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Local sourcing of multinational enterprises in China

Yingqi Wei

The York Management School, University of York, York, UK

Xiaming Liu

School of Management, Birkbeck College, University of London, London, UK

Chengang Wang

School of Management, Bradford University, Bradford, UK, and

Jue Wang

Southwestern University of Finance and Economics, Chengdu, China

Abstract

Local sourcing from indigenous firms by multinational enterprises (MNEs) is an important channel through which the former may benefit from the positive externalities generated by the latter. Employing a special survey data set covering 493 multinational subsidiaries in China for the period 1999-2005, this paper investigates the determinants of local sourcing. It is found that the extent to which an MNE sources from indigenous firms is influenced by its entry, network and market orientation strategies, its basic characteristics such as size and learning ability and its country-of-origin. The importance of these determinants varies with regions.

JEL Codes: F2, O1

Key Words: FDI, local sourcing, economic development and China.

ALL CORRESPONDENCE PLEASE TO Dr CHENGANG WANG
Tel: (+44) 1274-234378; E-mail: c.wang9@brad.ac.uk

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Local Sourcing of Multinational Enterprises in China

I. Introduction

Multinational enterprises (MNEs) may choose to use locally produced components and intermediate products for reasons such as costs, convenience, proximity, flexibility, delivery reliability and tariff and non-tariff barriers. Through local sourcing, MNEs can generate considerable benefits in host countries, including increased demand for intermediate products (Javorcik, 2004), technology spillovers (Javorcik, 2004; Blalock and Gertler, 2007), stimulation of local entrepreneurship (Lim and Fong, 1982), agglomeration of industries (Schmitz and Nadví, 1999) and development of competitive advantages (Porter, 1990). Local sourcing and the associated backward linkage of MNEs can act as an effective mechanism through which externalities of FDI are channeled to indigenous firms, especially in transition economies (UNCTAD, 2001; Javorcik, 2004). Given its critical role in economic development, local sourcing by MNEs has attracted much attention to both the academic and public sectors.

However, not all MNEs source locally. Rather, some MNEs have good reasons to source from home countries or globally. For example, the reliability of procurements and economies of scale or better quality control can be achieved through using existing facilities outside the host country. In some cases, it may also be due to the fact that there is a lack of a formal and (or) informal institutional framework in the host country. There is anecdotal evidence that some MNEs overlook local sourcing because of high costs induced by factors such as the ineffective protection of intellectual property rights, corruption, bureaucracy of local government officials and untrustworthiness of local suppliers in host countries (Eberhardt et al., 2004). To benefit from backward linkage effects, many developing countries have imposed local content requirements (LCR) on multinational subsidiaries.

The topic of local sourcing has also generated a significant amount of academic research. In

the past 30 years or so, local input linkages associated with foreign firms have been extensively examined in the US (Reid, 1994), the UK (Pearce and Papanastassiou, 1997; Crone, 2002; Williams 2005), Ireland (McAleese and McDonald, 1978; O'Farrell and O'Loughlin, 1980, 1981; Görg and Ruane, 2000, 2001) and in Europe (Tavare and Young, 2006). In the context of developing countries, Alfaro and Rodríguez-Clare (2004) compare variations in backward linkages of foreign firms in Brazil, Chile, Mexico and Venezuela, and Giroud and Mirza (2006) in Cambodia, Malaysia, Thailand and Vietnam. Giroud (2007) compares the differences in linkages of foreign firms in Malaysia and Vietnam. Driffield and Mohd Noor (1999) also investigate the determinants of MNEs' local linkages in Malaysia but only focus on the electronics and electrical industries. From the perspective of multinational's country of origin, Park (2000) and Belderbos et al. (2001) analyze the sourcing patterns of US and Japanese multinationals respectively.

To the best of our knowledge, only limited research has been carried out on FDI linkage effects in China, and the location effect on FDI linkages has not yet been examined. In 2007, China attracted nearly US\$75 billion FDI (<http://www.fdi.gov.cn>) and maintained its position as the largest host in developing countries for 15 consecutive years. China deserves special attention. The unprecedented growth of FDI has also been accompanied by China's outstanding progress in economic development. Since opening up to the outside world, China has achieved an average GDP growth rate of around 8% over the past 30 years. As surveyed by Wei (2004), existing studies, in general, have reached a consensus that FDI has made a significant contribution to China's development, in the areas of employment, foreign trade, economic growth and technology transfer and spillovers. However, there is no systematic analysis of the determinants of foreign firms' local sourcing based on large sample data. Li and Yeung (1999) conduct two company case studies: Shanghai Volkswagen Automotive Company Ltd (SVW) and

Shanghai Bell Telephone Equipment Manufacturing Co Ltd. Ivarsson and Alvstam (2005) investigate Volvo. Both find that foreign firms have provided technical assistance to a substantial proportion of the domestic suppliers as part of mutual business engagement in China. Eberhardt et al. (2004) study component localization of 27 UK firms in China in 2003 and identify that factors such as lack of component availability, low quality level of local inputs, small orders and excessive requirements toward component suppliers from customers are important impediments to source locally.

In analyzing the determinants of FDI linkage effects in China, it is important to pay attention to the location of FDI. China's impressive macroeconomic performance has been associated with regional disparity. Economic development has been uneven across regions, so has the distribution of FDI. It has been observed that FDI in the coastal region far exceeds that in the western region as the former is the low information cost area and enjoyed preferential treatment in China's early experimentation with FDI (Wei, 2004). The existing literature indicates that positive FDI spillover effects are more profound in the coastal than in the inland region (Wei et al., 2001) and the benefits may be largely resulted from backward linkages of FDI (Liu et al., 2008). Using FDI to advance its technological capability has been a major goal of China's opening up policy (Long, 2005). The recent Western Region Development Strategy (WRDS) again counts on FDI. In the WRDS, the western region, endowed with nature resources, is promoted to be a labor-intensive and low-cost manufacturing base (OECD, 2002). Jointly published by the State Economy and Foreign Trade and Economic Cooperation in 2001, the 'Catalogue of Advantages Industries for Foreign Investment in Central and Western Regions' and the 'Industrial Catalogue Guiding Foreign Investment' provide more favorable policies to the western region. For instance, a company with 25% or greater equity share of FDI located in the western region is eligible for foreign enterprise tax benefits. In the face of difficulties

associated with lower level of development and capturing spillover effects, the western region's exploration of FDI backward linkage effects can be a crucial factor to the success of WRDS.

This paper analyzes the determinants of local sourcing of foreign firms in China based on a survey sample containing as many as 493 multinational subsidiaries operating in China over the period 1999-2005. Firstly, the study attempts to address how MNE's strategy, characteristics and country-of-origin affect local sourcing. Secondly, we compare and contrast the sourcing patterns of MNEs located in Chongqing, Beijing and Jiangsu. Our results show that the importance of the determinants of local sourcing varies with regions. The remainder of this paper is organized as follows. Section II reviews existing studies. This is followed by a description of the data and methodology and a presentation of the empirical results. The final section concludes and policy and managerial implications are also discussed.

II. Literature Review

Local sourcing is important to the development of indigenous firms as this process is associated with the transmission of knowledge from MNEs and creation of demand for local products and services, leading to economies of scale and specialization and efficiency. Javorcik (2004) argues that foreign firms have a strong incentive to prevent technology diffusion to their competitors. However, foreign firms may directly transfer knowledge to their local suppliers, urge them to upgrade their production management and technology and allow them to reap economies of scale, in order to benefit from their improved performance. Dunning (1993) shows that MNEs may affect suppliers not just in terms of the quantities of goods and services that they purchase, but also through an impact on the quality of inputs, and the efficiency with which those inputs are supplied. Backward linkages from foreign affiliates to indigenous firms are important channels through which intangible and tangible assets can be passed on from the former to the latter. They can contribute to the upgrading of indigenous enterprises and embed foreign

subsidiaries more firmly in host countries (UNCTAD, 2001). These linkages are particularly important for developing countries where technological capacity is limited. It is difficult, if not impossible, to rely on the market or self-sufficiency to provide the necessary means for indigenous suppliers to reach an adequate level of competence.

Sourcing locally also benefits MNEs. According to transaction cost theory, the decisions to “make or buy” and “buy from whom” depend on transaction characteristics between economic agents. In today’s highly competitive market, firms have increasingly focused on core competencies while outsource other activities. For reasons of costs, convenience, proximity, flexibility, delivery reliability and tariff and non-tariff barriers, MNEs may choose to use locally produced components and intermediate products. The intensified globalization process characterized by liberalization and deregulation of international trade and investment and privatization has shaped the way in which MNEs carry out their sourcing operations. Rapid technological development in telecommunication and transportation industries enables MNEs to source from the most competitive suppliers in the world wherever they are. Many MNEs have formulated global production networks, inducing their established home-based or global suppliers to follow them to new locations (Ernst and Kim, 2002). This imposes challenges to indigenous suppliers in the host economy as they face competition not only from competitors abroad but also foreign competitors investing and operating in their home turf.

What determines local sourcing of MNEs? The existing literature identifies three groups of variables: strategy, characteristics and country-of-origin. The rest of the section briefly reviews the relevant literature on the impacts of these factors.

Strategy

Market-orientation strategy. Market-orientation strategy is expected to lead to variations in the level of local content. Local market-seeking subsidiaries are established to serve local

customers. Hence, they are more likely to adapt products to local tastes and circumstances, use locally developed components, and establish a local supply network (Belderbos et al. 2001; Eberhardt et al. 2004). On the contrary, it is expected that MNEs with globalization strategy tend to integrate its subsidiaries into a group-wide production system and have a centralized department for their procurement, and hence induce weak local linkages. Both Belderbos et al. (2001) and Giroud and Mirza (2006) find that local market seeking MNEs record a higher local content ratio than export-oriented MNEs.

Entry strategy. MNEs establish their operations using different entry modes such as joint venture (JV) and wholly owned subsidiary (WOS). A JV is likely to source a higher level of locally produced products than a WOS since the local partner in a JV may already have readily available local suppliers or have expertise in procurement from local suppliers. The local partner can also serve as an intermediary facilitating linkages between the JV and local suppliers and serve as an interface in reducing foreign firm's entry barriers to local networks. Belderbos et al. (2001), Chen et al. (2004) and Eberhardt et al. (2004) report that foreign entry mode is related to supply linkages of foreign affiliates, but Driffeld and Mohd Noor (1999) and Giroud and Mirza (2006) fail to find any difference in sourcing patterns of JVs and WOSs.

Network strategy. According to network theory, an MNE often forms networks for its business activities from R&D to production, marketing and logistics (Ernst and Kim, 2002). The development of a network depends on costs of learning, adjustment and adaptation. A new relationship between suppliers and consumers is more likely to be formulated if they can coordinate and leverage internal and external resources effectively to minimize these costs. Close contacts with local suppliers help reducing transaction costs associated with MNEs' local sourcing, i.e. the costs associated with negotiating prices, drawing up contracts, and settling disputes. Eberhardt et al. (2004) find that improved communication with suppliers contributes to

component localization in China.

Characteristics

Size. The size of a foreign affiliate may affect local sourcing and linkages. Arguably, large firms may be more able to internalize their local material inputs, and hence engage less in local sourcing. This has been confirmed by Driffield and Mohd Noor (1999) and Görg and Ruane (2001). However, Chen et al. (2004) find that large firms are more active than small firms in pursuing local linkages and argue that their larger capacity implies that they are more able to absorb risks involved in network integration. On the other hand, Giroud and Mirza (2006) and Tavares and Young (2006) find no significant relationship between sourcing and firm size.

Age. The experience in a host country is widely believed to be an important determinant of the extent of local sourcing (e.g. McAleese and McDonald, 1978; O'Farrell and O'Loughlin, 1981; Görg and Ruane, 2000, 2001; Tavares and Young, 2006). Finding and establishing relationships with suitable and reliable local suppliers is a time-consuming process. By gaining experience in a host country, MNEs become more familiar with the local economy and the way of doing business, and will find it easier to source locally. Suppliers may have to learn to adapt to the demands of multinational subsidiaries in terms of quality and delivery schedules. Hence, the level of local sourcing is expected to be positively associated with the length of operation of a foreign subsidiary in the host country, i.e. the so-called "vintage effect". Many studies tend to confirm this, e.g. McAleese and McDonald (1978), O'Farrell and O'Loughlin (1981), Driffield and Mohd Noor (1999), Giroud and Mirza (2006) and Tavares and Young (2006). However, Görg and Ruane (2001) find a non-linear relationship between firm age and supplier linkages.

Autonomy. Subsidiaries that have a higher level of autonomy from their parents with mandate for production are more likely to develop extensive local networks and embed in the local economy (Birkinshaw and Hood, 1998). The greater the autonomy exercised by the subsidiary,

the more likely it is to try and identify local suppliers and establish relationships with them. O'Farrell and O'Loughlin (1981) find that firms which have total autonomy over input purchasing source more of their inputs locally than firms that do not have that autonomy. Within the Chinese context, Eberhardt et al. (2004) also find that autonomy plays a vital role in local sourcing decisions.

Learning ability. Learning is a key determinant of firms' competitive advantage (Foray and Lundvall, 1996; Asheim and Dunford, 1997). Firms operating in a foreign country often face disadvantages when competing with local firms. These disadvantages can be emanated from differences in language, culture, the legal system and other inter-country differences (Moosa, 2002). This is so-called 'liability of foreignness' (Cuervo-Cazurra et al. 2007). To overcome the liability, MNEs need to devote resources to enhance their learning ability. This may involve the development of tacit knowledge of how to operate in the new institutional environment (Prahalad and Lieberthal, 1998) and local information networks (Zaheer, 2002). There are significant differences between Western and Chinese business practices. Hence it is expected that an MNE's ability to adapt to local institutional environment also affects its local sourcing decision. MNEs and their subsidiaries with willingness and better ability to learn may find it easier to identify suitable local suppliers to minimize costs. Eberhardt et al. (2004) note that the cultural issue is important not only in subsidiary management but also in dealings with suppliers. Firms who are willing to learn and able to adopt local settings tend to identify the suppliers with relative ease and have better relationship with their suppliers. Zhang and Goffin (2000) find that in the China-specific context the knowledge/learning synergy from global sourcing is an important factor in determining the sourcing pattern of MNEs. They also report that local knowledge processed by MNEs facilitates the communication between foreign subsidiaries, local suppliers and government officials.

Country-of-Origin

Davidson (1989) suggests that “there exists a strong correlation between the nationality of a corporation and its operating strategy”. Sourcing patterns of US, European and Japanese firms are significantly different (Swamidass and Kotabe, 1993). Pearce and Papanastassiou (1997) and Drifford and Mohd Noor (1999) provide evidence on strong local sourcing propensities of EU firms in the UK and US firms in Malaysia, respectively. Japanese firms are often found to be less inclined to establish backward linkages but rely on imports of components and materials from Japan (e.g. Murray et al. 1995; Belderbos et al., 2001) for the reasons of a relatively short FDI history, being more dependent on existing suppliers in Japan, being part of *keiretsu* and high standards for quality and dependable supply. Developing countries, such as China despite their cost advantages, have been known for the poor capability of their firms. Zhang and Goffin (2000) examine sourcing practices of 5 foreign firms in China and find that they have failed to establish long-term relationships with local suppliers because the latter are “unreliable in terms of delivery and quality”. On the other hand, Crone (2002) and Tavares and Young (2006) show that country-of-origin has no relationship with the extent of local input linkages in the UK and the EU respectively. Similarly, Giroud and Mirza (2006) find little evidence that US, Japanese and EU firms have significantly different local sourcing strategies in ASEAN countries.

III. Data and Methodology

This study uses survey data from 493 multinational subsidiaries in Chongqing and Beijing municipalities and Jiangsu Province, China over the period 1999-2005. A detailed description of the survey is provided in the Appendix. Our data set allows us to use a more inclusive measure of local sourcing than those used in the literature. Local sourcing here is defined as the percentage of total inputs (i.e. raw materials, components and intermediate inputs) that are sourced from indigenous firms in China. This is in contrast to other existing measures which also

include labor inputs or purchases from other locally-based multinationals. For example, McAleese and McDonald (1978) use the ratio of expenditure in the host country to firm's total expenditure. Such a measure includes both expenditure on materials and services and labor costs. Belderbos et al. (2001), Görg and Ruane (2000, 2001) and Giroud and Mirza (2006) use the share of inputs sourced in the host country. Such a measure includes sourcing from not only indigenous firms, but also foreign firms operating in the host country. Thus, a high value of such linkage measure doesn't necessarily indicate a high level of supply from indigenous firms. As argued earlier, MNEs have formulated global production networks (Ernst and Kim, 2002). Some MNEs have located in host countries specifically to supply other MNEs in the networks. Therefore, these linkages are not to indigenous firms, but to multinational suppliers.

Our dataset also has an advantage as it is of panel structure which allows us to explore local sourcing over time. Studies such as Driffeld and Mohd Noor (1999), Eberhart et al. (2004), Tavares and Young (2006) and Giroud and Mirza (2006) employ cross-section data, i.e. they look only at firms at a single point in time. Though they are informative, they cannot infer whether local sourcing at the subsidiary level changes over time. Time effects are particularly important in the context of China. During its process of economic reforms and opening to the outside world in the past 30 years or so, China has been progressively liberalizing its trade and investment regime. For instance, WOSSs had not been allowed until the late 1980s but they became the most popular entry mode in the late 1990s (Wei, 2004). In 2001, China joined the World Trade Organization (WTO) and passed the amendment to the Law of the People's Republic of China on Foreign Capital Enterprises, the amendment to the Law on Sino-Foreign Contractual Joint Ventures and the amendment to the Law on Sino-Foreign Equity Joint Ventures. More importantly, local content requirements were formally removed from China's laws governing foreign invested enterprises in 2001. All these changes may have affected the

production and transaction behaviors of both foreign and indigenous firms. For instance, during the transition, some local governments still pressurized foreign firms on LCR. Nevertheless, over time, with China deepening her commitment to the WTO, foreign firms may become more likely to use their more efficient foreign suppliers either in or outside China. Then the removal of LCR may imply the reduction of backward linkages with indigenous Chinese firms. On the other hand, these policy efforts can reduce environmental uncertainty and improve efficiency of transactions. Hence they may encourage MNEs to be more actively involved in the Chinese economy, which may facilitate backward linkages. A panel data approach is able to capture possible changes arising from policy evolutions.

Table 1 provides summary statistics for local sourcing. Based on our sample, MNEs source over 91% of raw materials, components and intermediate inputs within China. The close examination of data also reveals that, all multinational subsidiaries sourced locally during the period 1999-2003 and it was only after 2004, some subsidiaries did not source locally at all. This to a large extent may reflect the impact of China's LCR policies and other related trade policies. *The Economist* (2008a) notes though China made the commitments to opening up to foreign suppliers of car parts in its accession to the WTO in 2001, "in 2006 it increased the tariff on car parts from 10% to 25% if the parts comprised more than 60% of the finished car's value". An ANOVA F test of equality of means over time shows that the decreasing trend of local sourcing is statistically significant at the 10% level with the statistic of 1.995. In addition, there is a clear regional difference in local sourcing patterns. On average, subsidiaries sourced 84% of components and intermediate inputs in Beijing, 91% in Jiangsu, but 94% in Chongqing. An ANOVA F test again confirms that such regional differences are statistically significant at 1% level with the statistic of 94.845.

We apply the two-limit Tobit model to examine the determinants of local sourcing. Some

previous studies on local/international sourcing, e.g. Giroud and Mirza (2006) and Tavares and Young (2006), have estimated regressions using OLS. This may be questionable as the value of the dependent variable lies between 0 and 100%, and the implied model of the conditional mean places inappropriate restrictions on the residuals, which means that OLS estimates are biased and inconsistent. Tables 2 and 3 present the variable description and descriptive statistics respectively. Though variables such as local market orientation, size and age are continuous, for variables of local network with suppliers, production autonomy and learning ability, senior managers in the subsidiaries were asked to answer the questions on a 5- point Likert-type scale.

IV. Empirical Results

The Chinese Economy: an aggregate analysis

Table 4 presents both OLS and Tobit estimation results for comparison. Specifications (1) and (2) include the same set of variables, but are estimated with OLS and Tobit respectively. Specification (2) is different from specification (3) in that the latter does not include country-of-origin dummies. Comparing the first two specifications, it is clear that the OLS results are different from Tobit ones. Our discussion below will largely focus on specification (2). The model fitness test statistics confirm that the models are statistically significant

The local market orientation variable is negative and statistically significant. This suggests that subsidiaries which are local-market-oriented are less likely to source from indigenous Chinese suppliers than those which are oriented towards international markets. This contradicts our expectation. However, we believe that such a finding is plausible in the context of the Chinese economy. Many MNEs have used China as an export base of labor-intensive products. Following the product life cycle theory, local sourcing tends to occur towards the end of the product life cycle in developing countries where well standardized technologies are adopted and competitive advantages are cost-based. As the majority of Chinese manufacturing products are

mature products, MNEs are able to find suppliers of standardized technologies with relative ease (Swamidass and Kotabe, 1993). Hence these export-oriented MNEs are more likely to source from local Chinese firms who have cost advantages over firms from other countries (Park, 2000), and this is consistent with China's comparative advantage. On the other hand, historically, those foreign subsidiaries who aim to target China's domestic market tend to focus on premium segments where Chinese customers used to pay 70% to 100% premiums for world-class brands (Gadiesh et al. 2007). For these firms, costs may not be perceived as paramount importance because the strategic priorities are to penetrate the local market. They have relied heavily on imports of components and intermediate products for these final products to avoid issues related to quality, delivery performance and insufficient expertise of local suppliers, and differentiate their products from those of indigenous competitors.

The dummy variable "JV" and local network variable are both statistically significant. This confirms that an MNE's decision on local sourcing is affected by its entry mode of being a WOS or JV and its close networking with local suppliers. JVs are more likely to source locally than WOSSs. Close communication between multinational subsidiaries and suppliers helps enhance local sourcing.

Subsidiary size is negative and statistically significant in determining local sourcing. Large size provides a subsidiary with sufficient resources and scale economies for its competitive position in the host market, and may hence discourage its efforts to develop links with indigenous suppliers. Moreover, large MNEs tend to adopt global procurement strategy and their input sourcing can be obtained via channels such as in house production and intra-firm trade rather than local sourcing.

Similar to a number of existing studies, we use age to measure the impact of subsidiary experience in the host market. Here squared age is also included to investigate whether there is a

diminishing effect associated with experience. Subsidiary age is found to have a nonlinear effect on local sourcing. When a subsidiary grows older, there is more local sourcing, but the effect of age diminishes over time. The subsidiary gradually obtains knowledge of local manufacturing and market conditions and builds up its own production network. However, the age effect varies across regions, and we will explore this further later.

Being consistent with our expectation, autonomy seems to affect local sourcing as the variable is statistically significant. Multinational subsidiaries with more autonomy in production planning are more likely to source from indigenous Chinese firms than those whose production planning is largely decided by the parent firm.

The ability to adapt to local culture and local customs doesn't seem to affect a subsidiary's local sourcing pattern. We suspect that the country-of-origin dummies may have to some extent captured this effect. The removal of country-of-origin dummies in specification (3) confirms this and the variable now becomes statistically significant with the expected sign.

Turning to the country-of-origin dummy variables, it is apparent that US and EU firms seem to source less, and Hong Kong, Macao, Taiwan and Singapore firms source more, than other foreign firms, while Japanese firms have similar sourcing patterns to other foreign firms. As Hong Kong, Macao, Taiwan and Singapore are culturally closer to China than other foreign countries, it is not surprising to see that MNEs from these areas source more from China. On the other hand, the US and EU countries are mostly culturally distant from China, and hence they are more likely to use firms in their existing networks. Though there is emerging evidence that Japanese firms have changed their sourcing practices since the mid-1990s and have started to source more locally from Asia (Ernst, 1997), this is not evident in China.

We also introduce time dummies into the estimation. Linkages between foreign and indigenous firms change over time as shown in table 1. As an emerging economy, China has

experienced substantial structural changes over the past years. China has also increasingly adopted proactive policies aiming at enhancing linkages between the foreign and domestic sectors. The coefficients on the year dummies all have the negative sign, implying that over time there is a decreasing trend in local sourcing by foreign firms. However, relative to the base year 1999, only since year 2003, there has been a significant difference in local sourcing. We also test whether there is a significant difference in the coefficients on year dummies 2003, 2004 and 2005. It appears that the coefficients on year dummies 2004 and 2005 are not statistically different from each other. Overall the results suggest that over time, foreign firms have changed their sourcing behavior. They have significantly sourced less since year 2003, but after 2004, the trend becomes stabilized.

The Chinese Economy: coastal and inland regions

We expect local sourcing patterns vary across China's coastal and inland regions. Firstly, the two regions differ in a number of factors including resource endowment, location, culture, stage of economic development and government policies. Prior to implementing reform and opening to the outside world in late 1978, the central government carried out vertical division of labor across regions: the coastal region developed manufacturing industries while the inland provided low priced raw materials. In the initial period of economic reforms, the central government gave priority to the coastal region and the inland lagged behind. FDI was heavily skewed towards the coastal region (Wei and Liu, 2001). However, with the deepening of economic reform and opening to the outside world, preferential government policies towards opening up to the outside world and economic development have spread to the inland areas. Taking advantage of their natural resource endowments and making use of the industrial capabilities initially established by the so called 'Third Front Construction' during the 1960s and 1970s, the inland region has also developed downstream manufacturing. Though its share remains small in China, FDI in the inner

region in absolute term has been rising. In addition, the central government has used both fiscal and financial policies to support poor areas. Regional policy has now focused on the *Develop the West* (Golley, 2007). The Chinese government has also called for “coordinated development”, focusing on achieving balanced development between different regions.

Table 5 gives the estimation results for three sub-samples: Chongqing in the inland region and Beijing and Jiangsu Province in the coastal region. Beijing, as the capital and one of the commercial centers, and Jiangsu Province, as a highly developed industrial and commercial area, are much better developed than Chongqing. Chongqing became an autonomous municipality in 1997 and it is the commercial and transportation centre in the western China. Since the Chinese government announced the western development program more than a decade ago, Chongqing has already become one of the fastest growing areas. It is the lead city that can represent the western China. Comparing Jiangsu and Chongqing, one key characteristic is that Jiangsu depended less on state-owned enterprises than Chongqing before China’s opening up. This has actually become an advantage as Jiangsu has been able to grow and expand township and village enterprises (TVEs) and privately owned enterprises (POEs) much rapidly than many other regions in China. In 2007, these enterprises together accounted for just over 50% of industrial output in Jiangsu (http://www.stats.gov.cn/tjfx/dfxx/t20080410_402473452.htm).

It is apparent from Table 5 that the importance of the determinants of local sourcing varies across regions. Market orientation strategy, networking strategy and size have similar impacts on these three locations. But for the remaining variables, the effects vary across regions. (1) The coefficients on JV are insignificant in specifications for Beijing and Jiangsu, but significant for Chongqing, implying that only in Chongqing, JVs source more than WOSSs. (2) The age variable is no longer statistically significant for Beijing while it has a linear impact in Jiangsu and a nonlinear impact in Chongqing. (3) Production autonomy is statistically insignificant for

Chongqing, but is significant for Beijing and Jiangsu. (4) In Chongqing, Japanese and EU subsidiaries source less than other foreign firms, while there is no significant difference between subsidiaries from the US, Hong Kong, Macao, Taiwan, Singapore and other foreign countries. In Jiangsu, US subsidiaries source less than all other foreign firms. (5) In Beijing and Jiangsu, foreign subsidiaries have changed their sourcing strategy from 2002, which is different from Chongqing, where foreign subsidiaries have made the transition from 2003.

Overall, the above estimation results suggest that the local environment has a significant impact on MNEs' sourcing strategies. Beijing, as the capital of China, is in general better known to MNEs. As the role model for other regions, the Beijing authorities provide better services, the implementation of laws and regulations is relatively strong, and costs associated with employing local suppliers and using locally produced components and intermediate products tend to be low. More importantly, local infrastructure is better developed. Beijing is well linked to the rest of China and the world through its airport, intercity rail service and expressway network (The Economist, 2008b). Multinational subsidiaries, hence, do not need to rely on local partners in JVs and years of experience for local sourcing.

Jiangsu, on the other hand, was not well known to the foreigners before opening up, but its development has been accelerated since then. Locating in the east coastland of China, Jiangsu is close to Shanghai. Since opening up, it has developed the transportation system which enables the province to have better access to the assets of Shanghai, including physical and human capital, information and knowledge. It has also developed various ports linking the province to the rest of the world. Furthermore, the Jiangsu government has been very active in attracting FDI, and implemented many favorable policies to MNEs, including preferential tax, land cost, and the supply of water, electricity and any other raw and processed materials. Therefore in dealing with a much changing environment, MNEs' years of experience positively increase local sourcing.

MNEs in Chongqing depend more on local sourcing because of location disadvantage and local government pressures. Though there are a number of infrastructure projects aiming to link Chongqing to the rest of both China and the world, transportation in both highway and railway is still an issue, which increases firms' costs substantially if they choose not to source locally (Wang, 2007). Relative to better developed regions such as Beijing and Jiangsu, the Chongqing authorities still greatly intervene in business activities with administrative measures (Wen and Xu, 2003). Against this background, it is likely that JVs tend to source more locally than wholly owned subsidiaries. Whether having production autonomy, multinational subsidiaries may have little choice but to source locally.

In summary, relatively speaking, MNEs in Chongqing are more likely to source locally than their counterparts in Beijing and Jiangsu. However, partially because of locational factors, Chongqing has received much less FDI than Beijing and Jiangsu. Hence in absolute terms, it is the coastal region which benefits more from MNEs' local sourcing than the western region. The findings above suggest that firm strategy, characteristics and country of origin do affect MNEs' local sourcing, but business environments moderate their effects. It is very important for Chongqing, maybe other western areas, to improve their business environments in order to gain more from the direct and indirect effects of local sourcing.

V. Conclusions

The purpose of this study is to analyze the extent and determinants of local sourcing of MNEs in China. MNEs and their FDI activities in China have been confirmed by many studies to have played an important role in the development of the Chinese economy. This is particularly true of the coastal region which has a higher degree of openness and better infrastructure, and hence has attracted a much larger amount of FDI. MNEs may not willingly transfer technologies to indigenous firms, even Chinese partners in joint ventures, but they may willingly do so to their

local suppliers, even just for the purpose of reducing their own cost levels. While local sourcing by MNEs is important, the phenomenon has received little attention in academic research on the Chinese economy. This may be partially due to data unavailability. The significance of this study for research on local and global sourcing of MNEs is that it uses survey data of nearly 500 firms in Chongqing, Beijing and Jiangsu in China.

The econometric analysis of the determinants of local sourcing indicates that strategy, characteristics and country-of-origin of multinational subsidiaries appear to influence local sourcing and supplier linkages. More specifically, export-orientation strategy, joint venture strategy and networking with local suppliers seem to positively affect local sourcing. Holding other things constant, small and autonomous subsidiaries tend to source more locally. Age on the other hand has a non-linear effect. However, the importance of the determinants varies across regions. Both descriptive statistics on local sourcing and econometric analysis suggest that the sampled multinational subsidiaries decreased their local sourcing over time. This is true for all three regions surveyed.

Local sourcing and supplier linkages have considerable policy and managerial relevance. The Chinese government since opening up and economic reform has initiated a series of measures aiming at capacity building and competitiveness of indigenous firms. One of such measures is local content requirement. However, as shown by this study, such direct policy intervention by the government could be counterproductive. In the relatively closed economy, though MNEs have to use local suppliers for their production, this may not necessarily improve the competitiveness of local suppliers. On the contrary, in some cases, it may lead to high-cost production of low quality products. Once the country/region opens up, such uncompetitive indigenous firms face tough competition from foreign firms either inside or outside the host country and MNEs would unmercifully look for high quality suppliers to meet their standards

wherever in the world they are. Park (2000) studies MNEs' global sourcing and finds that, in comparison to other newly industrialized economies such as Brazil, Mexico, Korea and Taiwan, China enjoys a cost advantage, but with poor ratings in quality, delivery and cooperation. Hence it is not surprising since China joined the WTO and removed local content requirements and other trade barriers, more MNEs have looked for foreign suppliers of components and intermediate products, either inside or outside China. So one lesson from this study is that the creation of a more competitive business environment by the government would promote more local linkages. The government should design policies to improve the ability of local suppliers to match the quality of imported components and intermediate products.

From the perspectives of strategic management, researchers and practitioners are now giving more attention to the topic of global and local sourcing. Firms have increasingly recognized the importance of their suppliers as valuable resources that contributes to their competitive advantage. Progress in information and communication technologies, the advancement of infrastructures and transportation system, and the lowering of trade barriers have provided firms with a viable choice between global and local sourcing. The findings from this paper suggest strategy, characteristics and country-of-origin of MNEs all affect the extent of local sourcing from indigenous firms

Appendix

Data for this study were collected from multinational subsidiaries in China. A draft survey instrument was first designed and pre-tested via personal interview with chief executive officers or other senior managers of 14 multinational subsidiaries. These interviews helped to obtain insights into multinational subsidiaries in China, and provided an assessment of the questions' validity and the likely reliability of the data that would be collected (Saunders et al, 2003). The questionnaire was then modified and finalized and was sent to 1,223 multinational subsidiaries

from 37 different countries (including US, EU, Japan, Hong Kong, Macao, Taiwan, and Singapore) in 3 regions (Beijing, Chongqing and Jiangsu).

These three regions were chosen for reasons of resource constraints and their different levels of development. Beijing, as the capital and one of the commercial centers, and Jiangsu, as a highly developed industrial and commercial region, are much better developed than Chongqing. According to Chinese Economic Annual Report 2005 (Chinese Industrial and Commercial Bureau, 2006), Jiangsu Province was the No. 2 inward FDI destination in China. In 2007, Jiangsu, alone had over \$20 billion FDI. Chongqing, located in the southwest of China, is the commercial and transportation centre in western China. Since the Chinese government announced the western development program more than a decade ago, Chongqing has already become one of the fastest growing areas, and is the youngest metropolitan in China. It is the lead city that can represent the western China. Finally, we had a total usable sample of 493 multinational subsidiaries with an effective response rate of 40%. As some subsidiaries were established during the sample period, hence our final data set is an unbalanced panel ranging from 219 subsidiaries in 1999 to 493 in 2005. The number of subsidiaries varies between regions with 302, 142 and 49 in Chongqing, Beijing and Jiangsu, respectively.

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Table 1: Summary Statistics of Local Sourcing

	<i>Number of observations</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Min</i>	<i>Max</i>
Year					
1999	219	92.86	13.84	30	100
2000	243	92.47	14.56	5	100
2001	281	92.04	15.07	8	100
2002	331	92.05	15.23	12	100
2003	381	91.29	15.67	10	100

2004	439	90.22	16.21	0	100
2005	493	89.76	16.17	0	100
Region					
Chongqing	1,506	94.13	13.23	5	100
Beijing	633	84.39	19.33	0	100
Jiangsu	248	91.14	11.23	60	100
All	2,387	91.24	15.50	0	100

Table 2: Variable Description

<i>Variable</i>	<i>Description</i>
Local sourcing	The share of raw material, components and intermediate inputs sourced from indigenous Chinese firms
Local market orientation	The share of local sales in total sales
JV	Entry mode 1 = Joint venture; 0 = Wholly owned subsidiary
Local network with suppliers	The degree of contact and communication with local suppliers. 1 = Very good ... 5 = Very bad
Size	log(total assets)
Age	Age
Age2	Squared age
Production autonomy	Production autonomy 1 = Autonomy ... 5 = No autonomy
Learning ability	Adaptability to local culture and customs 1 = Very good ... 5 = Very bad.
US	Country of origin dummy, 1 = US; 0 = otherwise
Japan	Country of origin dummy, 1 = Japan; 0 = otherwise
EU	Country of origin dummy, 1 = EU; 0 = otherwise
HMTS	Country of origin dummy, 1 = Hong Kong Macao, Taiwan and Singaporean; 0 = otherwise
yr00	Year dummy, 1 = year 2000; 0 = otherwise
yr01	Year dummy, 1 = year 2001; 0 = otherwise
yr02	Year dummy, 1 = year 2002; 0 = otherwise
yr03	Year dummy, 1 = year 2003; 0 = otherwise
yr04	Year dummy, 1 = year 2004; 0 = otherwise
yr05	Year dummy, 1 = year 2005; 0 = otherwise

Table 3: Descriptive Statistics and Correlation Matrix

<i>Variable</i>	<i>Mean</i>	<i>standard deviation</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Local market orientation	72.00	37.10					
2. Local network with suppliers	1.76	0.65	-0.01				
3. size	7.42	1.96	0.04	-0.20			
4. age	5.71	3.60	-0.03	-0.10	0.21		
5. Production autonomy	1.77	0.77	-0.37	-0.03	0.21	-0.11	
6. Learning ability	1.81	0.65	-0.03	0.33	-0.18	-0.09	0.17

Table 4: Local Sourcing, An Aggregate Analysis

	(1) OLS	(2) Tobit	(3) Tobit
Local Market Orientation	-0.032*** (0.009)	-0.072*** (0.021)	-0.089*** (0.021)
JV	3.133*** (0.657)	5.654*** (1.462)	6.319*** (1.480)
Local network with suppliers	-4.029*** (0.491)	-7.860*** (1.103)	-7.857*** (1.130)
Size	-1.473*** (0.172)	-3.865*** (0.388)	-4.694*** (0.390)
Age	1.339*** (0.276)	3.009*** (0.592)	3.234*** (0.609)
Age ²	-0.044** (0.020)	-0.101** (0.041)	-0.116*** (0.043)
Production Autonomy	-0.910** (0.446)	-1.800* (0.995)	-2.266** (1.016)
Learning Ability	0.372 (0.522)	0.146 (1.201)	-2.118* (1.203)
US	-6.296*** (1.156)	-9.862*** (2.463)	
Japan	-2.195* (1.148)	-3.559 (2.503)	
EU	-5.186*** (1.117)	-7.950*** (2.390)	
HMTS	1.336 (0.977)	5.932*** (2.182)	
yr00	-0.934 (1.330)	-2.060 (3.055)	-2.272 (3.138)
yr01	-1.041 (1.304)	-2.607 (2.998)	-3.022 (3.081)
yr02	-1.979 (1.265)	-4.300 (2.899)	-4.813 (2.979)
yr03	-2.689** (1.243)	-6.024** (2.842)	-6.727** (2.919)
yr04	-3.279*** (1.224)	-8.299*** (2.781)	-9.357*** (2.855)
yr05	-3.925*** (1.212)	-9.799*** (2.746)	-11.195*** (2.816)
Model fitness test statistics	25.59***	422.36***	338.67***

Notes: Robust standard errors are in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are: wholly foreign owned subsidiaries, foreign firms from other developing countries than Hong Kong, Macao, Taiwan and Singapore and no autonomy.

Table 5: Tobit Model for Local Sourcing, by Region

	Chongqing	Beijing	Jiangsu
Local Market Orientation	-0.098*** (0.032)	-0.064** (0.030)	-0.211*** (0.041)
JV	5.016** (2.308)	1.120 (2.144)	0.337 (2.795)
Local network with suppliers	-5.996*** (1.619)	-11.601*** (1.820)	-8.686*** (1.984)
Size	-4.058*** (0.606)	-3.997*** (0.653)	-5.270*** (0.662)
Age	5.346*** (0.860)	0.174 (1.024)	2.499** (1.115)
Age ²	-0.234*** (0.058)	0.098 (0.072)	-0.045 (0.084)
Production Autonomy	-0.897 (1.719)	-4.981*** (1.851)	-6.655*** (1.377)
Learning Ability	-0.461 (1.846)	-1.410 (1.917)	-2.728 (1.915)
US	-5.775 (4.272)	-14.463*** (3.071)	-27.829*** (7.370)
Japan	-12.816*** (3.962)	-13.375*** (4.340)	-10.596 (7.040)
EU	-9.891** (4.249)	-11.694*** (2.868)	-1.027 (7.104)
HMTS	-5.434 (3.563)	8.539*** (2.975)	0.685 (7.260)
yr00	-3.483 (4.736)	-2.127 (4.333)	-3.493 (4.057)
yr01	-4.351 (4.626)	-4.362 (4.310)	-4.406 (4.111)
yr02	-5.725 (4.443)	-7.276* (4.217)	-8.178* (4.444)
yr03	-7.271* (4.362)	-11.060*** (4.144)	-9.842** (4.557)
yr04	-9.951** (4.279)	-13.309*** (4.082)	-14.210*** (4.760)
yr05	-12.063*** (4.239)	-14.767*** (4.070)	-15.323*** (4.638)
Model fitness test statistics	149.72***	229.15***	209.36***

Notes: Robust standard errors are in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The omitted dummies are: wholly foreign owned subsidiaries, foreign firms from other developing countries than Hong Kong, Macao, Taiwan and Singapore and no autonomy.