Strategies and Tactics of Chinese Contract Manufacturers and Western OEMs (2001-2011)

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Abstract: As policy makers seek to draw lessons from the growth of Chinese manufacturing, we need to better understand the evolving strategies adopted by Chinese manufacturers since the economic reforms of the 1980s. Focusing on the apparel and electronics sectors, we look at how Chinese manufacturers sought to move to higher value-adding parts of the supply chain in different ways during the period 2001-2011 and how their western OEMs responded. As a first step towards understanding the co-evolving strategies and tactics of Chinese contract manufacturers and western OEMs, we use a simple game-theoretic framework of contract manufacturer and OEM strategies to look at the actual tactics many Chinese contract manufacturers adopted. Our findings are that Chinese contract manufacturers ended up co-operating, competing, or co-opetiting (i.e., cooperating and competing at the same time) with western OEMs. Also, western OEMs used their position in the supply chain to devise counter-measures, possibly ending with win-win solutions for both sides.

Keywords: Co-opetition; co-evolution; supply chain; value chain; strategy; tactics; game theory; contract manufacturing; electronics industry; apparel industry; game theory.

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1. Introduction

Economists and policy researchers (cf. Huang 2003) have looked into the question of the high rate of growth of Chinese manufacturing over the three decades from 1980 to 2010, which have seen China becoming the world's largest manufacturer as a country and one with the second-highest GDP. Much of this work has focused on FDI flows *into* China as many western manufacturers (or brands) strove to avail the low cost and supportive government policies to establish contract manufacturing or their own facilities in China. However, this work generally applies only to the mid 1990s. A few scholars – cf. Deng (2004), Warner et al (2004), and Child and Rodrigues (2005) – look at a later decade, around 1995-2005, to view FDI flows going out *from* China since about 2000 as a possible measure of Chinese manufacturing prowess. Part of such outgoing flows were motivated by securing raw material supplies in Africa and Asia, but much of it was also to be to 'enter higher value-added markets' (Child and Rodrigues, 2005).[2] But how have Chinese manufacturers moved up the value chain and how have their western OEM customers responded, in particular during the period 2001-2011?

Since 2001, Chinese manufacturers in different sectors have been making bold moves in the west. Hangzhou's Geely acquired Volvo for $1.8 billion; China's CSR Corp formed a $50 million joint venture with GE to supply high-speed trains in California and Florida; and BYD, a Shenzhen-based contract manufacturer of lithium batteries for OEM customers such as Motorola and Nokia, has sought to establish its presence in the nascent US electric car market by raising $232 million funding from Warren Buffett. In 2008, BYD began to sell electric cars worldwide rather than only supplying batteries. The same year, Hangzhou's WanXiang, a contract manufacturer for automotive parts such as drive-shafts and mufflers for Ford and others, acquired Ford's driveshaft division and established its own research center in Illinois.

[2] Post-2010, Chinese retailers such as Bosideng seek to establish their own brands in the west selling non-Chinese goods to appeal not only to western consumers but also to appeal to Chinese customers as a brand well established in the west!

There are other examples of outbound moves that involve Chinese contract manufacturers that were relatively unknown in the west earlier except to their western OEMs. Haier, a Qingdao-based contract manufacturer of Mitsubishi refrigerators, established its own factory in South Carolina in 2006 and started selling its own brand of home appliances (refrigerators, dishwashers, wine coolers, etc.) in the US after failing to acquire Maytag for $1.3 billion in 2005 (cf. Palepu et al. 2006). In 2011, Tianwei New Energy, a Chengdu based solar photovoltaic (PV) product manufacturer, established a new production plant in Idaho and began to sell its polysilicon materials, silicon wafers, PV cells, PV modules, and PV systems in the US. In 2011, Wuhan-based Linuo Solar Energy acquired IBM chip facility in NY in August 2011 (SNT, 2011).

Our work explores the idea of 'moving to higher value-added markets' as motivating manufacturing strategies for both Chinese manufacturers and their western counterparts, both of which we treat as part of the same "eco-system". As Chinese companies moved up the value chain during 2001-2011, western companies also responded appropriately. The strategies of Chinese manufacturers and those of western companies thus are co-evolving and this co-evolution is something other emerging economies will seek to learn from in the coming years. Indeed, it has been suggested that 'a co-evolutionary perspective would provide an appropriate analytical framework' in this context (Child and Rodrigues, 2005: p. 405). As a first step, we use a single-stage game theoretic lens with co-opetition as one of the basic strategies given that Chinese manufacturing companies are suppliers as well as competitors to western companies.

In the absence of publicly available hard data on why Chinese and western companies' managers acted the way they did and when and how they made agreements, our approach is *exploratory* and we use using examples of tactics Chinese manufacturers and their western customers have taken as reported in the business press. We have focused on manufacturers in the electronics and apparel industries for our examples given the attention on these two sectors in the business press when it comes to Chinese manufacturing. First we propose a simple game-theoretic framework for the strategic interactions between contract manufacturers and their western OEMs. We use this framework to examine the strategies and the specific ways these strategies have been operationalized by companies on either side. Part of the framework is the use of the concept of *co-opetition* (Nalebuff and Brandenburger, 1996) whereby Chinese contract

manufacturers and their western original equipment manufacturers (OEM) may co-operate and compete *simultaneously*. We use examples from the business press to support the existence of these strategies and counter-strategies.[3] Moreover, we show specific tactics that Chinese contract manufacturers are taking to operationalize their strategies as well as those that OEMs are taking or at least can take. We find that Chinese contract manufacturers have used co-operation, competition, or co-opetition (i.e., co-operating and competing at the same time) in the supply chain with their western OEMs.

Our contribution is twofold: *First*, we add to the management literature on the development of a coherent, cumulative body of knowledge regarding China's manufacturing practice especially over 2001-2011 during which outbound FDI has grown as the focus of Chinese manufacturing has shifted away from simply providing low cost contract manufacturing. Doing so may shed further light on research on Chinese manufacturers; e.g., in explaining the managers' priorities (Li, 2000: Table III). *Second*, we introduce an application of co-opetition in a simple game-theoretic framework for supply chain management as a first step to understanding industry behavior in the context of co-evolving strategies of manufacturers and their customers. We thus add to the surprisingly short list of articles that consider co-opetition in the supply chain (cf. Bakshi and Kleindorfer 2009 and Gurnani et al. 2007).

Our work has managerial implications, not only for policy makers to understand behavior of companies in a supply chain, but also for managers of contract manufacturers and of OEMs as regarding tactics and counter-tactics, thus complementing the practitioner literature on this topic (cf. Arruñada and Vázquez 2006). Moreover, a view of co-evolution is important in addressing concerns among western manufacturers and policy makers as reflected in such headlines as "China buys the world" and "Dangers of a rising China" in the western business press that reflect concern among western manufacturers and policy makers about China's and Chinese companies' growing economic power (Economist, 2005, 2010a, 2010b).

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[3] We also include some manufacturing plants of western companies in China as well as some other companies in Asia (but not Japan) to gather specific tactics of companies in the same context.

The paper is organized as follows: Section 2 provides two motivating examples that show a rather different type of manufacturer than one would expect from the low-cost manufacturers of the 1980s and early 1990s. Next we discuss the theory underlying our view of co-evolving buyers and sellers, i.e., co-opetition in Section 3. Section 4 presents the strategic interactions specifically for Chinese contract manufacturers and their OEM customers. Sections 5 and 6 describe the strategies Chinese contract manufacturers and their western OEM customers respectively could take. We then use examples from the consumer electronic and apparel sectors to see what specific tactics these companies have taken and we link these tactics to the different strategies. We conclude in Section 7 with some research questions.

2. Motivating Examples: Galanz and Huawei

A successful electronic industry manufacturer is the Galanz Group, moving from textiles to electric appliances in 1992. Galanz has since become the world's biggest producer of microwave starting with only 10,000 microwaves a year and rising rapidly since to six million in 1999 and over 25 million in 2007. [4]

Since 1992, Galanz's manufacturing strategy has evolved rapidly while banking on the company's low cost advantage. In 1993, Galanz made a deal with Toshiba of Japan for producing Toshiba microwave ovens, and eventually, moving up the value chain, Galanz purchased the microwave division from Toshiba, leaving Toshiba with a 10 percent stake.

In 2007, Galanz held about 40 percent of the world market. To further grow revenues, Galanz also launched air conditioners and other house appliances. Consequently, the extensive trading with more than a hundred countries and regions in the world increased company's total output to RMB18 billion, along with its import and export, which amounted about US $1 billion in 2006. Moreover, since 2000, the company has been investing 5.6% of its revenues approximately on research and development and by 2007, it had 600 patents in microwave oven technology.

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[4] See http://www.galanz.com/NewsShow.aspx?ColId=102&SecId=103&id=400

Another company is Huawei, a networking and telecommunications equipment manufacturer. In 2010, the company was the largest supplier of mobile telecommunications infrastructure equipment in the world, second only to Ericsson, with revenues of approximately US$ 29 billion (CNY 185 billion) with nearly 13% profitability.

The company was founded in 1987 as a sales agent for PBX switches for a Hong-Kong-based company. Subsequently it started its own PBX line, eventually deploying a digital phone switch in 1992. In 1994, it established long-distance communication network and in 1997, won its first foreign contract with Hong-Kong-based Hutchinson-Whampoa and also launched wireless GSM-, CDMA- and UMTS-based products. Two years later, the company opened a research centre in India developing telecom software.

The speed of change, especially of overseas expansion, accelerated over the 2001-2011 with more R&D centres in Sweden and in the US in 2000. Interestingly, the company divested non-core subsidiary Avansys to Emerson around that time as well. By 2002, Huawei's international market sales had reached US$552 million. In order to develop communication technologies the company began a joint venture with Siemens in 2003. In 2004 Huawei won a contract to build a 3G network for Telfort, the Dutch mobile operator, and other contracts with UK-based BT and with Bell Canada. In 2005, Huawei signed a Global Framework Agreement with UK-based Vodafone, winning Approved-Supplier status.

Continuing its focus on research, Huawei established Shanghai-based joint R&D center with Motorola in 2007 and the following year launched a joint venture with UK Global Marine Systems to develop undersea equipment. To further its growth, Huawei has gone into the smartphone handset business, likely having reached the number three position in smartphone manufacturing after Apple and Samsung in 2012.[5]

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[5] See http://www.businessweek.com/news/2012-07-18/huawei-s-cheap-deals-pressure-samsung-in-smartphone-arena

Besides Galanz and Huawei, many erstwhile Chinese contract manufacturers such as Lenovo have changed rapidly and grown leaps and bounds over the last decade. This is hardly the case of manufacturers whose main strategy is competing on low cost.

3. Underlying Theory

As a first step towards understanding the co-evolution of Chinese contract manufacturers and their western OEMs, we have viewed their strategies (and associated tactics) through the lens of game theory. Researchers have applied game theory in many different supply-chain settings, in particular among buyers and sellers (Cachon and Netessine 1998). Buyer-supplier relationships certainly contain elements of competition as in a zero-sum game as regards price. However, these relationships also include elements of collaboration in different contexts: risk sharing (cf. Cachon and Lariviere 2005 and Norrman and Jansson 2004); new product development (cf. Petersen et al. 2005); and supply-chain innovation (cf. Roy et al. 2004). Thus, supply chains naturally contain elements of *competition* and of *cooperation* between suppliers and buyers.

In contrast to traditional understanding of strategic interactions of co-operation and competition, Nalebuff and Brandenburger (1996) present the notion of *co-opetition* whereby firms co-operate and compete simultaneously. Instead of the traditional zero sum non-cooperative games, they argue that co-opetition can lead to a "plus sum" game in which the total value created by co-petition is larger than without it but still needs to be divided among the players. Despite the natural fit of co-opetition to understand and analyze supply chains, the concept has not been brought into the broad supply chain literature.

Within a supply chain, a supplier and a buyer *compete* "vertically" in a zero-sum game as regards price. However, they also *cooperate* in that the buyer cannot sell any product unless the supplier provides the product or component. Bakshi and Kleindorfer (2009) provide an example of such co-opetition in the face of supply chain disruption. Gurnani et al. (2007) provide a different example of co-opetition in the following sense: (a) the supplier and retailer co-operate to increase the underlying demand by improving product quality and increasing sales effort; respectively; and (b) the supplier and retailer engage in vertical competition: the supplier sets the wholesale price and the retailer sets the retail price.

Although co-opetition has not been studied thoroughly within the supply chain literature, co-petition appears in many situations. For example, in early 2011, Chongqing based Chang'an Automotive became the contract manufacturer who would produce the Coda electric cars designed and engineered by a California's based OEM Coda (www.codaautomotive.com). While these two companies engage in the typical *vertical competition* between contract manufacturer and its OEM customer, their *co-operation* creates more value because Coda has only the design, branding, and marketing expertise in the US, while Chang'an has not yet established its reputation for producing electric cars (McDonald 2011). Hence, the combination of competition and co-operation from both sides (i.e., co-petition) yields a win-win solution: Coda can launch new electric cars quickly, and Chang'an can build its reputation in electric car manufacturing. Indeed, in late 2011, Chang'an was able to form a partnership with PSA Peugeot Citroen for producing electric cars for the China market (Jing 2011).

To help companies understand a broader game-theoretic perspective than competition (vertical or horizontal) or cooperation alone, Nalebuff and Brandenburger (1996) introduce the concept of a *value net* (Figure 1) whereby any company can engage in co-opetition with four different categories of 'players': customers, suppliers, competitors and 'complementors'.[6] A *competitor*, from the perspective of a customer (or a supplier), is a player that causes the decrease in the value of the company's products when the customer (supplier) buys from (sells to) the competitor. Likewise, a *complementor*, from the perspective of a customer (or supplier), is a player that causes the increase in the value of the company's offerings when the customer (supplier) buys from (sells to) the complementor (e.g., the "iPhone/iPad app" developers are complementors to Apple's tablet market). Moreover, not only do all links potentially have simultaneous elements of cooperation as well as competition, thus co-opetition, but also any single player can play multiple roles, for instance, a supplier like Samsung may also be a (horizontal) competitor to Apple (Figure 1).

[6] With co-opetition is the simultaneous presence of cooperation and competition, we distinguish it from cooperation and competition when the latter are not present simultaneously to highlight the difference between the three concepts.

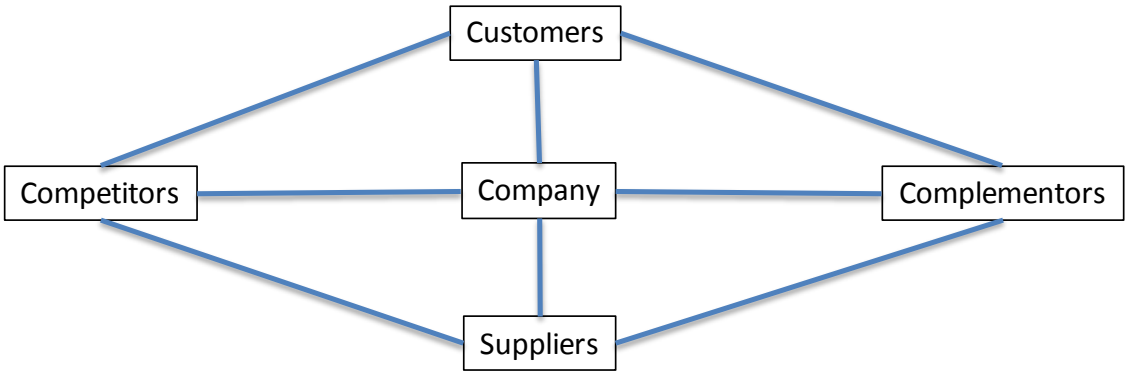

Figure 1: Value Net with all links reflecting possible co-opetition (source: Nalebuff and Brandenburger, 1996, p. 17)

Nalebuff and Brandenburger's (1996, p. 17) value net can be adapted for a supply chain with a contract manufacturer and an OEM by combining the value nets of both parties (Figure 2).

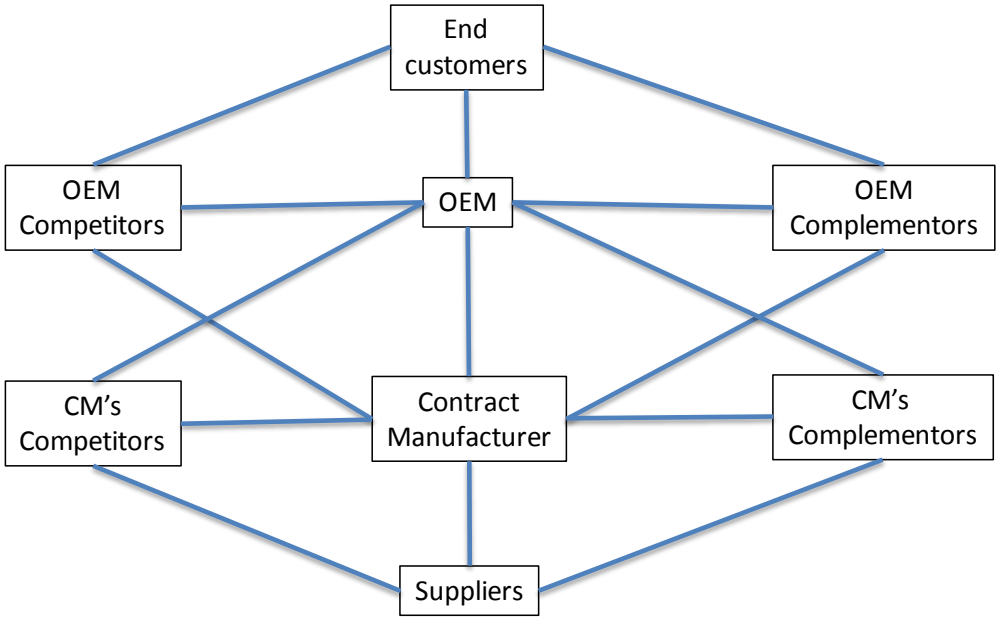

Figure 2: Value Net for contract manufacturers and OEMs; links between players reflect possible co-opetition

4. Positing Strategies for Chinese Contract Manufacturers and Their OEM Customers

The Chinese manufacturing as a whole has been the fastest growing among all countries during 2001-2011; however, contract manufacturers operating in China faced the following risks during this period:[7]

(1) ***High Market Risks***: Because the contract manufacturing industry tends to compete on labor pool and (low) labor cost, the entry barrier for new entrants located in different regions was relatively low especially when government controls were regional. As more contract manufacturers provide similar services in China, price competition becomes fierce especially when information (products, price, etc.) about different contract manufacturers in China became accessible to western companies via online portals such as Alibaba. Unless the demand for these contract manufacturers continued to grow, the profit margin would continue to decline. Ultimately, price competition would force some contract manufacturers out of the market.

(2) ***High Financial Risks***: Contract manufacturers exist partly because of low labor cost. However, the labor cost in China has increased, on average, over 10% annually since 2005, especially in coastal areas. For example, Foxconn increased doubled its worker's pay in two increments after 10 of its workers committed suicide in 2010 at its Shenzhen plant (cf. China Daily, 2010). At the same time, the labor cost is further exacerbated as the RMB occasionally gets re-evaluated against the US dollar. Finally, being located at the back of the supply chain, contract manufacturers experience large fluctuations in order variability as well as the well-document amplification of the business cycle – for instance, the 2008-09 downturn in the west – decrease average capacity utilization. For example, the capacity utilization of contract manufacturers in the consumer electronic industry was only 65% in 2009 (Zetter, 2009).

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[7] Throughout this paper, we refer to contract manufacturers as those Chinese owned contract manufacturers or foreign owned contract manufacturers with most of their offshored manufacturing facilities in China.

(3) ***High Demand Risks***: Not having direct access to consumers or even retailers, contract manufacturers depended on the OEMs for forecasted demand as well as consumer trends. Without supply chain visibility, contract manufacturers were susceptible to being saddled with inventory when end-customer demand decreases.

(4) ***High Supply Risks***. As the demand in emerging market surged, the supply of raw materials fell short resulting in increased prices. For instance, as car sales rose by 25% in China in 2010, the price of rubber and palladium went up by 74% and 39% respectively. Due to contractual agreements, contract manufacturers were not always able to pass on the price increase to their OEM customers, thus seeing their profit margins reduce.

The above-mentioned risks created a perfect storm for the industry in 2001. For instance, Solectron, a US-based contract manufacturer with most of its manufacturing facilities located in China, anticipated large orders from their OEM customers such as Cisco and Nortel and placed huge orders of components in advance so as to meet their OEM customers' demand with lower supply cost. However, the actual demand was well below forecast and Solectron was saddled with a $4.7 billion inventory write-off and a $3.1 billion loss in 2001 (Huckman and Pisano, 2005). In contrast, although Cisco, an OEM, took a $2.5 billion write-off in inventory, it recovered that amount in the following quarter as extra profit.) Solectron was unable to recover from the severe loss in 2002 and was eventually acquired by Flextronics in 2007. Even though sales of the telecommunication equipment picked up in 2003, contract manufacturers did not fare as well as their OEM customers (Benson-Armer et al., 2004).

Typically, contract manufacturers had low margins over 2001-2011: in the electronics industry, operating margins for the top five contract manufacturers have hovered between 2 and 3 per cent between 2004 and 2009; these are either based in China or have their manufacturing facilities in China even if they are based elsewhere. Over the period between 2001 and 2009, the world's top five contract manufacturers were Foxconn, Flextronics, Jabil Circuit, Celestica, and Sanmina-SCI, accounting for 70% of the market share. For details, see Sodhi and Tang (2010), Palma (2009) and Pick (2009).

The risks faced by contract manufacturers along with the low margins may help understand the particular pressure these manufacturers were under. Specifically, after implementing various cost reduction initiatives, these contract manufacturers tried to create and capture value in the supply chain in order to survive (Zhai et al. 2007). Many Chinese contract manufacturers undertook quality-improvement initiatives (Robb and Xie 2001), developed new capabilities (Hameri and Paatela 2005), consolidated capacity with other contract manufacturers and outsourced their own assets in turn to reduce costs. Furthermore, they offshored or near-shored to inland China other Asian countries such as Cambodia, Indonesia, Thailand and Vietnam where labor costs were lower than in the established industrial regions in China.

Contract manufacturers also sought to acquire brands in other countries to move closer to the customer. Indeed, the size of outbound investment by Chinese manufacturing and other companies went from $2-3billion annually in prior years to $23 billion in 2005 (Economist 2005). Although some of the investment was doubtless for securing energy as a resource, many deals were announced that would give Chinese manufacturers a brand overseas, thus allowing them to move up the value chain by selling directly to end-customers and consumers (Table 1).

Target company	Acquirer	Size
IBM (US)	Lenovo Group	$1.75b
Ssangyong Motor Corp (48.9%, South Korea)	SAIC	$0.51b
Maytag (US)	Haier	$2.25b
PCCW (20%, Hong Kong)	CNC Group	$1.02b
Unocal (US)	CNOOC	$18.5b

Table 1: **Examples of announced Chinese M&A deals, 2003-05, ostensibly to sell directly to end-customers (Economist 2005)**

Essentially, these contract manufacturers appear to have followed a subset of three basic strategies to create value:

(CM Strategy 1) *Get a higher price or higher volume from the OEM by creating new value for its OEM customer*;

(CM Strategy 2) *Spread sunk costs by getting more revenues by selling to other OEMs*; and

(CM Strategy 3) *Seek higher prices by selling directly to end-customers*.

While the contract manufacturers took different tactics associated with these strategies, the OEMs could have reacted with potential counter-strategies as well:

(OEM Strategy 1) *Align the contract manufacturer's tactics to its own revenue growth*;
(OEM Strategy 2) *Seek other contract manufacturers in addition or instead*; and
(OEM Strategy 3) *Defend own turf by working in conjunction with the contract manufacturer's strategy*.

By considering the contract manufacturer's three basic strategies and the OEM's three basic counter-strategies, there are nine potential pairs of strategies that the OEM and the contract manufacturer could adopt. Essentially, these nine pairs of strategies capture the possible strategic interactions between a contract manufacturer and its OEM customer. By considering the potential payoffs for both parties associated with these nine potential pairs of strategies, it is conceivable that one can formulate this setting as a (multi-period) 2-person strategic game under different settings including: co-operative game, non-cooperative game, simultaneous moves, sequential moves, with communication, without communication, etc.; clearly, the specific game setting would depend on specific context.

Rather than analyzing this strategic game for a specific setting to determine the equilibrium strategies, given our goal of taking a first step towards co-evolution, we seek to show that co-operation, competition, and co-opetition are potential "equilibria" of the strategic game played by the contract manufacturer and the OEM customer. We do so by using industry examples to illustrate a simple game-theoretic framework. For instance, let us consider the case when the contract manufacturer selects *CM Strategy* 1 by extracting more value from the OEM, and the OEM selects *OEM Strategy* 1 by aligning with contract manufacturer in equilibrium so that both firms end up *cooperating* with each other. Similarly, when the contract manufacturer selects *CM Strategy* 2 by seeking other OEMs as customers, and the OEM deploys *OEM Strategy* 2 by seeking other contract manufacturers, both firms end up *competing* with each other. Finally, when the contract manufacturer selects *CM Strategy* 3 by selling directly to end customers and the OEM select *OEM Strategy* 3 by defending its own turf that depends on the

product category or geographical market, both firms engage in simultaneous competition and co-operation, thus *co-petition* (Table 2).

Contract manufacturer generic strategy	**OEM generic counter-strategy**	**Strategic interaction in equilibrium**
Extract more value from current OEMs	Align contract manufacturer's tactics to achieve its own revenue growth	Cooperation
Add more OEM customers in same or other product categories	Seek other contract manufacturers or partner (depending on product categories) to balance bargaining power	Competition
Sell directly to end-customers in same/ different product categories and (geographical) markets	Defend your turf or partner (depending on product categories and markets)	Co-opetition

Table 2: A simple game-theoretic framework showing contract manufacturer's strategies and OEM's counter-strategies that could lead to cooperation, competition, and co-opetition in equilibrium.

With this framework (Table 2) as a tangible way to describe the potential strategies selected by the contract manufacturers and the OEMs in equilibrium, let us now first look at these strategies in more detail and then look at the actual tactics of contract manufacturers as observed in the electronics and the apparel sectors over 2001-2011.

5. Posited Strategies for Chinese Contract Manufacturers and Actual Tactics

To gain a deeper understanding of strategic interactions between the contract manufacturer and the OEM, we need a specific context. For this reason, we first describe the contract manufacturers' basic strategies described in the last section in the context of the consumer electronics and the apparel and textile industry sectors in China. These industries comprised US $66 billion and $39 billion respectively of exports from Chinese manufacturers to the United States in 2009 (Workman, 2010). Then we describe the specific tactics of Chinese contract manufacturers and how these tactics operationalize each of these three strategies, leaving the next section to present the same for OEMs.

Chinese contract manufacturers have adopted the following **strategies** by taking certain tactics in the consumer electronics and the apparel and textile industry sectors:

CM Strategy 1: Extract more value from existing OEM customers

To increase bargaining power and reduce demand risks, contract manufacturers fostered partnerships with their OEM customers by offering value-adding solutions. The goal was to grow the pie and to get a larger share of the pie as well. As a way to support their OEM customers' entry into the BRIC (Brazil, Russia, India, and China) and in Central and Eastern Europe, many contract manufacturers established manufacturing facilities so as to co-locate with their OEM customers in these regions. For instance, Foxconn established a facility in India in 2006 to serve major OEM customers such as HP and Dell as well as a facility in Manaus City, Brazil in 2005 to support Nokia's expansion strategy in South America. Besides co-locating with the OEM customers in new geographical markets, Flextronics now provides integrated solutions to their OEM customers comprising design, source, shipping and customer service, making it more difficult for their OEM customers to switch (Engardio, 2005).

Luen Thai of Hong Kong (www.luenthai.com) began offering end-to-end services from fashion design to manufacturing to logistics to direct delivery to store to major OEM customers such as Ralph Lauren in knit and woven shirts, active wear, and denim wear. Recognizing their

customers need to compete on price and time to market, Luen Thai launched a new initiative "Design to Store" (D2S) to reduce the total supply chain cost and the total time from design to sell for a new item. This initiative called for full collaboration among fabric supplier Ruentex, contract manufacturer Luen Thai, and customer Ralph Lauren, so that all parties could use information technology to share knowledge about fabric, design, manufacturing, logistics, and in-store sales (Khan et al. 2006). Luen Thai's D2S capability helped them to grow from $500 million in 2003 to $832 million in 2008 with a gross margin of 18.5% and an operating margin of 2.8%.

CM Strategy 2: Expand OEM market by seeking other OEM customers

Contract manufacturers sought to retain existing OEM customers and acquire new OEM customers in existing and/or different product categories. However, as the existing product categories became less profitable, contract manufacturer sought to expand their services in emerging product categories. For example, when contract manufacturing of computers and printers become saturated with very low margins, Flextronics expanded its product categories from computers to video games such as Xbox, from smart phones to telecom equipment, and from automotive navigation systems to remote patient monitoring healthcare systems; however, getting new OEM customs in new product categories can be challenging.

Contract manufacturers sometimes sought new OEM customers when they lost their existing OEM customers for whatever reason. After Li and Fung lost long term customer Ralph Lauren, the company cultivated new OEM customers such as H&M and Kohl's by providing design and production services as their one-stop shopping contract manufacturer. Furthermore, in 2009, Li and Fung re-organized itself by providing integrated distribution logistics services (formerly known as IDS that was operated as a separate and independent division) to OEM customers who require seamless distribution of their products across Asia and beyond.

CM Strategy 3: Sell directly to end-customers

Contract manufacturers launched their own brand of product for certain specific product categories although cautiously and with major restructuring so as to not compete directly with their OEM customers. After computer-manufacturer Acer acquired Texas Instruments' notebook

personal computer division in 1997, it spun off its contract manufacturing operations as Wistron in 2000. By the end of 2009, Acer overtook Dell to become the second largest personal computer in the world after HP (Masterson, 2009). Lenovo, an erstwhile contract manufacturer to IBM for personal computers, acquired IBM's personal computer division in 2005 and then phased in its own brand of personal computers in 2008. Other contract manufacturers such as Asustek (Asus) and Micro Star International (MSI) have successfully launched their own brands of netbook computers (Shih et al. 2009).

In the apparel manufacturing industry, major contract manufacturers launched their own brands, especially in Asia. For example, in 2007, MAS Holdings sold lingerie of its own brand, Amanté, in Asia (www.amantelingerie.com). Esquel relaunched its store PYE in China selling quality and high-end cotton shirts after a previous failed attempt at retailing in the early 90s; it also launched a casual line retail store, Shirt Stop, in Beijing in 2008. In 2004, Daphne, a contract manufacturer for dress shoes based in Shanghai, established its own brand of Shoebox and began operating its own Shoebox stores. By 2010, there were 750 Shoebox specialty shoe stores operating in China (Cheng, 2010).

Keeping in mind these strategies of the contract manufacturers (Table 2), we now consider the specific tactics that Chinese contract manufacturers have adopted. Here are examples of **tactics** from the apparel and electronics industries:

CM Tactic 1: Develop intimate knowledge about end-customers

Being far removed from the end-customers of the products they produced for their OEM customers, contract manufacturers sought to obtain in-depth knowledge about end-customers (Figure 2). They had little experience in distributing products or managing retail operations in western countries. Without this knowledge, contract manufacturers could neither sell their own designs with credibility to potential OEM customers nor plan their production efficiently. Therefore, they sought to develop first-hand knowledge about the end-customers.

To this end, Singapore-based Flextronics developed a new division in called Retail Technical Services (RTS) that offers in-store consultation and sales, in-home or office installation or remote technical support for products such as cell phones, home theatres,

electronic games, and home computer networks on behalf of their OEM customers (RTS, 2011). In 2007, Verizon Wireless contracted with Flextronics RTS for in-store technical support. By interacting with end users in Verizon stores, Flextronics acquired knowledge not only about customers' preferences for wireless products and services but also about retail operations.

Going beyond offering services ranging from product design to distribution, Hong Kong's Li & Fung Limited (www.lifung.com) sold their customers' products in China and other parts of Southeast Asia. It helped Calvin Klein Jeans, Gant, and Billabong to launch their stores in Asia since 2006. In similar vein, Daphne International Holdings (www.daphneholdings.com), a Shanghai based dress shoes contract manufacturer, obtained the rights to distribute and sell high-end international brands of shoes for their customers such as Arezzo (Brazil), Born (US), Nike (US) and Adidas (Germany) in China in 2008 (Huang, 2010).

CM Tactic 2: Increase visibility to consumer

To improve bargaining power with their OEM customers, contract manufacturers developed ways to ensure that end-customers or consumers were made aware of their products just as the "Intel Inside" campaign sought to create enough consumer awareness so that consumers would specifically ask vendors for Intel chips in their computers.

While the standard practice is to remain in the shadow of the OEM, contract manufacturers are increasingly asking their key OEM customers to display their names to create consumer awareness of the contract manufacturer. Shunde-based Galanz, discussed in Section 2, started printing the label '*Made by Galanz*' on all the microwaves it produced for OEMs (Child and Rodrigues, 2005). Hong Kong-based apparel contract manufacturers Esquel and Luen Thai display the names of key OEM customers including Espirit, Muji, Nike and Ralph Lauren on their websites.

CM Tactic 3: Explore emerging product categories

Contract manufacturers expanded their product portfolio to increase their capacity utilization and to counter balance the business cycles of different product categories. Of particular interest were emerging categories where there was little competition either from other contract manufacturers

or from OEMs. For instance, Taiwan-based HTC produced PDAs for HP and Dell since the 1990s but launched its own branded smartphones in 2006 and partnered with Google to co-develop the Droid smartphones in 2008 (Economist, 2009).

In the medical device industry, western OEMs could not outsource their design work completely, but appropriately-certified contract manufacturers sought to collaborate with these OEMSs to reduce development time and cost (Harris, 2007). Healthcare was a burgeoning market in 2001-2011 and electronics contract manufacturers found emerging product categories such as cardiac rhythm management (CRD) and remote patient monitoring, respiratory and anaesthesia machines. They also sought to make end-user medical devices such as cardiac rhythm management (CRD) and remote patient monitoring, respiratory and anaesthesia machines expected to grow as a category well beyond 2010 (Harris, 2007).

"Green" technology is another category that became important over 2001-2011. Accordingly, Flextronics created a new division focusing on solar panels, while Foxconn ventured into manufacturing of carbon emission monitoring devices in 2009. In 2007, WanXiang, a contract manufacturer for automotive parts, diversified its product offerings from automotive parts to electric powered solar panels and electric vehicles in order to tap into the growing renewable energy business in the US.

As the price competition became fierce in knit and woven garments, MAS Holdings of Sri Lanka (www.masholdings.com) made a fundamental shift from casual wear contract manufacturing to producing women's lingerie for Victoria's Secret and men's and women's swimwear for Speedo (Pahwa and Cordon, 2005). MAS Holdings is now the largest contract manufacturer of intimate wear and active wear in the world, with revenues that have grown from $225 million in 2000 to over $700 million in 2009. Furthermore, after implementing its ERP system successfully in the late 1990s, MAS Holdings spun off its information service department into a separate company, Rapier Consulting, in 2002 to help customize ERP for other contract manufacturers in the apparel industry.

CM Tactic 4: Invest in R&D

To gain bargaining power, contract manufacturers invested heavily in R&D capabilities as we have already seen from the two case studies in Section 2. Using this capability, contract manufacturers developed new products for new markets or develop new product designs that use cheaper raw materials. Some contract manufacturers began to outsource not only design but also R&D. Stan Shih, founder of Taiwan's computer-maker Acer, has noted that contract manufacturers had been steadily increasing their R&D capabilities (Wei, 2009). By designing, developing, testing, and manufacturing ready-to-go products (e.g., notebook computers, cell phones, digital music players, LCD televisions, PC motherboards, and monitors), contract manufacturers like Taiwan's HTC (smart phones), Inventec (personal computers), and Quanta (notebook computers) offered their products, rather than just components, to different OEM customers to sell under the OEM brand name.

Hong Kong's apparel contract manufacturer Esquel developed nano-scale polymers to impart oil- and stain-repellent properties and/or UV protection to fabrics. Esquel was among the earliest adopters of RFID in the textile and apparel industry to use RFID at the bale level instead of the batch level to ensure consistency in cotton quality. The company won many innovation awards and contracts from such OEM customers as Brooks Brothers, Hugo Boss, and Nordstrom. Besides steady growth in revenue from $468 million in 1999 to $588 in 2007, Esquel has enjoyed a higher gross margin of 23.6% and an operating margin of 7.1%, substantially higher than that of competitors such as Luen Thai (Peleg-Gillai, 2007).

CM Tactic 5: Think green

In the United States, the GreenCert designation (www.greencert.com) aims to reduce environmental impact and to meet or exceed regulatory requirements. The certification requires hardware to measure and monitor greenhouse gas emissions and software to capture and analyze the data collected and has thus created revenue opportunities for electronics contract manufacturers. In March 2009, Foxconn formed a partnership with IBM to develop such an integrated system to deploy the GreenCert designation in Taiwan and to provide consulting services to other manufacturers seeking the GreenCert designation (IBM 2010). In the apparel

industry, Esquel invested in water treatment facilities in China to treat 20,000 tons of wastewater per day to comply with environmental requirements in 2006, and sought to develop ways to reuse treated water in the fabric finishing operations.

CM Tactic 6: Acquire OEM's underperforming assets

OEM firms also sought to off-load lacklustre factories in a bid to increase their return-on-assets (ROA) and contract manufacturers acquired these factories to get orders from these OEM customers as well as from others. Dell sold its personal computer factory in Poland to Foxconn in late 2009, and Sony sold 90% of its TV factory in Slovakia to Foxconn in March of 2010. In exchange, Foxconn secured PC orders from Dell and TV orders from Sony (Wakabayashi, 2010). In 2006, Karstadt Quelle (www.karstadt.de), the largest retailer in Germany, sold its purchasing department to Li and Fung for $200 million. In exchange, Li and Fung took over purchasing and importing operations for KarstadtQuelle. Wal-Mart signed a similar agreement with Li & Fung in 2010 as well (Talley and O'Keeffe, 2010).

CM Tactic 7: Shedding assets

Some contract manufacturers were able to use their tangible assets (factories) and intangible assets (human capital) more effectively than others, thus improving their survival. Firms that survive-and-thrive tend to liquidate under-performing assets to fund strategic investments (McKinsey 2009). Indeed, contract manufacturers sought to unload some of their own manufacturing facilities to focus on R&D and design capability for their OEM customers, letting other firms take care of manufacturing even further upstream just like many OEMs had done earlier. For example, contract manufacturer Quanta, focusing on the design of notebook computers for other companies, shifted some of its manufacturing operations to other firms.

Li & Fung maintained asset-lean operations by not owning any manufacturing operations, providing instead a complete service chain from market research to design, from raw material sourcing to factory sourcing, and from shipping to retailing. Because of this, Li & Fung was adaptive to supply and demand dynamics and maintained double-digit growth even during the 2007-08 financial downturn. Its revenue doubled from US$7.1 billion in 2005 to US$14.2 billion in 2008 with an operating margin of 2.8%.

By examining the value created by different tactics as stated above, we can summarize how these actual tactics support those three posited strategies adopted by various Chinese contract manufacturers (Table 3).

	Tactics of contract manufacturers and how they support different strategies	**CM Strategy 1: Extract more value from current OEMs**	**CM Strategy 2: Add more OEM customers in same or other product categories**	**CM Strategy 3: Sell directly to end-customers**
1	**Develop knowledge about customers**	Use knowledge to provide more services	Use knowledge to offer products and services to new OEMs	Use knowledge to sell products directly to end-customers
2	**Increase consumer visibility**	Extract higher rent from OEMs	Use brand to attract more OEMs	Use brand to sell products directly to end-customers
3	**Explore new/emerging product categories**	Support OEM in seeking new product categories	Attract new OEMs in these product categories	Sell products directly to end-customers in these new categories
4	**Invest in R&D**	Offer more services to current OEMs	Develop new capabilities for new OEM customer	Develop product for end-customers
5	**Thinking green**	Support OEM in furthering OEM's green credentials	Attract new OEMs based on green credentials	Sell products directly to end-customers based on green credentials.
6	**Acquire OEM's underperforming physical assets**	Improve OEM's ROA by taking OEM's underperforming assets	Use spare capacity to offer products to other customers	Obtain customer information by getting closer to the end customer
7	**Shed assets**	Become more flexible in taking other tactics		Become more flexible in seeking end-customers while still retaining OEM business

Table 3: Tactics of contract manufacturers showing support of the posited strategies

6. Posited Strategies for the OEMs and Actual Tactics

Because OEMs and contract manufacturing belong to the same ecosystem that includes consumers and other end-customers, we must look at the tactics of western OEMs so as to understand the tactics of Chinese contract manufacturers. Certainly, OEMs could recognize the tactics for their Chinese contract manufacturers and react to operationalize strategies of their own to generate profits for themselves.

Understanding their contract manufacturers' strategies is useful for the OEMs to develop counter-strategies by exploiting their position at the front of the supply chain. Only by doing so can they ensure that the contract manufacturer's tactics are in line with the OEM's interests. However, if this is not possible, then the OEM could use its position to defend its turf and/or seek compromise. In this section, we first describe these counter strategies (Table 2) with some supporting evidence in the consumer electronic and apparel sectors. Then we look at the tactics from the business press as we did with contract manufacturers to see how the actual tactics fit these strategies.

Here are the three posited **strategies**:

OEM Strategy 1: Align with key contract manufacturers

When the contract manufacturer's strategy is to extract more value from the OEM, the OEMs focused on furthering their branding through marketing and other means. For instance, as mentioned earlier, Chang'an automotive expanded its capability to produce electric cars as a contract manufacturer (CM Tactic 5 under CM Strategy 1), its California based OEM customer Coda focused on branding and marketing.

At the same time, OEMs can seek new product categories as well as (geographical) markets and whether or not to involve the contract manufacturer in these efforts. It could also outsource more functions, e.g., design, to the contract manufacturer. The OEM could also share end-customer experience with the products that the contract manufacturer is making along with whatever sales information it can comfortably share. Thus, the counter-strategy here is to align the contract manufacturer's tactics to the OEM's own revenue growth so as to achieve a win-win

solution. For example, as Daphne produces and distributes various Nike products in China, Nike is trying to double its sales in China by marketing its products as a fashion brand instead of sports brand. This may be because apparently most Chinese do not have a western-style passion for working out (Burkitt, 2010).

OEM Strategy 2: Balance bargaining power with contract manufacturers

When the contract manufacturer seeks to add other OEMs, if these other OEMs are in the same product categories, then the OEM must either seek other contract manufacturers or insist on processes to ensure confidentiality. Although Flextronics serves different OEMs in certain product categories; these OEMs get separate management teams, engineers, assembly workers, and production lines in different locations. If these other OEMs are in product categories that the OEM currently does not have, then there may be an opportunity for the OEM to get into these new product categories itself with the contract manufacturer's help.

OEM Strategy 3: Establish clear market boundaries with contract manufacturers

When the contract manufacturer's strategy seeks to sell directly to end-customers, the OEM must distinguish between whether the end-customers are for existing product categories or different and for the same (geographical) markets or different. For existing product categories in existing markets, the OEM has to protect its turf as it would with any competitor. However, in other cases, the OEM has to consider the costs of entering these product categories or markets and whether or not it could leverage the contract manufacturer's experience (e.g., the Chang'an-PSA partnership for producing and selling electric cars in China). The OEM could also come to an understanding with the contract manufacturer about turf boundaries in dividing up these new product categories or markets. For example, although Esquel does sell its own brand of cotton shirts in its PYE stores and Daphne sells its own brand of shoes in its Shoebox stores in China, their customers are in a different segment than those of its western OEMs (Hugo Boss, Brooks Brothers, etc. for Esquel, and Born, Nike, Adidas, etc. for Daphne).

Now we examine the specific **tactics** that OEMs have actual taken insofar as we can gather from the business press and which we then link with the above OEM strategies.

OEM Tactic 1: Leverage existing brand to expand product categories

OEMs leveraged their existing brand value to expand their product categories to capture new markets and pre-empt potential new entries. In the consumer electronics industry, as many contract manufacturers acquire the capability to produce and sell various MP3 players, California-based Apple has leveraged its brand image to expand its product categories from iPod to iPhone to iPad and AppleTV. Apple has rolled out its iPhone, iPhone 3G, iPhone 3Gs, and iPhone 4 within short succession to continue engaging with the end customers. In the apparel industry, Adidas ventured into body care products (body wash, cologne, shampoo, etc.) and watches by leveraging its strong brand image in sports wear. This created major challenges not only for Apple's competitors, but also for its contract manufacturers that may have sought to sell their own brands of products directly to retailers or consumers.

OEM Tactic 2: Bundle product and customer services

The OEMs are closer to the consumer than their Chinese contract manufacturers. Some OEMs like Apple even furthered their online and brick-and-mortar retail operations over 2001-2011. They sought to deepen their relationship with consumers by bundling customer services with their physical products. Contract manufacturers find it difficult to do this so their interest in end-customers can be fended off; moreover, as potential for revenues increases, it would be in the contract manufacturer's interest to stay with the OEM. By bundling its products with iTune and iBook, Apple created additional value for its customers. Apple has also opened over 300 Apple stores since 2001 to provide technical support, repair, and workshops for customers in major markets around the world.

Other computer companies have strengthened their offerings to include consulting: IBM acquired the consulting arm of PriceWaterhouseCooper, HP acquired EDS consulting, and Dell acquired Perot Systems. Some apparel OEMs developed customization services through their retail stores that contract manufacturers cannot copy easily. In a similar vein, Nike launched its NikeiD personalized service by selling its personalized products (shoes, clothing and equipment)

on its own website (www.nikeid.nike.com). Other western retailers have taken similar steps: custom tailored jeans at Levi's stores, suits at Ralph Lauren's stores, and shirts at Nordstrom.

OEM Tactic 3: Invest in innovation

Developing innovative products and services is a good idea for any company, but doing so also ensures the contract manufacturer's loyalty. It also fends off any potential competition including that from any other OEM that the contract manufacturer may wish to work with or even from the contract manufacturer interested in reaching out to end-customers.

A late entrant to the mobile phone market, Apple developed the "App Store" to enable external developers to post their apps on this virtual retail store under a revenue-sharing scheme. This enabled Apple to offer over 300,000 applications quickly and cheaply in 2010, creating major challenges for competitors and any OEM ambitions into the end-user market. Nike developed Lunarlite foam to reduce the impact on bones and Nike's Flywire lightweight upper with suspension bridge design to improve fit. Such innovation and its promotion raise the bar for competitor and contract manufacturer alike.

OEM Tactic 4: Form horizontal partnerships for co-branded products

OEMs sought partnerships to create co-branded products that contract manufacturers cannot copy easily. Apple co-developed the Nike+iPod Sports Kit with Nike in 2006 to measure and record the distance and pace of a walk or run. LG partnered with Prada to develop a designer cell phone, while Motorola partnered with D&G to develop a designer RAZR V3i phone in 2008. In the apparel industry, Adidas partnered with Porsche design sport shoes in 2009; H&M launched its annual special collection of special design apparel with famous designers / celebrities such as Madonna, Lanvin, Roberto Carvalli, and Viktor & Rolf.

OEM Tactic 5: Form vertical partnerships with contract manufacturers

OEMs seek to partner with their contract manufacturers to prevent them to become direct competitors. In the electronics industry, various OEM computer companies partnered with Intel

to market their "Intel inside" computers. After a failed attempt to launch its own smartphones, Google formed partnerships, first with HTC and then with Samsung Electronics to co-develop successive generations of smartphones that run on Google's Android operating system. While the hardware design was done mainly by HTC and Samsung respectively, applications were developed by Google itself or by independent parties via the open platform "Marketplace" that allows external developers to post their apps via a revenue sharing model that is similar to the Apple's "App Store" concept.

In the apparel industry, such OEM customers as Salvatore Ferragamo have partnered with Li & Fung under the Trinity (trinity-limited.com) name to establish different joint ventures to sell their products in Asian countries including China, Malaysia, Singapore, South Korea and Thailand. Such partnerships can be a win-win solution for these OEM customers and Li & Fung: OEM customers can expand their markets quickly and Li & Fung can reduce the demand risks in supplying to these OEM customers.

OEM Tactic 6: Shed manufacturing/service assets to contract manufacturers

With contract manufacturers seeking to extract more value from their OEM customers, and OEM customers themselves seeking to shed asset-based low value-adding functions, win-win situations were created with manufacturing outsourcing. Many western OEMs have been shedding their manufacturing assets since the late 1980s. As more OEMs explored new markets in different geographical regions, reducing physical assets and sourcing from contract manufacturers enabled OEMs to respond to market uncertainty in a cost effective and a time efficient manner. For instance, Apple used to own its factory to produce its own Mac personal computers, but it finally decided to sell off its own factories and outsource all manufacturing operations to its contract manufacturers such as Taiwan's Foxconn. However, to maintain some bargaining power with its contract manufacturers, Apple has developed backup contract manufacturers to ensure smooth production so as to reduce its supply risks.

In the apparel industry, OEMs Zara (Spain) and Brooks Brothers (US) maintained their bargaining power with their contract manufacturers in China by sourcing their stable items from

their contract manufacturers in China and by producing their fashion items in-house in Spain and United States, respectively.

Recall however that the contract manufacturers themselves may be seeking to shed physical assets themselves and may be more interested in higher value-adding activities such as R&D or design. OEMs therefore evaluate what other services they can outsource to the same contract manufacturers, as for instance, Verizon's outsourcing of in-store customer service to Flextronics, and Kohl's department stores outsource the design and logistics distribution of its private label products to Li & Fung.

By examining the above six tactics, we can summarize how these tactics support those three generic strategies adopted by various OEMs (Table 4).

	Tactics of OEMs and how they support different OEM strategies	**OEM Strategy 1: Align contract manufacturer's tactics to achieve own revenue growth**	**OEM Strategy 2: Balance bargaining power with contract manufacturers**	**OEM Strategy 3: Establish clear market boundaries with contract manufacturers**
1	**Leverage existing brand to expand product categories**	Use contract manufacturer to help with the new product categories	Use other contract manufacturers for new product categories	Establish a new market segment based on new product categories
2	**Bundle product and customer services**	Use contract manufacturer to help with the development of the bundle	Use other contract manufacturers to develop new services	Establish a new market segment that is based on the bundle
3	**Invest in innovation**	Co-invest with or leverage contract manufacturer's R&D	Use other contract manufacturers to establish innovative products or services	Establish a new market segment based on new innvations
4	**Form horizontal partnerships for co-branded products**	Use contract manufacturer to help with the co-branded products	Use other contract manufacturers to produce the co-branded products	Establish a new market segment for the co-branded products
5	**Form vertical partnerships with contract manufacturers**	Use contract manufacturer to develop new markets		Establish exclusivity contracts to prevent contract manufacturer compete in the same market

6	**Shed manufacturing/service assets to contract manufacturers**	Improve ROA by giving underperforming assets to contract manufacturer	Use other contract manufacturers to produce the product without exclusivity	

Table 4: Tactics of OEMs showing support of the posited generic strategies

7. Conclusions

In seeking to answer the question of why Chinese manufacturing has taken off at a much more rapid pace than in the west since the late 1980s, we have restricted ourselves to the more recent and less studied period of 2001-2011 and, in particular, to the electronics and the apparel sectors. The significance of this period is the pre-eminence of outward FDI flows from China, as Chinese companies sought higher value-adding markets abroad rather than simply be content to be low-cost suppliers to western OEMs. Such a move may have come from necessity: the risks faced by contract manufacturers along with the low margins pressured these contract manufacturers to develop basic strategies to seek value in the supply chain.

We have taken the view that, being part of the same eco-system, Chinese contract manufacturers and their western OEMs have co-evolved rather than the former simply supplanting the latter. To better understand this co-evolution, we first presented a simple game-theoretic framework positing generic strategies of contract manufacturers and those of their western OEMs. Next we provided industry examples of tactics specific companies have taken and showed the links of these tactics to the posited strategies via Table 3 for contract manufacturers and via Table 4 for OEMs. Thus, by examining the tactics taken by the OEMs and their linkages with the underlying counter-strategies, we have established the existence of strategic interactions between the Chinese contract manufacturers and their OEM customers as described in Table 2.

From a policy perspective, the tactics taken by the Chinese contract manufacturers suggest their revenue-enhancing strategies are intended to add value and to extract more value from their existing customers, while adding more OEM and more end-customers to their roster (Table 3). We have thus argued their tactics stem from their position in the supply chain, not

because of any conspiracy as is sometimes hinted by policy makers. Indeed, OEMs are not helpless: they too have taken advantage of their position in the supply chain and we have outlined possible counter-strategies as well as specific tactics that OEMs can take and have taken.

Given our qualitative approach, while we have not established the equilibrium that is based on a specific context in this strategic game, we have shown that the strategies adopted by the contract manufactures and the potential strategies that OEMs can consider adopting result in games based on co-operation, competition, or co-opetition. Moreover, we have shown that supply-chain co-opetition is a good way to understand industry behavior with our application to Chinese contract manufacturing for the apparel and the electronics industry sectors.

The co-existence of all three strategic interactions (co-operation, competition, or co-opetition) raises the following questions as possible future research and policy topics, not just for Chinese contract manufacturers but also for those in other emerging economies:

1. How do we further this work for 'an appropriate analytical framework' for a co-evolutionary perspective?
2. Does the co-evolution between Chinese contract manufacturers' tactics and their western OEMs' stimulate innovation?
3. With both Chinese manufacturers and western ones having co-evolved over the past three decades, does it make sense for policy makers in India and other emerging economies to simply emulate Chinese manufacturing policies formulated in the 1990s?
4. Would the Chinese contract manufacturers become more vulnerable with rapidly rising labour cost (and resulting labour dissatisfaction or even unrest) in China and when the renmimbi is likely to increase value in the foreseeable future against the US dollar and other major western currencies? On the flip side, as western OEMs become even more asset "light", will they have an upper hand in becoming even more profitable by becoming more flexible in terms of products, markets, etc.?
5. As Chinese contract manufacturers and western OEMs take different tactics to sustain their profitable growth, what would be the steady-state outcome of the interplays between the contract manufacturers and their OEMs?

6. As more Chinese contract manufacturers develop and sell their own brands of products in certain markets, can they continue to act as contract manufacturers and as OEMs without spinning off OEM companies like Acer and BanQ? Should OEMs' enter into co-petition arrangements upfront with their contract manufacturers or should they establish no-compete clauses with their contract manufacturers?
7. If the unemployment rates continue to stay high in the western countries will such policy tactics like increasing import tax for products made in China help the economy in western countries, say by triggering more Chinese manufacturers to set up production operations in western countries in the same way as the Japanese manufacturers did in the 1980s?

Ultimately, as OEMs continue to outsource their operations, the strategic interactions and tactics of (Chinese) contract manufacturers and their (western) OEM customers continue to provide an exciting research area. Moreover, as focus moves on manufacturing in other emerging economies like India and Brazil to advance economic development, studying China from such a perspective may be much more fruitful than in static terms of past policies.

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