history of industrial development in China, when vigorous entry, low market concentration, and low price conditions prevailed, then firm selection and productivity improvements were seen. In addition to highlighting the phenomenon of vertical disintegration, this chapter includes a theoretical summary of a mechanism that leads to vertical disintegration lowering entry cost, thereby lowering product price.

Furthermore, this book as a whole proposes a perspective that aids
understanding of the experience of China’s industrial dynamics. We propose that the driving force behind China’s industrial dynamics is an extensive utilization of price mechanisms. This extensive utilization is achieved through the following notion: if price mechanisms require transaction costs (Coase 1937) to be used, the transaction cost is an entry cost. Any structure that serves to reduce a transaction or fixed cost, for example through the use of appropriate platforms or appropriate rules, will facilitate Chinese firms in using price mechanisms extensively. In addition, vertical integration may be avoided if the structures used make it possible to reduce risk or incentive problems. Vigorous entry results in price competition, and this leads to further vertical disintegration to reduce average cost and price. In Section 1.2, we will go through the logic behind this notion in more detail.

1.2 THEORY OF VIGOROUS ENTRY AND LOW PRICE

1.2.1 Fixed Cost Determines Entry; Marginal Cost Determines Exit

This section will consider the logic behind vigorous entry, low market concentration, low price. As we have already seen, when compared to India and Japan, the degree of market concentration of Chinese industries is fairly low. This is a common feature across many industries and thus is unlikely to be a determining factor of technical factors specific to particular industries. In the field of industrial organization theory, entry and exit from markets has been discussed as follows (see Tirole 1988; Belleflamme and Peitz 2010):

1. The number of firms entering a market is determined by the fixed costs necessary for entry.
2. The number of firms operating in a market is inversely proportional to size of the fixed costs required for entry. However, if fixed costs possibly enhance the effect of differentiation of their products, and at the same time the fixed costs are sunk, that is, not recoverable when the firm decides to retreat from the market, the number of firms in the market stop increasing even though the market size has increased.
3. When the size of the fixed cost is large, the average cost may decrease as production volume increases, that is, scale economy will work. However, if the fixed cost is small or zero, the average cost gets close to variable cost, scale economics do not work; average cost becomes independent of the scale of production. Furthermore, the average
costs of a firm with a substantial fixed cost are higher than the average of a firm with negligible fixed costs, if both firms are operating in the same market and are faced with the same conditions regarding variable costs. In this case, if the two firms compete in a market, the end product price realized will be close to the average costs of the firms with negligible fixed costs.

4. In terms of exit, the variable costs may be important. If a firm enters into a market and starts operating, as long as the price of their product is higher than the variable costs, they have no incentive to exit from that market. As long as the product makes a profit between product price and variable costs, the firm can expect to cover the fixed cost on entry in the long run.

As a whole, I hypothesize in this book that the very low concentrated market structure in China appears because (1) structures or mechanisms exist that lower fixed cost for entry, and (2) variable costs are low due to a variety of institutional factors, which reduce pressure on firms to exit.

1.2.2 Changeable Boundary Between Fixed Costs and Variable Costs

How then are fixed costs and variable costs defined? A fixed cost refers to a cost that is required to enable production, independent of the volume of production. For example:

1. The cost of acquiring technology, such as the introduction of machinery or training to acquire technology.
2. The cost of establishing sales channels.
3. Labor costs. As will be discussed later in Chapter 10, labor cost can be either a fixed or variable cost. If the workforce is employed on a salary, including an element of social welfare, then the labor cost becomes a fixed cost.
4. Entry costs are defined as the costs needed to start a business AND are independent of the volume of production. Some types of transaction costs are fixed costs, where they are necessary for business and independent of production volume; for example, the cost of the search to find customers or suppliers, the cost in acquiring information necessary to start business, training or learning costs for particular technologies, or the building up of know-how to do business in a particular industry. These are transaction costs necessary to utilize price mechanisms working in a market, and a fixed cost for a firm wanting to expend before entry into the market.
In contrast, a variable cost refers to a unit cost needed to dispense the goods or services that a firm supplies; for example, energy expenditure, raw materials, labor cost (by the hour), service or lease fees for professional services or machinery. Defective products and any waste of time or materials are also variable costs.

The boundary between fixed costs and variable costs is subject to change as a result of institutional and strategy alterations. Marukawa (2007), and several papers found in Fujimoto and Shintaku (2005), reported that the key components of each industry that were usually manufactured internally (vertically integrated) in Japanese companies were procured from outside by Chinese firms. The manufacture of engines for automobiles is an example of this case. A procured engine is a variable cost, but the use of internal research and development (R&D) and engine production departments within a company are fixed costs.

Another example of a changeable fixed and variable cost is labor. Under the lifetime employment system common in Japan until the 1990s, and the employment system of state-owned enterprises (SOEs) used in China until the late 1990s, the labor force worked on a salary and firms carried the cost of social welfare. This fixed cost of labor, which had to be met regardless of sales, put pressure on firm’s profits. Chapter 10 will give more detail with regard to the situation in China.

Technology or sales channels can be either a fixed cost or a variable cost. A manufacturer can choose to integrate the sales channel inside the organization. In this case, the payment for the operation or the salary for employees in the sales department is a fixed cost. However, if a manufacturer chooses to make a contract with a sales agent or a wholesaler, possibly with a rebate based on volume, the expenditure related to the sales function is transformed into a variable cost. Technology can vary between a fixed and variable cost. If a manufacturer outsources a process with a high technological requirement, or pays a machining fee instead of making a huge investment in machinery, then fixed costs for technology or machinery can be saved. Under this arrangement, manufacturers are subject to risks with regard to product quality or being let down by trading partners. The most essential risk would be a failure to procure the key components. The literature shows that vertical integration is one method of minimizing these risks. The other new trend is the utilization of platforms. The concept of a platform will be discussed in the next section.

As can be seen thus far, entry costs or fixed costs can be reduced by a firm’s strategy. Chinese firms enter into a market very vigorously, and the market is very scattered, as Chinese firms prefer to use strategies to reduce their fixed entry costs.
1.2.3 Entry-cost Saving Strategy: The Economic Effect of Platforms (1)

Reducing fixed costs has the effect of lowering the entry cost for firms, and product prices. A firm therefore has a clear incentive to lower fixed costs. However, saving fixed costs by buying in may hinder essential technological innovation; the effect of product differentiation may be limited. There is a trade-off between vertical integration and buying in from outside. A third option is the utilization of platforms. This results in a far smaller fixed cost and limited differentiation of products without substantial technological innovation.

A “platform” is defined here as a mechanism that shares some functions that require huge fixed costs for firms among multiple suppliers, customers or several products. Functions shared between products or agents are, for example, the site of transactions, molds, and so on. Analysis of the economic function of the use of platforms has rapidly progressed in both economic and management studies since the 2000s (theoretical papers include Rochet and Tirole 2003; Illing and Peitz 2006; Ghosh and Morita 2008; Hagiu and Wright 2011. For a guidebook with extensive case studies, see Evans, Hagiu and Shmalensee 2006). The case studies in this book found platforms in two different domains: technology and transactions.

This book claims that a platform is a device for the promotion of vertical disintegration. Examples of platforms that have facilitated product engineering include the integrated circuit (IC) for cell phones, chassis for automobiles, and molds. Platforms that have facilitated transactions include market or Internet sales sites, and transaction exchange. Platforms in this book are classified into technology platforms and transaction platforms.

A platform used for product structure is called a technology platform. By sharing an essential but costly part over multiple products, the platform can lower the fixed cost per unit. Utilizing a platform has one constraint; the junction between core and non-core parts needs to be standardized. If this cost of standardization is acceptable, a firm can expect to reduce its fixed costs by using a platform. However, sharing design and architecture limits product differentiation.

The other type is a transaction platform. This can be found in supermarkets, Internet transaction sites such as e-Bay, Amazon, and Alibaba, physical markets, directories such as Yellow Pages, and in consignment contracts with agents (Illing and Peitz 2006; Hagiu 2007, 2009; Hagiu and Wright 2011). Transaction platforms also save fixed costs on sales and provide a procurement channel for entry. They save search costs for customers or suppliers, economizing on the expenditure necessary to set up their own outlets.
As a whole, platforms facilitate a lower fixed cost per unit by sharing it with other agents or products. Regardless of differences in domain, technology, or transaction channels, platforms contribute to the saving of fixed costs and the lowering of entry costs.

1.2.4 Low Price: The Economic Effect of Platforms (2)

In addition to lower entry cost, a platform has the power to lower product prices. The low price of Chinese products is well known and most people attribute it to low wages. It is true that the policies regarding labor, food, and energy have functioned to keep the prices of these production factors low (see Part III of this book). However, this is not the only reason for the low prices of Chinese products. As mentioned previously, the fixed-cost saving strategy utilized by Chinese firms is also important. Here is an equation on average cost pricing:

\[
\text{Price} = \text{average cost} = \frac{\text{fixed costs}}{\text{sales volume}} + \text{variable costs}
\]

From this equation, we can see the popular perception that low wages and low factor prices result in a low price, focusing on the impact of variable costs. However, a strategy of saving fixed costs by using platforms or vertical disintegration focuses on the impact of the fixed cost per unit. For example, if the fixed costs can be somehow reduced to zero, then the average cost is equal to the variable costs. In this case, the average cost is definitely lower than in a case employing vertical integration and by reducing the average cost by increasing sales volume. Therefore, this book proposes that the low prices of Chinese goods were realized by two factors: low production factors, as a result of Chinese social policies, and fixed-cost saving strategies used by firms.

The strategy of saving fixed costs has the power to lower product price. Specifically, fixed costs can be saved by using platforms; as more firms use a platform the fixed cost per unit is further reduced. As a result of this mechanism, the price competitiveness of the platform strategy is superior to that found in vertical integration. This also applies to sales. The lower product price results in an increase in demand for the product.

In the real market, price is a major competitive device, even though firms pursue differentiation. If a firm uses a platform to lower average cost and product price, rival firms must match their competition or be forced out of the market.

The experiences of competition in the cell phone market show the effect of a strategy to save fixed costs. A difference in strategy regarding platform use led to a difference in product price and competitive positions between
The disintegration of production

different brands (see Chapter 4 for further details). In this industry, the baseband IC is the key component as well as the platform. The largest vendor for 3G cell phone ICs is MTK, run by a Taiwanese semiconductor design firm. MTK is an IC design house and started out as a vendor for international brands such as SONY. Later, in order to access the huge demand of the Chinese market, they developed a reference IC for 3G so that Chinese brands could assemble a cell phone even without in-house engineers. Based on MTK’s reference design, Chinese brands were able to add some minor changes that enabled them to differentiate their product from competitors’ phones. The MTK IC was called a “turn-key solution,” which implies that all that is needed is a key to assemble the ready-made cell phone, and had an almost monopolistic status in 3G ICs in China.

Table 1.1 shows a matrix of phones that did and did not use the MTK IC, and their product prices. The table shows that the product price in phones using the MTK IC is far lower than those without; the price difference remained at about 900 RMB in both 2006 and 2007. According to Ding, Pan and Watanabe (2012), the difference in the average price is statistically significant. This price difference not only affects the market share of each brand, but also determines selection in the market. A local brand called Amoi attempted to integrate an R&D team into their firm so that they had the ability to establish essential technological differentiation. However, their costs were far higher than their rivals who used the MTK chip. Their product price was therefore too high and they were forced out of the market. They went bankrupt in 2009.

The use of a platform is a strategy reducing fixed, or entry, costs for the

<table>
<thead>
<tr>
<th>Brands using MTK chip</th>
<th>Used</th>
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<tr>
<td></td>
<td>2006</td>
<td>2007</td>
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<tr>
<td>Average price of all brands (unit: RMB)</td>
<td>1199</td>
<td>1007</td>
</tr>
</tbody>
</table>

Notes:
1. The main 30 cities in China (Beijing, Changsha, Chengdu, Chongqing, Dalian, Dongguan, Fuzhou, Guangzhou, Hangzhou, Harbin, Hefei, Jinan, Kunming, Nanchang, Nanjing, Nanning, Ningbo, Qingdao, Shanghai, Shenyang, Shenzhen, Shijiazhuang, Suzhou, Taiyuan, Tianjin, Wuhan, Wuxi, Xiamen, Xian, Zhengzhou.
2. Data was obtained from randomly sampled cell phone outlets. Information on whether the products used MTK ICs or not is from interviews conducted by the Shenzhen Semiconductor Association.
3. Data on deviation was omitted. Standard deviation was very low; the data showed a concentration at the average level.

Source: GfK Research.
firm; for example, semiconductor chipsets for cell phones, die and casts or molds, and chassis. All these serve to reduce the fixed costs of the firm, and lower entry costs. However, as Ge and Fujimoto (2005) pointed out, the shared function might limit product innovation as the assemblers do not have the capability to reconstruct the architecture themselves, and, as a result, are not capable of implementing product innovation. However, the examples of the *shanzhai* cell phones, color TVs, or automobiles given in this book indicate that platforms can induce innovation. Ghosh and Morita (2008) supported the possibility of product innovation with platform use. The findings of their theoretical analysis are that product innovation with platform use will take place if the platform itself continues to evolve and to be supplied through open transaction.

Modularization, platforms, and vertical disintegration do not necessarily conflict with innovation and industrial development. Chapters in Part 1 of this book will discuss this point.

1.3 THE VIGOROUS ENTRY AND LOW PRICE PHENOMENON AND THE COMPETITIVE MARKET

1.3.1 Strategies to Save Entry Costs and Pseudo-perfect Competition Market

Let us try to summarize the discussion thus far. Looking back on the process of industrial development in China, a feature observed across many industries is that a large number of firms has entered into the market while expanding rapidly, although the market share of each firm is small. The small size of market share combined with the large number of firms in the market would normally be features found only in a limited initial period of industrial growth. However, compared with India and Japan, it is apparent that there is a low concentration of markets in China. Can it be assumed that there is a structural reason behind this decentralized market structure? One clue to the answer to this question is the vertical disintegration phenomenon that has been highlighted by numerous industrial researchers.

How has this situation of a very scattered market share, combined with a large number of firms in the market, emerged in China? One possible answer is low entry costs and low fixed costs for Chinese firms. How have Chinese firms lowered their entry costs? This has been achieved through the strategies employed by the firms rather than national institutions or the business environment. Vertical disintegration, or the vertical split
phenomenon, was a strategy devised to save entry costs. Furthermore, this strategy leads to vigorous entry and low price. This strategy became sustainable with the arrival of platforms (the technology platform and transaction platform, as mentioned earlier).

What is interesting is that the profile of the market economy that appeared from this vigorous entry and low price phenomenon looks very much like the perfect competitive economy that can be found in standard textbooks on microeconomics. A standard microeconomic perfect competitive market is defined as follows:

To begin, suppose that (1) each of an infinite number of potential firms has access to the technology necessary for satisfactory production and that there is no entry barrier. (2) Firms can enter the market, but not affect the price, therefore (3) firms will decide their own production volume $q$; this is the main strategic variable. Under this assumption, the size of demand and supply price become as follows: (i) number of firms $J \times$ each firm’s supply $q = Q$. (ii) price $p$ is equal to marginal cost. If a non-price factor does not negatively correlate with price, the consumer surplus will be maximized under this price and resource allocation reaches maximum efficiency (Mas-Colell, Whinston and Green 1995: 10E, 334).

In the real world, each firm has some market power and can compete in terms of price in the differentiated competitive market. Thus, strictly speaking, assumptions (2) and (3), necessary for the market to be identified as a perfect competitive market, do not hold. However, assumption (1), that all potential firms should have access to suitable technology for good production and that there is no entry barrier, looks very similar to that allowed by the use of a platform; platforms facilitate a high degree of accessibility to technology, thus lowering the entry barrier.

The vigorous entry and low price phenomenon found in China is possibly a symptom of the pseudo-perfect competitive market. This state is a result of strategies devised by firms to save entry costs. At the same time, there is a potential for social welfare, the sum of a firm’s profit and consumer welfare, to be maximized. This could be the reason why vertical disintegration and the use of strategies to save entry costs are so widespread in China.12

1.3.2 Theory of Entry and Vertical Transaction

The above hypothesis, that vigorous entry and low price are attributed to a desire to save entry costs by firms, is an inference based on findings from industrial research and the theory of entry and exit. Recently, theoretical analysis has also presented a similar proposition.
Will free and vigorous entry benefit social welfare? This question was first posed to examine whether industrial policy can be justified. The excess entry theorem, proposed by Suzumura and Kiyono (1987), as well as Mankiw and Whinston (1986), claimed that the number of firms in the market may become higher than that needed for it to function at the most efficient level. As a result, a policy to limit free entry might improve social welfare, the sum of a firm’s profit and consumer welfare, and could therefore be justified. These analyses refer to cases in industries such as steelworks, chemical refineries, cement works, and the paper and sugar industries. A massive investment on entry, homogeneous products and oligopolistic markets are among the common features found in these industries. Because of the homogeneous nature of products, the room for differentiation is limited, and the price may be pushed down to a marginal (variable) cost level. At the same time, due to huge fixed costs (investment for entry), the average cost is far larger than the variable cost. However, the low price does not lead to huge demand because of homogeneity, and thus the firm cannot cover the deficit between the average cost and the variable cost by increasing the volume of sales. In this case, the firm cannot help but exit from the market. Since this is negative for consumer welfare, a policy to limit entry can be justified.

However, the theorem does not necessarily apply in the case of an industry which produces differentiated products. Recent literature concerning the effect of entry on social welfare has begun to take account of intermediate goods, which were ignored by the excess entry theorem. Ghosh and Morita (2007) formalized in detail the transaction of intermediate goods in a vertical relationship between the buyer and seller. In this setting, free entry may lead to both excess entry and exit. In the excess entry theorem, intermediate goods transaction was assumed to be based on average cost price. Recent analysis, however, allows for competition in intermediate goods supply, and has argued that this competition lowers the price of intermediate goods, leading to an expansion in the demand for end products. When the fixed costs for intermediate goods production are larger than a certain level, excess entry may take place, but an optimal level of excess exits may occur based on the fixed cost for intermediate goods (Morita 2008).

A strategy for the use of platforms may affect the size of fixed costs for intermediate goods production. As we have seen already, the fixed costs for the assembler will decrease. In addition, the fixed cost at a social level might be reduced due to economies of scale at the stage of intermediate goods production.
CONCLUSION

In this chapter, I have attempted to explain the vigorous entry and low price phenomenon as a structural characteristic in a framework consisting of the strategy of firms and industrial competition. Firms prefer to save fixed costs; therefore they enter the market in a vertically disintegrated way. This strategy thereby evokes vigorous entry. Vertical disintegration also brings about lower prices. Saving on fixed costs results in a low average cost, and allows the firm to set prices at a lower level. Case studies in Part I and II will detail this process in actual situations. This feature is critical with regard to the future development pattern of Chinese industry.

As chapters in Part III will detail, the Chinese government has taken action to maintain the prices of production factors such as labor, energy, and food. This policy has substantially benefited the growth of Chinese industries. However, these policies of maintaining low variable costs are about to change. Wages, energy costs, and food prices are all expected to show rising trends in the 2010s and onwards. However, because the strategies and environment for the support of vertical disintegration are being maintained, the low prices seen as the result of a strategy of saving fixed costs are still viable.

NOTES

1. I focus here on the decisions that firms make as to which, and how many, modes they undertake themselves. If a firm controls only a limited number of modes, they will need other firms for the modes that they do not fulfill in order to sustain the value chain in their particular industry. In this case, some researchers describe the situation as “vertical division of labor.” The division of labor often takes place without any negotiation. As a result, I use the terms “vertical disintegration” and “vertical split” here to imply the situation where the decision has been made by one agent.

2. Chapter 2 of this book utilizes an additional evaluation axis in addition to (1) integration/disintegration and (2) openness/closeness factors discussed above. This axis is concerned with the difference in (technological) capability between the buyer and supplier (axis 3). We think that we can capture the third factor in axes (1) and (2) by explicitly identifying what items are transacted between firms; only products or products with services.

3. The reasons for vertical integration that have been observed in case studies in this book involve securing procurement of a source of raw materials or of key parts from upstream (Chapter 2 and 5). This is the argument that risk in procurement induces vertical integration.

4. China is notorious for its weak legal enforcement and high contract default ratio. Watanabe and Yanagawa (2013) detailed the situation, taking trade credit contracts as an example.

5. The time frame also makes this distinction ambiguous. In the long run, all costs are variable costs.
6. Technical standards such as ISO should be regarded as a type of platform. Thanks to standards set by the government or through international negotiations, the adjustment costs between anonymous potential transaction partners are substantially reduced.

7. Platforms in this category have been assigned several different terms. Marukawa et al. (2006) termed them “technology platforms.” Ghosh and Morita (2008) used the term “product platform.” According to Krishnan and Gupta (2001), a product platform is defined as “parts that consist of a system of products and assets as its subsystem.” Robertson and Ulrich (1998) define a product platform as a “set of assets that are shared by multiple products.” For example, Toyota uses a common platform for its Land Cruiser and Lexus LX 470, and Honda uses a common platform for its CR-V and Acura RDX.3. Porsche and Volkswagen use a common platform for Porsche’s Cayenne and Volkswagen’s Touareg, 4 where the former is more luxurious than the latter. These are examples of platform sharing across vertically differentiated products within a firm and across firms (Ghosh and Morita 2008).

8. The explanation of the transaction platform above focused on cases where the platform has one function (i.e., it is single-sided). However, some platforms are double-sided or multi-sided in function. For example, Amazon offers a store that sells products to customers, but at the same time it also offers the procurement of secondary goods. Hagi’s papers discuss the reasons for and impacts of multi-sided platforms.

9. For lead firms or technology suppliers, modularization and platforms are the fruits of their innovation activities. But for assemblers, this may not provide much scope for innovation of the technology for the users of the system. However, assemblers will undertake innovation at another phase, for example, marketing or customizing. Which type of innovation is more valuable? One way of looking at this question is that it should be evaluated by which better improves social welfare, consumer welfare and firms’ profits. This approach is described in Chapter 3.

10. By utilizing the technological platform, an assembler can save time and energy in learning the market and building up capacity. This results in lowered entry cost, and is called vigorous entry. This mechanism has worked well in industries with semiconductor-based technological development. Accounts of experiences in the home appliance, cell phone and solar cell industries will be detailed in this book. Even though the product architecture is of a modular type, this has not necessarily hindered development of the industry or technological progress. As long as the consumer values a low price, then a process of reducing the average cost through vertical disintegration will be rewarded with reinvestment to improve the platform technology, which results in newer technology reaching the assemblers.

11. In other words, a non-price factor, for example, good quality, is realized when the price is lower. This rarely happens in the real world.

12. The Chinese government does not necessarily support the current situation or approve of vigorous entry. The Chinese situation is often one of a mixed market, where heterogeneous types of firms (say, SOE and private) are competing, which may affect the efficiency of the market. This is a topic for further research.

REFERENCES

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APPENDIX: THEORETICAL ANALYSIS

A1.1 How is the Number of Firms in the Market Determined?

First, as a reference, consider the case of free entry and price competition in the market (Salop 1979). If there is no regulation from laws and institutions on entry into the market, a firm will decide to enter if a positive profit is expected. As a first step, the firm will decide whether to enter into a specific market, for example, a region or a product category. The second step will be for the firm to set a price after studying the strategies of rival firms operating in the target market. Here, we assume that the profit of an individual firm will decrease with the increase in the number of firms in the market.

In this situation the firm will decide to enter the market if the following condition holds:

\[
d(p - c) - F \geq 0,
\]

where \(d\) is final demand, \(p\) is price, \(c\) is variable cost and \(F\) is entry cost.

If \(n\) is the number of firms in the market, then the following relationship exists:

\[
\pi(n) > \pi(n + 1)
\]

where \(\pi\) = a firm’s profit.

The number of firms in the market will be determined at an \(n^e\) that satisfies \(\pi(n^e) - F > 0\) and \(\pi(n^e + 1) - F < 0\). Ignoring the fact that \(n\) is an integer, there exists an \(n^e\) that satisfies the following equation:

\[
d(p - c)/n^e - F = 0 \quad (1.1)
\]

Assume that a firm competes with a price in a differentiated market, the profit maximizing price is then as follows (Salop 1979):

\[
p = c + \tau/n \quad (1.2)
\]

where \(\tau\) = consumer’s cost for substitution.

When the consumer decides to buy a firm’s product, foregoing a rival’s product, then substitutive cost \(\tau\) is the cost involved. For example, when you can buy identical goods at two different stores, the transportation costs incurred to travel to a store can be taken as the substitution cost \(\tau\). Another example might be found where a consumer loves SONY products. The
deeper his attachment to SONY products, the higher the cost to transfer to, for example, Toshiba products. This is another case of the substitution cost \( \tau \).

In this environment, a firm will set its price so that Equation (1.2) holds. The number of firms in the market will be determined from Equation (1.1). Overall, the number of firms in the market will be determined from (1.1) and (1.2) as follows:

\[
\frac{d\tau}{(ne)^2} = F \\
n^e = \sqrt{\frac{d\tau}{F}} 
\]  

(1.3)

The higher the substitution cost \( \tau \), which in practice means the longer the distance or the deeper the attachment to the products, the higher the price that the firm can set. However, an increasing number of rival firms in the market means that the firm cannot help but set a lower price. Due to this relationship, the substitution cost \( \tau \) to the consumer can be also called the market power of the firm. The larger the entry cost the smaller the number of firms in the market, and vice versa.\(^1\)

A1.2 How Low Price is Determined

According to Equation (1.2), the price function of a supplier can be rewritten as follows:

\[
p = c + \sqrt{F\tau/d} 
\]  

(1.2’)

This equation indicates that if a firm uses a strategy to save fixed costs, consumer attachment is low, or variable factor costs are low, the price should be set lower. This is the case in Chinese industry.

The prices that appear, and are observed in the market, are the equilibrium price after price competition. How this equilibrium price appears will be discussed below.

A1.3 Vertical Disintegration vs. Vertical Integration

Finally, I will examine the nature of the equilibrium when firms with heterogeneous strategies compete with each other. Here we consider the strategies to vertically disintegrate and to vertically integrate in competition.

Consider a market where an assembler procures intermediate goods \( X \), then assembles final product \( Y \) and sells it at price \( p \). When a supplier produces intermediate goods \( X \), the firm needs an entry fee \( F \) for each supplier and a variable cost \( c \) per unit. In the market for the final
goods $Y$, $n$ firms are operating, and each firm will have a demand $d_n$. The total demand in the market for $Y$ is

$$D = d_1 + d_2 + \ldots + d_n$$

The demand $D$ decreases to price $p$, described here as $D(p) = a - p$.

If firm I integrates the production of intermediate goods $X$ and final goods $Y$, their average cost is as follows:

$$AC_I = c + \frac{F}{d_I}$$

However, firm D disintegrates the production of intermediate goods $X$, and concentrates on assembling $Y$ at price $p$. The supplier will produce $X$ and sell it at price $v$ (here, we assume that $p = \alpha v$ ($\alpha$ is a markup ratio: $\alpha \geq 1$)). If numerous suppliers enter into the market for $X$, price $v$ will be depressed to the average cost $v = F/D$. Here, the average cost for the assembler becomes as follows:

$$AC_D = c + \frac{F}{D}$$

Because $D > d_I$ holds from the definition of $D$ and $d_I$, the average cost of the disintegrated strategy $AC_D$ is lower than the average cost of integration $AC_I$. The difference in cost will differentiate the product price. The assemblers are competing against each other and assumed to be forced out of the market if they make a deficit. The minimum constraint on price is the average cost level. If only vertically disintegrated firms are competing against each other, the end product price $p$ at equilibrium becomes:

$$p_d = \alpha AC_D$$

If all the firms are vertically integrated, the final product price is $p_I = AC_I$. Here, the price level of the vertically integrated equilibrium is higher than the vertically disintegrated equilibrium:

$$P_I > P_D$$

Even if identical products are produced, the price level might not be identical when firms’ strategies regarding integration or disintegration are taken into account.

Finally, what happens if vertically integrated firms and vertically disintegrated firms compete with each other? If firms that employ a vertically
disintegrated strategy are more efficient than firms that choose to integrate, then the vertically disintegrated firms will set their price at their average cost level to force the integrated firms out of the market, leading to larger profits.

A1.4 Variable Cost Determines Decision to Exit

Another factor that affects the number of firms in a market is the speed of exit. In China, the slow speed of exit also increases the number of firms active in the market. Entry decision is determined by entry fixed cost. What factor then determines the decision to exit? Besanko et al. (2004: 310) explain that the level of variable costs affects a firm’s decision to exit, particularly when entry costs are sunk. When fixed costs for entry are sunk, the firm cannot recover the costs if it decides to exit from the market. In this case, as long as the price is equal to or higher than variable costs, firms will decide to stay in the market because the firm can expect to recover the sunk fixed costs in the long run. Because of this logic, if variable costs in the market are maintained at a low level, firms have a very weak incentive to exit. In contrast, if the entry costs are not sunk, firms prefer to exit earlier if they can expect only a very thin profit. Factors that render entry costs to be sunk are as in the following cases: (1) firms have made some commitment in a labor contract or procurement contract; (2) the existence of a relation-specific investment makes it difficult to resale the investment, thereby causing entry costs to become sunk; (3) governments do not permit firms to exit.

As we have discussed thus far, firms in China tend to avoid sunk costs and save fixed costs, and therefore entry costs do not usually become sunk. However, as will be detailed later in this book, variable costs have been maintained at a low level both by government policies as well as by strategies and competition by firms. This tendency has probably contributed to a lowering of the opportunity cost to remain in the market and not exit. In addition, since the 1990s to 2000s, local governments that placed the securing of employment in their cities or counties at the top of their agenda often required firms to stay in the market. Combined with these factors, Chinese firms had weak incentive to exit from the market. This mechanism also reinforced vigorous entry in Chinese industries.

Notes

1. If entry cost is zero, the number of firms in the market becomes infinite.
2. Here, we ignore variable costs for the production of X.