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FDI spillovers and the entry speed of foreign firms: the case of China

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Abstract

Using a firm level dataset from Chinese locally-owned industrial enterprises (LOEs) for the period 2001-2003, this study examines the relationship between the performance of individual LOEs and the entry speed of foreign-owned enterprises (FOEs) in the industry where the LOE operates. We find evidence of a negative impact from the foreign entry speed (FES) and such effect mainly occurs in industries where the FES is moderate. The effect was moderated by the LOE's location and its technology gap with FOEs in the industry. An LOE in eastern coastal China was more negatively affected than those in the inland. A small technology gap helped LOEs to eliminate partly the negative impact but such moderating effect was specific to LOEs that had a large technology gap and that operated in the industry with a moderate FES.

Key words: Foreign direct investment, spillovers, foreign entry speed, locally-owned firms, firm performance, China

1 Introduction

The prospect that inward foreign direct investment (FDI) generates benefits to locally-owned firms (LOEs) motivates many host country governments to provide incentives for attracting foreign investors. Meanwhile the huge growth potential of emerging economies, such as China, has made multinational enterprises (MNEs) recognise the significance of having continuous presence and even expansion of their operations in those markets. The host governments expect a 'growth engine' effect from FDI, i.e. productivity and technological benefits from inward FDI will favor LOEs in both the short and long term. Although the effect is widely believed to exist, it has been seldom inquired whether the faster entry of foreign-owned firms (FOEs) the better performance of the LOEs. This issue calls for a close examination as it concerns the sustainability of the 'growth engine' effect which many

developing host economies relay on in achieving technological catch-up with the advanced economies.

The current literature of FDI spillovers suggests that productivity and technological spillovers arise from the presence of MNEs in a host economy through several channels, such as demonstration effect, competition effect, backward and forward linkages, employee turnover, and market access externalities (Blomström & Kokko, 1998). As it is theorised as such, empirical studies examine specifically the relationship between the level of the performance of LOEs and the level of the presence of FOEs. Exploring such a relationship, existing studies examined spillover effects at the industry level (e.g., Caves, 1974; Buckley, Clegg, & Wang, 2002; Liu et al., 2000) and at the firm level (e.g., Huang & Sharif, 2009; Liu, 2008; Liu & Wei, 2006; Tian, 2007), and recently from a spatial perspective, some studies examine the effects using data at the sub-national or city levels (e.g., Cheung & Lin, 2004; Huang, 2004). Those studies find negative (e.g., Tian, 2007), positive (e.g., Liu & Wei, 2006), or mixed (e.g., Haddad & Harrison, 1993) results of the effects. Thus, despite of the contribution of previous studies, the literature has suggested that the linear specification of the relationship produces no conclusive outcome.

Several recent studies suggest that such a relationship should have a curvilinear rather than linear form (Wang, Clegg, & Buckley, 2007, Wang & Yu, 2007; Wang, Clegg, & Kafouros, 2008). That is, the presence of FOEs itself moderates the spillover effects. In other words, where there is already a certain level of foreign presence, the entry of FOEs will generate positive, negative, or a combination of both effects. These studies define the linear (without moderator) spillovers as the primary effects and the curvilinear (moderated by foreign presence) spillovers as the secondary effects. The results of these studies provide evidence supporting the existence of both primary and secondary effects.

Through the examination of moderating effects of foreign presence on spillovers, the studies above shed light on the importance of considering the experience of LOEs and the association of those firms' experience with the level of impact from the entry of FOEs they receive at present. This issue matters for the LOEs in emerging economies in particular, as LOEs nowadays operate in an

increasingly rapidly changing environment involving competition from both indigenous and foreign rivals at various levels. An LOE's experience in receiving spillovers from different players has become a critical element to their success. There is evidence that the competition among FOEs, among LOEs, and between FOEs and LOEs in an emerging economy has generated a complex impact on the performance of individual LOEs (Chang & Xu, 2008).

Foreign entry speed (FES) is measured by the annual growth rate of foreign presence. In other words, it captures the joint effect of the present foreign entry (the level of the foreign presence) and the experience of the local sector in receiving an impact from the FDI in the previous period (the increase or decrease of the foreign presence). A positive FES means that foreign penetration grows and local sector loses their competitive position (despite of the growing market). This change in competition and market conditions will have an impact on the performance of individual LOEs positively or negatively, depending on how individual LOEs assimilate the spillovers.

Using a firm level data of Chinese manufacturing LOEs for the period 2001-2003, this study examines the relationship between the performance of individual LOEs and the entry speed of FOEs into an industry where the LOE operates. During the examined periods of this study, China has witnessed continuous and fast growth of inward FDI companied by an aggressive foreign entry and potentially strong foreign competition. Under this context, this study aims to test (1) whether FES is significantly associated with an LOE's performance, (2) whether this association is positive or negative in nature, i.e. whether a fast foreign entry is beneficial or detrimental to an LOE's performance, and (3) whether any firm specific factors moderate the effect of FES.

This study contributes to the existing literature from two perspectives. This is the first study which examines the relationship between the FES and the level of performance of individual LOEs. While previous literature has been unable to reach a conclusion on the exact relationship between foreign presence and the performance of LOEs, this study offers evidence supporting the existence of a nonlinear relationship which concerns the rate of change of foreign presence and the level of individual LOEs' performance. It helps shed light on the current debate on the lack of exact

specification of spillovers which leads to inclusive results. Secondly, the usage of firm level data helps to deepen our understanding of FDI spillovers which are received by individual LOEs. As this study zooms into the microeconomic level, it makes it possible to take account of the influence of firm specific factors such as the ownership, the location, and the environment in which a firm operates. It hopes to help improve our understanding of how spillovers received by individual LOEs are influenced by the changing environment resulted from the FES.

2 The theoretical framework

2.1 The concept of foreign entry speed and the effects of foreign entry speed within an industry

FES is the rate of the change of foreign presence per unit of time. Foreign presence, also termed as foreign penetration, is the share of the activities of FOEs relative to the activities of all firms in the host economy (e.g., Kokko, 1996). FDI spillovers are the productivity and technological externalities arising from the presence of FDI. Theories of FDI spillovers suggest those effects arise when the performance of local entities in a host economy is associated with the foreign presence. As the changes of the proportion of FOEs' activities in a domain represent the pace of foreign penetration which is resulted from the relative competitiveness of the LOEs, we expect that FES is associated with the performance of LOEs.

There are three main reasons to consider the importance of the concept of FES. First, the underlining assumptions of many empirical studies indicate the failure of recognising the impact of different entry speeds on the performance of LOEs. Second, the commonly used linear specification of spillovers cannot address the issue that the time required for the channels of spillovers to develop may have a significant influence on spillover effects. Third, the positive or negative outcomes of competition effects of spillovers remain difficult to test in the linear specification of spillovers, and the usage of FES can help to shed light on the problem. The following section will discuss these reasons in more detail, and then will discuss the moderating effects of technology gaps on the spillovers arising from the speed of foreign entry.

The literature of FDI spillovers has reached the broad consensus that spillovers do not arise

automatically and inward FDI generates spillovers to individual LOEs through many channels (Blomström & Kokko, 1998). Under this context, many studies empirically examined spillover effects at the industrial (e.g., Caves, 1974; Buckley, Clegg, & Wang, 2002; Liu et al., 2001) and firm (e.g., Huang & Sharif, 2009; Liu, 2008; Liu & Wei, 2006; Tian, 2007) level, but did not find conclusive results as to whether or not FDI generate spillovers and to what extent those spillovers are felt by individual LOEs. So far previous studies have found negative (e.g., Tian, 2007), positive (e.g., Liu & Wei, 2006), or mixed results (e.g., Haddad & Harrison, 1993).

Besides the problem with using imperfect methodological treatment, there are three main issues concerned with the unconvincing outcome. First, most of studies test for the effects assuming the relationship is rather static, remaining unchanged over time. It is a common assumption that a certain level of LOEs' performance at one point in time is associated with a certain level of foreign presence during the same period or in a lagged period (e.g., Liu & Wei, 2006). This assumption, however, overlooks the possibility that the level of presence in each period is determined by the relative competence of LOEs in the host economy. It is likely that LOEs accumulate their competitive advantage through past experience of growth, and their presence influences the decision of MNEs that intend to enter a market in the host economy (e.g., Luo, 2007).

Many studies, such as Caves (1974), Li, Liu, & Parker (2001), have limited recognition of the endogenous relationship between FDI and the domestic sector. Typically, these studies consider that FOEs tend to invest in industries where local productivity is relatively high. This view only recognises the "initial context" for spillovers, but does not address two issues: (1) in order to avoid being confronted with intense competition, MNEs may enter industries where local productivity is not very high but local market potential is huge, and (2) what will happen next after MNEs enter an industry where local productivity is high and local competition is fierce.

For both issues, the conventional analyses of spillovers are not equipped to address them since the empirical approach commonly used aims to examine the relation between the level of foreign presence and the level of domestic sector performance. However, the impact from FDI in conditions (1) and (2)

is likely to be different. In the first case, because LOEs are not capable enough to defend their pitch, the entry of FDI will be characterised by a rapid speed, and the performance of LOEs will be negatively affected. In the second case, because LOEs have certain competence and perhaps possess the appropriate absorptive capacity, they will be able to sustain the short-term consequences, assimilate the benefits from FDI, and then respond sturdily to the entry of FOEs. This case will be characterised by a rapid speed of foreign entry and an increase in LOEs' performance.

Second, the literature suggests that the competition effects of spillovers are twofold. On the one hand, the entry of FOEs improves the allocative, technical, and technology transfer efficiency of LOEs (Caves, 1971). On the other hand, foreign entry into certain industries with some monopolistic characteristics may increase the level of competition and may crowd out inefficient domestic players if the positive effect cannot compensate for the negative impact eventually. At the aggregated level, empirical studies find that LOEs can achieve their productivity growth, and this in turn improves their absorbability, which further enhances their better understanding of foreign technology and maximises the positive spillovers from FDI (e.g., Li, Liu, & Parker, 2001). This issue at the firm level, however, may be difficult to test using a linear specification. The linear specification examines the net outcome of competition effect but fails to distinguish the positive from the negative effects. Using the rate of changes of foreign presence (entry speed), the competition effects can be clearly measured. Thus we hypothesise that:

H1a: The performance of an LOE is associated with the FES in the industry where the LOE operates.

H1b: The performance of an LOE is not associated with the FES in the industry where the LOE operates.

Third, by and large, the underlining hypotheses in contemporary studies of spillover are that with the help of industrial linkages, a certain amount of inward FDI produces a certain level of spillovers to the host economy, and the larger the amount of inward FDI, the larger the scale and magnitude of spillovers (e.g., Koizumi & Kopercky, 1977). Blomström & Kokko (1998) emphasise that it may take some time for the linkages between FOEs and LOEs to be established. It can be inferred that a large inflow of FDI within a short period of time may undermine the effectiveness of the linkages which

channel the spillovers between FOEs and LOEs. The intensity of linkages is highly likely to be associated with the relatedness of FOEs and LOEs' activities and the age of a firm's establishment as stronger relations tend to be grown by firms gradually over time (e.g., Spencer, 2008). Spillovers on a great grand are most likely to occur when the linkages, in particular vertical linkages (Javorcik, 2004), between LOEs and FOEs are steadily developed and maintained over a long period of time. It is then inferred that a rapid speed of foreign entry means that more FOEs or projects are established within a short period of time, and before LOEs can assimilate the benefit from FDI through linkages, the large increase in foreign presence within an industry may negatively impact on the performance of individual LOEs as no sufficient time is allowed for the establishment of linkages and other FDI channels.

LOEs operating in the same industry may be faced with negative competition effect and may not assimilate the benefits through demonstration because the exchange of knowledge is likely to depend on the trust between knowledge carriers which after all takes time to build up (e.g., Andersson, Forsgren, & Holm, 2002; Dhanaraj et al., 2004; Spencer, 2008). It is also likely the benefits of FDI are channelled by these linkages from FOEs to their local buyers and suppliers and then from those local buyers and suppliers to the LOEs in question (e.g., McEvily & Zaheer, 1999). This process takes time too as it involves the series of actions and reactions from both FOEs and LOEs. In a word, the examination of the level of foreign presence cannot capture the full effect of spillover because some of the channels of spillovers will take time to develop. By contrast, the scale of FES reflects the changes that happen during a period of time, and therefore offer a better tool of capturing spillovers than the level of foreign presence.

Following above discussion, we expect that the impact of the rapid and moderate FESs on the performance of individual LOEs is different. More specifically, we hypothesise that:

H2a: The performance of an LOE is associated with a high FES in the industry where the LOE operates.

H2b: The performance of an LOE is not associated with a high FES in the industry where the LOE operates.

H3a: The performance of an LOE is associated with a moderate FES in the industry where the LOE operates.

H3b: The performance of an LOE is not associated with a moderate FES in the industry where the LOE operates.

H4a: The performance of an LOE is not associated with a high FES but is associated with a moderate FES, i.e. both H2b and H3a are supported.

H4b: If the performance of an LOE is associated with both high and moderate FES (both H2a and H3a supported), such association is stronger with the moderate FES than with the high FES.

2.3 The moderating effect of location, ownership, and technology gap on the impact of foreign entry speed

The moderating effects of location. The impact of FES means that the growth of foreign presence result in changing competition and market conditions which influence the performance of individual LOEs positively or negatively depending on how individual firms assimilate the spillovers under various conditions. These conditions are usually concerned with both environmental and firm factors. Among others, one of the crucial environmental factors is location. As location is an essential FDI determinants according to the Ownership-Location-Internalisation (OLI) theory (Dunning, 1993), it suggests that FOEs drawn to different locations will characterise different potential for spillovers (Morgan, 1997). Examining the intra-industrial effect, Driffield (2006) finds that spillovers from FDI are more localised than previously believed. The author argues that the investigation of spillovers at the aggregate level without a consideration of the spatial dependency generate flawed results.

The location where an LOE operates can positively or negatively moderate the impact of FES. Driffield (2006) finds evidence for negative spillovers in an investigation taking account of agglomeration at the sub-national level, contrasting the effect at the national level which is found to be the opposite. In terms of FDI distribution, China is characterised by an imbalance between the eastern coastal and the inland area. Whereas the eastern coastal area has started to attract FDI from the very early era of reform and holds the majority of inward FDI (more than eighty per cent by 2006 according to NBS, 2007), the inland area is relatively lagged in openness and holds a far smaller proportion. The different degree of openness as well as FDI intensity means that the environment facing LOEs in those locations differ from one another. As the resource dependence theory suggests that firms' managers

interpret demands and dependencies in their environment before they make strategic choices and instituting adjustments to organizational strategies (Hrebeniak & Joyce, 1985; Li & Antuahene-Gima, 2001; Pfeffer & Salancik, 1978), LOEs may respond differently in facing the environmental turbulence arising from foreign penetration and the growth of foreign penetration. A firm locating in the eastern coastal area may receive stronger impact from FES. As the relatively high degree of openness of coastal areas have lead to the development of better institutional support such as improved competition environment, advanced financial service sector, and lowered transaction costs, the market mechanism is more dynamic and the shock arising from the FES will be felt by LOEs promptly. The converse is also true for LOEs that locate in the inland area. Follow the above discussion we assume there is a complementary pattern of the moderating effect of a firm's location choice of the coastal area and of the inland area. For the sake of simplicity, we hypothesise for LOEs' location choice of the coastal area only as follows:H5a: The effect of FES on the performance of an LOE is significantly moderated by the firm's location in the coastal area.

H5b: Given H5a stands, the effect of FES on the performance of an LOE is positively moderated by the firm's location in the coastal area.

H5c: Given H5a stands, the effect of FES on the performance of an LOE is negatively moderated by the firm's location in the coastal area.

The moderating effects of ownership. Mascarenhas (1989, p: 583) suggests that "ownership is a summative context condition that include the following factors: (1) the interests and constraints of respective owners (…) and of respective mangers (…), and (2) the ability of those parties to obtain resources from product markets and factor markets, such as capital, management, and technological talent". The ownership types not only explain the performance differences of firms, but also moderate the spillovers effect. As the different parties are eventually involved in determining the goal for a firm and indirectly influence the firm's operation, these parties' abilities and interests will influence the establishment, the types and the effectiveness of the channels for spillovers.

One of the characteristics of China as a transitional economy is that state-owned enterprises (SOEs) that once completely dominate the major industries of the country are undergoing rapid

transformation into collectively-, publically- and privately-owned enterprises. Under this context, the competitiveness of SOEs and the scale and magnitude of spillovers that they receive from FDI has been under debate. Girma & Gong (2008) and Buckley, Clegg, & Wang (2002) find that competition from sectoral FDI has a negative impact on the productivity, growth and survival probability of SOEs. Bin (2005) finds that large and medium sized SOEs have played a critical role in bridging the technology gap between advanced technologies brought in by FOEs and the technological base of other firms. Since SOEs acted as a technology conduit for other LOEs, it is expected that SOEs could have received the spillovers in one way or another. Furthermore, Li, Liu, & Parker (2001) find that SOEs have improved their technical levels via competition with FOEs.

Thus, these discussions suggest that ownership may positively moderate the impact of FES because SOEs' competitive strength comparing with non-SOEs lie in their larger capacity, more resources and protection provided by the government. It is likely that these advantages will assistant SOEs to eliminate negative effects from foreign competition. It can be also true that the government's intervention in SOEs have in general lead to certain deficiencies, such as their insensitivity towards market incentives and less autonomy granted to their managers due to external rules (e.g., Meyer, 1982). These deficiencies suggest that ownership may negatively moderate the impact of FES. Following the above discussion we assume there is a complementary pattern of the moderating effect of state- and non-state ownership. For the convince of expression, we only hypothesise for the moderating effect of non-state-ownership.

H6a: The effect of FES on the performance of an LOE is significantly moderated by the LOE's non-state-ownership.

H6b: If H6a stands, the effect of FES on the performance of an LOE is positively moderated by the LOE's non-state-ownership.

H6c: If H6a stands, the effect of FES on the performance of an LOE is negatively moderated by the LOE's non-state-ownership.

The moderating effects of technology gap. The failure in relating to the performance of domestic sector with the presence of FDI leads to recent research on moderating effects of a firm's absorptive

capacity (Cohen & Levinthal, 1990), or in other way interpreted as the technology gap between LOEs and FOEs (Findlay, 1978). Lall (1996) suggests that LOEs need a certain level of indigenous human capital to be able to benefit from knowledge transferred by MNEs. Thus it is often expected that only LOEs with a beyond-the-threshold level of absorptive capacity or a not-too-wide technology gap will benefit from spillovers. On this basis, there are opposing hypotheses on the moderating effects of technology gap. On one hand, the catch-up hypotheses suggest that the larger the technology gap, the greater growth of the local firms in the host economy (Findlay, 1978). On the other hand, the technology accumulation hypotheses suggest that LOEs that are not lagged too behind (meaning a moderate technology gap) and have some competitive strength will catch up relatively easily with FOEs (Cantwell, 1989). Empirical studies find evidence supporting both hypotheses, such as Haddad & Harrison (1999) for the catch-up hypotheses, and Cantwell (1989) and Liu et al. (2000) for the technology accumulation hypotheses.

An apparent gap in the current literature is that the moderating effect of an LOE's absorptive capacity or technology gap on spillovers has only been hypothesised to have a moderating effect on the level of spillovers (e.g. Blomström & Wolff, 1994, Haddad & Harrison, 1999, Kokko, Tansini, & Zejan, 1996; Kokko, 1996; Liu et al., 2000) but not on the changes of spillovers. Since absorptive capacity enable an LOE to assimilate knowledge that is diffused from FOEs, it could play an even more critical role in sustaining the firm's competence in facing rapidly changing market conditions, in particular those changes resulted from the growth of foreign penetration. Following this discussion, we hypothesise:

H7a: The effect of FES on the performance of an LOE is significantly moderated by the LOE's technology gap.

The previous studies show that there are opposing moderating effects of the technology gap. Kokko (1994) suggests that a moderate technology gap means that MNEs will transfer significantly advanced technologies and therefore the technological benefits will spill over to LOEs; by contrast, a small technology gap means the foreign and local technologies are similar, and there is not much for LOEs to learn. Following this, the impact of FES is likely to be significantly moderated by a medium

level of technology gap. Thus we hypothesise that:

H7b: The effect of FES on the performance of an LOE is positively moderated by a medium level of technology gap and the moderating effect of medium technology gap is stronger than that of the large and small technology gaps.

Advocates of the catch-up hypothesis (e.g., Findaly, 1978; Wang & Blomström, 1992) suggest that the increasing foreign presence create opportunities for LOEs to imitate foreign technology and improve efficiencies. The larger the technology gap, the higher value that an LOE will gain via the imitation of the foreign technology. Thus, the effect of FES is expected to be positively moderated by a large technology gap. Thus we hypothesise that:

H7c: The effect of FES on the performance of an LOE is positively moderated by a large technology gap and the moderating effect of the large technology gap is stronger than that of the small and medium technology gaps.

The advocates of the technology accumulation hypothesis, such as Cantwell (1989), suggests that a wider technology gap impairs LOEs' ability to catch up with foreign competitors and the most positive impact occur in industries where LOEs in general have a strong technology tradition so that they are able to challenge the invading MNEs. Thus a small technology gap of LOEs is expected to positively moderate the impact of FES.

H7d: The effect of FES on the performance of an LOE is positively moderated by a small technology gap and the moderating effect of small gap is stronger than that of the large and medium technology gaps.

An LOE's technology gap may have significant moderating effects under both conditions (1) and (2), i.e., the rapid and moderate FESs. The broad expectation is that in the condition (1) where there is a rapid foreign entry in industries where local productivity is low, an LOE with a large technology gap is more likely to be negatively affected. In particular, priori to considering technological improvement, the rapid foreign entry may not allow enough time for the LOE to at least leverage its current resources in the existing market and maintain its performance (e.g., Conner & Prahalad, 1996). By contrast, in the condition (2) where there is a moderate FES in industries of high local productivity, the entry of FOEs will be companied by the transfer of more advanced technologies from MNEs to the subsidiaries (e.g. Liu & Zou, 2008), and an LOE with a small technology gap is likely to benefit from

the knowledge diffusion. Moreover, in condition (2) where there is a rapid FES resulting from a sparing of location competition due to the competition among FOEs, LOEs with a high level of absorptive capacity (a small technology gap) are likely to benefit through observation of foreign operations and thus withstand partly of the negative impact increasing foreign penetration. In the opposite case, the prospect for an LOE with a large technology gap will be relatively poor. Thus we hypothesise that:

H7e: The effect of rapid FES on the performance of an LOE is positively moderated by a large technology gap and this moderating effect of the large gap is stronger than that of the small and medium technology gap).

H7f: The effect of moderate FES on the performance of an LOE is positively moderated by a large technology gap and is negatively moderated by a small technology gap.

So far we have identified the effects of FES and several moderators of these effects. Figure 1 summarises the main research framework.

3 Data and methodology

3.1 Data

This study uses a panel data constructed from CASSIE database. This database is kindly given by the Institute of Economics at Chinese Academy of Social Science (CASS) which conducted a firm level survey in 2005 on ownership reforms and the government's functional changes in Chinese SOEs before and after China's entry into World Trade Organisation (WTO). The database is build upon three questionnaires, each of which collects data of managers, firm's reforms, and operating statistics, respectively, for the period 2000-2004. The database contains essential indicators such as inputs (capital, labour, wages, assets, management fees, etc.), outputs (sales, value added, profit, taxes, etc.), industry codes, locations, ownerships, etc. In total, there are 1022 surveyed firms which are randomly selected from five cities in China, of which three cities are located in the eastern coastal China - Shenyang (north-east), Wuxi (east), and Jiangmen (south-east) and two cities are located in the inland - Zhengzhou (centre) and Chengdu (central west). For the geographical distribution of the sample, see figure 1. Among the surveyed firms, 941 firms are LOEs, with 30.4% SOEs, 18.6% of collective

ownership and 58.0% of local privately-owned firms. The remainders are FOEs. The sampled firms operate in fifteen two-digit manufacturing industries and the majority is in textile, chemicals, machineries, and electronics and electrical industries. Because the database is only a sample of all firms operating in China, we are not able to use the information of FOEs at the firm level. Instead, we collected industrial data from industrial census (NBS, 1998-2003) in order to calculate the FES for the industries. After using basic error checks and excluding missing values, the dataset used for the later estimation is an unbalanced panel of 863 LOEs for and the total number of observations is 2452.

3.2 The model

We develop the empirical model from a Cobb-Douglas production function:

$$Y_{it} = A_{it} e^{\epsilon_{it}} K_{it}^{\beta} L_{it}^{\alpha} \quad (1)$$

where subscripts *i* and *t* denote the domestic firm and the year; *e* is an error term that denotes unknown effects such as measurement errors and other disturbances. The dependent variable, Y_{it} is measured by sales, $SALES_{it}$ and value added, VAD_{it}, of an LOE *i*. The routine determinants are capital input, K_{it}, measured by the registered capital of firm *i* and labour input, L_{it}, measured by the averaged total number of employees of the firm *i*.. α and β are the constant returns to labour and capital respectively. Instead of assuming that the sum of the two returns equals to one, we let the data to decide each value. A_{it} is total factor productivity which captures a firm's efficiency and technological capability. Here let us define that A is a function of a firm's own management efficiency, economy of scale, location, ownership, the technology gap, and the speed of foreign entry. Thus, $A_{it}$is expressed as follows:

$$A_{it} = f(MGT_{it}, SIZE_{it}, Location_{it}, Ownership_{it}, GAP_{it}, FEspeed_{it}) \quad (2)$$

where MGT_{it} is the management efficiency, measured by an index of management fees (e.g., Wang & Yu, 2007), calculated as the quotient of the management fees for firm *i* in year *t* over the mean of averaged annual management fees of all domestic firms during the examined period of four years. Similarly, $SIZE_{it}$ is economy of scale, measured by an index of the fixed assets of the firm *i* (e.g.,

Murray, Kotabe, & Zhou, 2004). $Location_{it}$ is the region where the LOE i operates, measured by a dummy taking value 1 if the LOE locates in coastal China, and a value 0 otherwise. Liu & Wei (2006) found that geographical area effects are significantly associated with LOE's performance. $Ownership_{it}$ is the ownership type of the LOE i. For the convenience discussion, we measure the ownership using a dummy taking value 1 if the LOE is non-state-owned, and a value 0 otherwise. Thus a positive sign of ownership is expected to reflect the better efficiency of an LOE without state intervention. There are observations from previous studies broadly supporting the performance differences between SOEs and non-SOEs in China (e.g., Li, Liu, & Parker, 2001; Mascarenhas, 1989). GAP_{it} is the technology gap between the LOE *i* and the average FOEs in an industry, measured by the ratio of the LOE's labour productivity to the average foreign labour productivity in the industry (e.g., Kokko, Tansini, & Zejan, 1996; Liu et al., 2001).

$FEspeed_{it}$ is the FES, measured by the annual growth rate of foreign presence in an industry where the LOE operates, FP_{it}. $FEspeed_{it}$ is measured by the annual growth rate of foreign presence measured by many proxies, including capital share, employment share, sales share, value added share, the share of the number of FOEs, and the share of the total industrial output. These proxies have been used in many studies of spillovers (e.g., Liu & Wei, 2006; Tian, 2007). Following the previous discussion of the effects of high and moderate FESs, the model is modified as follows:

$$A_{it} = f(MGT_{it}, SIZE_{it}, Location_{it}, Ownership_{it}, GAP_{it}, FEspeed_{it}^{(A,H,M)}) \quad (3)$$

where $FEspeed_{it}^{(A,H,M)}$ denote the average, high and moderate FESs respectively. $FEspeed_{it}^{(H,M)}$ are measured by the products of FES ($FEspeed_{it}$) with the dummies, $Dummy\_h_{jt}$ and $Dummy\_m_{jt}$ respectively. $Dummy\_h_{jt}$ takes a value 1 if the FES in the industry j is higher than the average FES of all industries in consideration, and a value of 0 otherwise. $Dummy\_m_{jt}$ equals to the unit minus $Dummy\_h_{jt}$.

Following the previous discussion on the moderating effects, we introduce interaction terms between the FES and (i) location, (ii) ownership, and (iii) technology gap. Thus, we have:

$$A_{it} = f(MGT_{it}, SIZE_{it}, Location_{it}, Ownership_{it}, GAP_{it}, FEspeed_{it}^{(A,H,M)}, FEspeed_{it}^{(A)}, Location_{it} \times FEspeed_{it}^{(A)}, Ownership_{it} \times FEspeed_{it}^{(A)}, GAP_{it} \times FEspeed_{it}^{(A)}) \quad (4)$$

Adding the moderating effect of large, medium, and small technology gap, we have:

$$A_{it} = f(MGT_{it}, SIZE_{it}, Location_{it}, Ownership_{it}, Gap_{it}^{(A)}, FEspeed_{it}^{(A,H,M)}, Location_{it} \times FEspeed_{it}^{(A)}, Ownership_{it} \times FEspeed_{it}^{(A)}, Gap_{it}^{(A,L,M,S)} \times FEspeed_{it}^{(A)}) \quad (5)$$

where $Gap_{it}^{(A,L,M,S)}$ denotes the average, large, medium, and small technology cap. $Gap_{it}^{(A)}$is original measure of technology gap as in equation (2). $Gap_{it}^{(L,M,S)}$ is the products of $Gap_{it}^{(A)}$ with the dummies, $Dummy\_L_{it}$, $Dummy\_S_{jt}$,and $Dummy\_M_{jt}$ respectively. $Dummy\_L_{it}$ takes a value 1 if the technology gap is larger than the third quartile, and a value of 0 otherwise. Similarly, $Dummy\_S_{jt}$ takes a value 1 if the technology gap is smaller than the first quartile and a value of 0 otherwise. Finally, $Dummy\_M_{it}$ equals to the unit minus $Dummy\_L_{it}$ and $Dummy\_S_{it}$. Because the functional form for A_{it} is unknown, following Wei & Liu (2006) we choose to use the following simple forms:

$$log(A_{it}) = \delta_1 MGT_{it} + \delta_2 SIZE_{it} + \delta_3 Location_{it} + \delta_4 Ownership_{it} + \delta_5 Gap_{it}^{(A)} + \delta_6 FEspeed_{it}^{(A,H,M)} + \delta_7 Location_{it} \times FEspeed_{it}^{(A)} + \delta_8 Ownership_{it} \times FEspeed_{it}^{(A)} + \delta_9 Gap_{it}^{(A,L,M,S)} \times FEspeed_{it}^{(A)} + \varepsilon_{it} \quad (6)$$

Taking the equation (1) a logarithmic transformation and substituting for $log(A_{it})$ in equations (6), the main model is as follows:

$$log(Y_{it}) = \delta_0 + \propto log(K_{it}) + \beta log(L_{it}) + \delta_1 MGT_{it} + \delta_2 SIZE_{it} + \delta_3 Location_{it} + \delta_4 Ownership_{it} + \delta_5 Gap_{it}^{(A)} + \delta_6 FEspeed_{it}^{(A,H,M)} + \delta_7 Location_{it} \times FEspeed_{it}^{(A)} + \delta_8 Ownership_{it} \times FEspeed_{it}^{(A)} + \delta_9 Gap_{it}^{(A,L,M,S)} \times FEspeed_{it}^{(A)} + \varepsilon_{it} \quad (7)$$

4 Estimation results

Panel Least Ordinary Square (PLOS) techniques are used to estimate the empirical model. All estimations are fixed time effect models as the data is specifically collected for pre- and post-WTO periods. A test of redundant fixed effect test rejects the null hypothesis and supports the choice of fixed time effect model. Table 1 presents descriptive statistics and correlation matrix for all variables in the main model. It can be seen that the variables, size and management, are highly correlated. For the sake

of simplicity, only the results with MGT_{it} are presented in following sections. The results using $SIZE_{it}$ are similar to those with $MGT_{it}$and are available from the authors upon request. The results using different proxies of FES are consistent in general while some of the proxies including the growth of foreign capital share, employment share, and total industrial output share seem to offer stronger evidence. Due to space constraint, the subsequent discussions will focus on the results using the proxy of the growth of foreign capital share ($FEspeedK_{it}$). The results remain qualitatively unchanged when VAD_{it} replaces $SALES_{it}$as dependent variable.

In order to test the hypotheses individually for the main effect of FES and the various moderating effects, we first estimate the main effects and then introduce different moderators with their interaction terms into the regression using a hierarchical moderated regression analysis. Before creating the interaction terms, both FES and moderator variables are mean-centred to reduce the potential problem of multicolinearity (Aiken & West, 1991). We checked for multicolinearity in the models through examination of variance inflation factors (VIF) for each independent variable. None of the VIFs approached the threshold value of 10 suggested by Netter et al. (1985).

4.1 The results of the impact of foreign entry speed

Table 2 presents results for main effects and the moderating effects of location, ownership, and technology gap. The results in table 2 columns (1) and (2) show that main effects of location, ownership, and technology gap on the performance of LOEs are all highly significant at the 1% level. The addition of those explanatory variables (column (2)) increased the adjusted R^2 by 9.4% compared with the model in column (1). FES is found to be negatively associated with the performance of LOEs. The effect, however, appears to be weak with the coefficient of $FEspeedK_{it}^{(A)}$is only significant at the 10% level. Nevertheless, the results support the hypothesis H1a and reject H1b. The finding offers evidence for the nonlinear specification of spillovers and thus lends support to the advocates of considering alternative relationship between foreign presence and the performance of LOEs in searching for the spillovers (Wang, Clegg, & Buckley, 2007; Wang & Yu, 2007; Wang, Clegg, & Kafouros, 2008). The finding of the negative impact from FES demonstrates that the expansion of

foreign penetration has in general a harmful effect on LOEs. This is likely to be a result of competition forces from FOEs' expansion within the industry which have forced LOEs to reduce their output before these firms are able to improve efficiency and strike a balance (e.g., Harrison, 1996).

The results in column (3) show that a moderate FES is significantly associated with LOEs' performance, while a rapid FES does not establish such an association. The results thus support hypotheses H2b, H3a, and H4a, and reject hypotheses H2a, H3b, and H4b. The findings suggest that the impact from a moderate and rapid FES differ significantly and the essential impact is generated only by a moderate FES. The absence of the effect of a high FES offers some support to previous studies which argue for the critical role of the time (e.g., McEvily & Zaheer, 1999). The interesting finding is that while moderate FES does generate stronger impact, such impact is negative. In other words, rapid FES is expected to generate (if any) more negative impact than moderate entry speed does, but the results appear contradictory. The possible explanation is that the rapid FES occurs in industries where the local competition among all types of firms is intense. Thus this is one of the possible outcomes in condition (2). Chang & Xu (2008) found that foreign presence benefited LOEs by making survived LOEs stronger through competition and FOEs were crowded out by their peers and by reformed LOEs. The authors' findings suggest that FOEs improve their performance (and presence) through competing with both local and other FOEs. It is then likely that rapid foreign entry generates negative spillovers to LOEs through competition, but the increased presence of the better performing FOEs generate positive spillovers to LOEs via other spillovers channels such as the demonstration effect. By contrast, moderate FES may not stimulate significant demonstration effect but mainly exhibit a result of negative competition effect.

4.1 The results of the moderating effects on the impact of foreign entry speed

Columns (4), (5), and (6) present results of the moderating effect of location, ownership, and technology gap, respectively. The findings are that both location and technology gap moderate the impact of FES, and ownership did not play a moderating role. In consistency with the findings, the F-statistics support that the addition of the moderating effects in columns (4) and (6) and reject it in

column (5). Thus we find evidences supporting hypotheses H5a,b and H7a, and rejecting H5c and H6a,b,c. They suggest that an LOE's location positively moderate the negative impact of FES, i.e., LOEs in eastern coastal China is more negatively affected by FES. The finding of the moderating role of location is consistent with previous studies suggesting the influence of regional and environmental differences on the behavior of firms and the pattern of spillovers (e.g., Driffield, 2006; Li & Anthuahene-Gima, 2001). Furthermore, the finding highlights the intense competition effects existing in the coastal China where there is a high concentration of the inward FDI.

The finding of a significant moderating role of technology gap is consistent with the previous studies addressing the significant differences in spillovers received by LOEs with different level of technology gap (e.g., Liu et al., 2000). In column (6), the coefficients for $FEspeedK_{it}^{(A)}$ and $GAP_{it}^{(A)} \times FEspeedK_{it}^{(A)}$ are both significant with a negative sign, but the latter is smaller than the former, suggesting that LOEs with a smaller technology gap is less negatively affected by FES. It demonstrates that a small technology gap can help eliminate the negative competition effect from foreign expansion. This is broadly consistent with the technology accumulation hypothesis (Cantwell, 1989).

Table 3 presents results for the moderating effects of a large, small, and medium technology gap. Columns (1), (2), and (3) present results of the moderating effects of different levels of technology gaps. We find that the moderating effect of technology gap mainly exist for LOEs with a large technology gap but not for LOEs with a medium or small technology gap, supporting hypothesis H7c and rejecting H7b, d. The finding of varied moderating effects of technology gap suggests that some moderators of spillovers do not moderate the main effect linearly and universally but rather the moderating effects depend on which part of the observations we are looking at. The results of previous studies that found evidence for both the catch-up and accumulation hypotheses may be due to the misunderstanding of the true form of the moderating effect technology gap.

In column (1), the coefficient for $GAP_{it}^{(L)} \times FEspeedK_{it}^{(A)}$ has a negative but small value and is significant at the 1% level. It demonstrates that a relatively small technology gap helps LOEs that are

in general very much lagged behind of FOEs to eliminate negative impact of foreign competition. By contrast, the coefficients for $GAP_{it}^{(S)} \times FEspeedK_{it}^{(A)}$ (column (2)) and $GAP_{it}^{(M)} \times FEspeedK_{it}^{(A)}$ (column (3)) are insignificant, suggesting that a small technology gap doe not help LOEs that are not very much lagged behind of FOEs. F-statistics confirm the finding and support the addition of integration term in column (1), where the adjusted R^2 is significantly improved by 1.4%. One explanation for the finding could be that LOEs that are not lagged very much behind from FOEs (columns (2) and (3)) are more likely to operate in a similar medium to high end market segment as those of foreign entrants and thus are directly exposed to foreign competition. LOEs with a large technology gap (column (1)) tend to operate in on a lower end market and face relatively less direct foreign competition because of the relative less intensity of the foreign entry. Furthermore, those lagged LOEs may benefit from the increasing foreign presence if they possess some level of absorptive capacity (i.e., the moderating effect) to assimilate the knowledge diffused from foreign practices.

Columns (4-7) presents results of moderating effect of large and small gaps on the impacts from rapid and moderate FES respectively. Among the four interaction terms, the only significant coefficient is $GAP_{it}^{(L)} \times FEspeedK_{it}^{(M)}$, which has a negative but small value and is significant at 1% level, rejecting hypothesis H7e,f. The finding shows that a small technology gap is only helpful for LOEs that are very much lagged behind of FOEs and are facing a moderate FES in the industry. The observation of the difference in the moderating effects of varied technology gaps on the effect of varied FES suggests that the role of a spillovers moderator may differ in many cases depending on how the spillovers are measured, how the different types of spillovers are distinguished, and how the moderator itself is defined.

Broadly speaking, our results support the catch-up hypothesis (e.g., Findlay, 1978) by finding evidence that only lagged LOEs will be able to eliminate negative competition effect with the help of improved absorptive capacity (narrowed technology gap). Our results also support the technology accumulation hypothesis (e.g., Cantwell, 1989) by finding evidence that improved absorptive capacity

(narrowed technology gap) does partly shelter LOEs from negative impact from FES. More importantly, our results show that technology gap does not linearly moderate the impact from FES, and the outcome of the moderating effect depends on the level of the moderator itself (large, medium, or small technology gap) and the level of the main effect (rapid or moderate FES).

Throughout the estimations, the control variables including capital ($log(K_{it})$), labour ($log(L_{it})$, management (MGT_{it}) are all significant at the 1% level with the expected sign, consistent with the theoretical prediction from a production function and the expectation that management input is positively associated with a firm's performance (Liu & Wei, 2006; Wang & Yu, 2007).

5 Conclusion and discussion

Using a firm level data of Chinese locally-owned manufacturing enterprises (LOEs) for the period 2001-2003, this study examines the relationship between the performance of individual LOE and the entry speed of FOEs in the industry where an LOE operates. On the direct effect of FES, four main findings follow.

First, this study finds evidence for significant impact from the entry speed of FOEs on the performance of LOEs in China, supporting the existence of an association between the entry speed of FOEs and the performance of LOEs. It sheds light on the importance of using nonlinear specification in the analysis of FDI spillover effects, offering support to the studies such as Wang, Clegg, & Buckley (2007) in the search of alternative specifications for the spillover effects taking account of a dynamic interacting process between FOEs and LOEs. Second, throughout the estimations, the impact of FES was negative. The finding is consistent with previous studies which found negative competition effects from inward FDI (e.g., Buckley, Clegg, & Wang, 2007; Caves, 1971; Harrison, 1996). Third, our findings further show that the negative competition effects are more prevalent in industries where the FES is moderate rather than rapid. The finding shows that the impact of FES can vary depending on the characteristics of the FES. We reason that the absence of the impact observed from rapid FES in particular may be a result of the co-existence of positive demonstration effect and negative competition effect arising from it.

On the moderating roles of location, ownership, and technology gap, we found evidence of significant moderating effects from location and technology gap, but not from ownership. LOEs located in eastern coastal China received more negative impact from FES in general. The finding is consistent with previous study suggesting the influence of regional differences on spillovers. The finding highlights the intense and negative competition effects existing in the coastal China where there is a high concentration of the inward FDI. LOEs with absorptive capacity (a narrowed technology gap) helped to eliminate partly the negative impact from FES. The evidence is broadly in consistency with previous studies suggesting the moderating role of technology gap (e.g., Liu, et al., 2000). Furthermore, our results show that such moderating effect is specific for LOEs that are very much lagged behind of FOEs in the industry, and that operate in industries with a moderate FES. Our results thus suggest that technology gap does not linearly moderate the impact from FES, and the outcome of the moderating effect depends on the level of the moderator itself (large, medium, or small technology gap) and the level of the main effect (rapid or moderate FES).

The policy implication from our findings is fairly straightforward. As our evidence shows the negative effect from FES, it draws the attention policymakers in recognising that (1) FES has considerable impact on the performance of LOEs and (2) such impact is largely negative, different from the widely believed benefit arising from the (level of) foreign presence. While many host country governments assume that the presence of inward FDI will generate positive spillovers and hence expect the larger amount of inward FDI the better for the host economy, our result imply that industrial policies on promoting FDI should reconsider whether the flocking-in of inward FDI will be any beneficial to LOEs or not at all. The relation between the growth of inward FDI and the performance of LOEs requires careful examination in the future. Such impacts are not uniform across industries and firms, as our results show that the negative impact does not occur in every industry but in industries where the FES is moderate. The varied outcomes caution policymakers in assessing the impact of policies that promote FDI into various industries.

In addition, our finding of moderating effect of LOEs' location on the impact of FES question the potential benefits of further attracting inward FDI into eastern coastal China where LOEs are

particularly badly affected by FES within an industry. This offers support to China's 'go west' policy which encouraging foreign investors to explore business opportunities and so that the inward FDI will generate positive spillovers to help inland LOEs to catch-up. Our finding of moderating effect of technology gap specific to certain LOEs in certain industries suggests that policies considering the moderators which can assist to maximise the benefit of FDI should not overlook the nonlinear moderating effect. In other words, these moderating effects may be present at certain level depending on various characteristics of the direct effect and the moderator itself. Thus policy effort can be well justified to invest in the most critical factors which can maximise benefit from FDI.

Figure 1 The main research framework

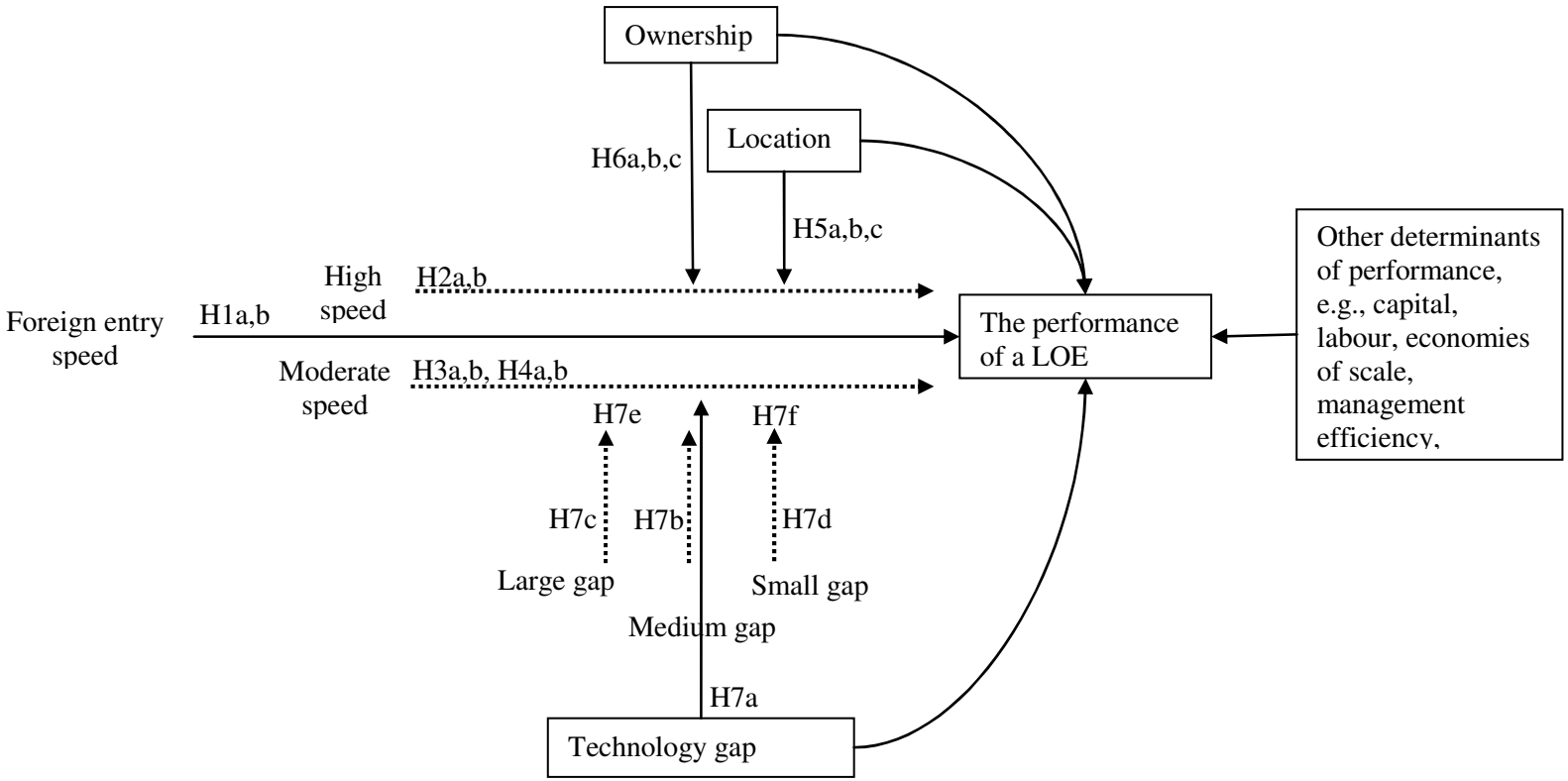
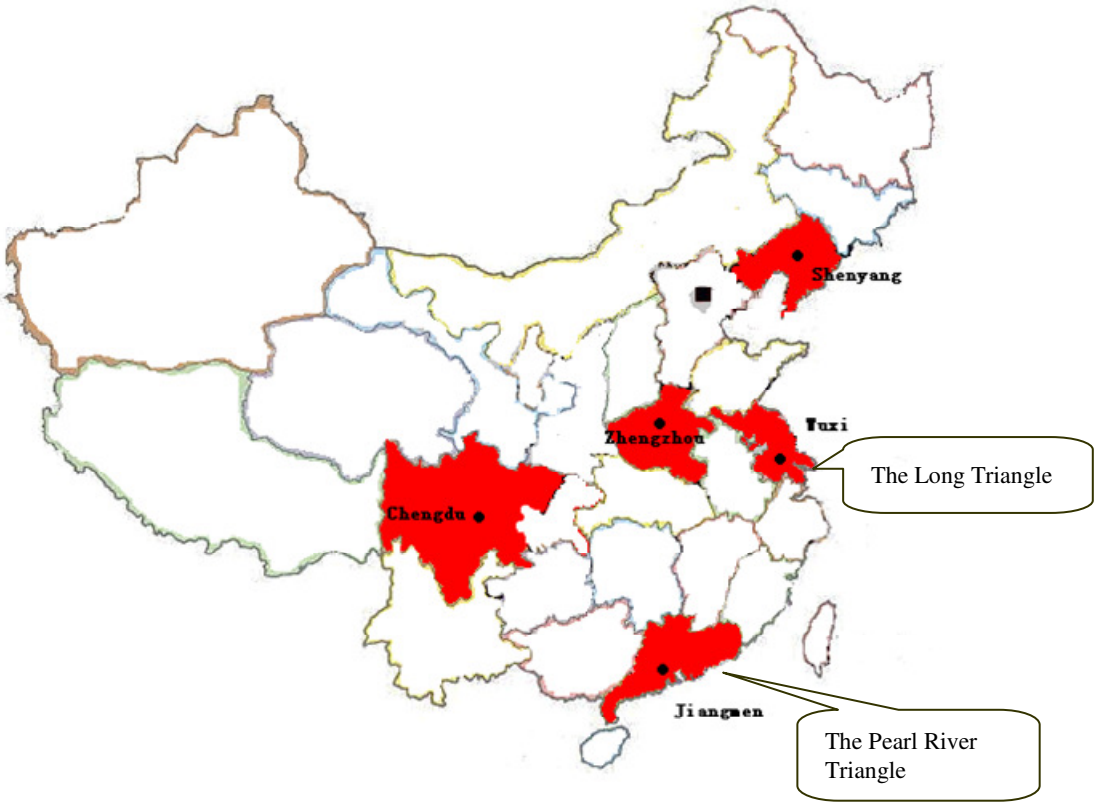


Figure 2 The geographical distribution of sampled LOEs



Note: The map is produced by the author based on the map of China published by State Bureau of Surveying and Mapping. The current map does not indicate the full territory of China and only the area of mainland is displayed for convenience of illustration.

Table 1 Descriptive statistics and correlation matrix of all variables

		Mean	Std. Dev.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	$log(K_{it})$	8.68	1.86	0.71	0.46	0.47	-0.17	0.45	0.10	-0.06	0.11	-0.05	0.03	0.01	0.08	0.01	0.03	0.00	0.05	-0.03		
2	$log(L_{it})$	5.25	1.22		0.47	0.50	-0.06	0.40	-0.05	0.05	-0.05	0.01	0.02	0.02	0.09	-0.01	0.05	-0.01	0.06	-0.05		
3	$SIZE_{it}$	1.01	3.82			0.63	-0.01	0.24	0.04	-0.01	0.06	-0.05	0.00	-0.05	0.07	-0.01	-0.04	-0.01	0.04	-0.05		
4	MGT_{it}	1.06	3.50				-0.03	0.24	0.01	-0.01	0.03	-0.02	0.05	0.04	0.10	0.01	0.04	0.02	0.07	-0.02		
5	$Location_{it}$	0.40	0.49					-0.16	0.06	-0.16	0.06	0.09	-0.02	-0.09	-0.10	-0.03	-0.17	-0.07	0.00	-0.03		
6	$Ownership_{it}$	0.28	0.45						-0.01	0.08	-0.04	-0.04	0.01	0.03	0.06	0.01	0.07	0.00	0.03	-0.03		
7	$GAP_{it}^{(A)}$	0	1.67							-0.33	0.59	-0.23	-0.01	-0.03	-0.04	-0.03	-0.08	-0.03	0.00	-0.01		
8	$GAP_{it}^{(L)}$	0	44.84								-0.33	-0.58	0.04	0.06	0.13	0.02	0.08	0.07	0.05	-0.01		
9	$GAP_{it}^{(S)}$	0	2.41									-0.57	0.00	-0.06	-0.05	-0.04	-0.15	-0.04	-0.01	0.02		
10	$GAP_{it}^{(M)}$	0	1.22										-0.03	0.00	-0.07	0.02	0.06	-0.02	-0.03	-0.01		
11	$FEspeedK_{it}^{(A)}$	0	1.75											0.38	0.02	0.07	-0.04	0.12	0.77	0.52		
12	$FEspeedL_{it}^{(A)}$	0	0.51												0.13	0.13	0.59	0.15	0.42	0.03		
13	$FEspeedSales_{it}^{(A)}$	0	5.44													-0.01	0.15	-0.01	0.07	-0.07		
14	$FEspeedVad_{it}^{(A)}$	0	3.95														0.12	0.07	0.13	-0.06		
15	$FEspeedN_{it}^{(A)}$	0	0.86															0.06	0.11	-0.21		
16	$FEspeedO_{it}^{(A)}$	0	3.93																0.14	0.00		
17	$FEspeedK_{it}^{(H)}$	0.20	1.34																	-0.15		
18	$FEspeedK_{it}^{(M)}$	-0.20	1.09																			
19	$log(SALES_{it})$	10.17	1.53																			0.64
20	$log(VAD_{it})$	8.56	2.42																			

Table 2 The main effects and the moderating effects of location, ownership, and technology gap

Dependent variable: $log(SALES_{it})$	Hypotheses	(1)	(2)	(3)	(4)	(5)	(6)
C		4.791 (45.12)***	4.419 (40.76)***	4.415 (40.70)***	4.422 (40.77)***	4.417 (40.73)***	4.423 (40.75)***
$log(K_{it})$		0.223 (13.80)***	0.188 (9.63)***	0.188 (9.60)***	0.188 (9.59)***	0.189 (9.64)***	0.188 (9.80)***
$log(L_{it})$		0.647 (26.38)***	0.739 (26.63)***	0.740 (26.60)***	0.740 (26.69)***	0.739 (26.62)***	0.740 (27.17)***
MGT_{it}		0.045 (5.08)***	0.043 (6.62)***	0.043 (6.62)***	0.043 (6.59)***	0.043 (6.63)***	0.044 (6.65)***
$Location_{it}$			0.202 (5.92)***	0.202 (5.91)***	0.201 (5.88)***	0.202 (5.92)***	0.201 (5.89)***
$Ownership_{it}$			0.217 (6.23)***	0.217 (6.21)***	0.217 (6.22)***	0.217 (6.23)***	0.215 (6.14)***
$GAP_{it}^{(A)}$			0.265 (8.14)***	0.265 (8.12)***	0.265 (8.14)***	0.265 (8.13)***	0.268 (8.52)***
$FEspeedK_{it}^{(A)}$	H1a, H1b		-0.016 (-1.86)*		-0.005 (-0.50)	-0.021 (-1.42)	-0.022 (-2.35)**
$FEspeedK_{it}^{(H)}$	H2a, H2b			-0.006 (-0.59)			
$FEspeedK_{it}^{(M)}$	H3a, H3b, H4a, H4b			-0.031 (-1.95)*			
$Location_{it} \times FEspeedK_{it}^{(A)}$	H5a,b,c				-0.043 (-2.13)**		
$Ownership_{it} \times FEspeedK_{it}^{(A)}$	H6a,b,c					0.009 (0.48)	
$GAP_{it}^{(A)} \times FEspeedK_{it}^{(A)}$	H7a						-0.020 (-1.90)*
Adjusted R^2		0.633	0.727	0.727	0.728	0.727	0.728
ΔR^2					0.001	0.001	0.001
F-statistic					4.181**	0.207	9.366***

Note: *, **, and *** denote significance at 10%, 5%, and 1% levels respectively. Figures in parentheses are t statistics. Foreign entry speed is measured by the growth of foreign capital share within the industry where LOEs operate.

Table 3 The moderating effects of large, small, and medium technology gaps

Dependent variable: $log(SALES_{it})$	Hypotheses	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C		4.442 (42.57)***	4.420 (40.71)***	4.418 (40.76)***	4.417 (40.66)***	4.426 (42.80)***	4.420 (40.68)***	4.418 (40.81)***
$log(K_{it})$		0.168 (11.34)***	0.188 (9.64)***	0.188 (9.63)***	0.189 (9.66)***	0.168 (11.41)***	0.189 (9.63)***	0.188 (9.64)***
$log(L_{it})$		0.769 (35.79)***	0.739 (26.63)***	0.739 (26.62)***	0.739 (26.64)***	0.772 (36.01)***	0.738 (26.64)***	0.739 (26.62)***
MGT_{it}		0.042 (6.86)***	0.043 (6.64)***	0.043 (6.61)***	0.043 (6.58)***	0.041 (6.92)***	0.044 (6.73)***	0.043 (6.63)***
$Location_{it}$		0.189 (5.67)***	0.202 (5.90)***	0.202 (5.92)***	0.203 (5.92)***	0.191 (5.71)***	0.202 (5.91)***	0.202 (5.93)***
$Ownership_{it}$		0.224 (6.47)***	0.216 (6.20)***	0.217 (6.23)***	0.217 (6.23)***	0.225 (6.50)***	0.216 (6.19)***	0.217 (6.23)***
$GAP_{it}^{(A)}$		0.311 (16.04)***	0.266 (8.13)***	0.265 (8.14)***	0.266 (8.13)***	0.317 (15.80)***	0.269 (7.82)***	0.266 (7.90)***
$FEspeedK_{it}^{(A)}$		-0.002 (-0.21)	-0.017 (-1.93)*	-0.017 (-1.91)*	-0.017 (-1.82)*	-0.013 (-1.55)	-0.021 (-2.24)**	-0.016 (-1.89)*
$GAP_{it}^{(L)} \times FEspeedK_{it}^{(A)}$	H7c	-0.007 (-5.25)***						
$GAP_{it}^{(S)} \times FEspeedK_{it}^{(A)}$	H7d		-0.004 (-0.78)					
$GAP_{it}^{(M)} \times FEspeedK_{it}^{(A)}$	H7b			-0.004 (-0.45)				
$GAP_{it}^{(L)} \times FEspeedK_{it}^{(H)}$	H7e				0.001 (0.49)			
$GAP_{it}^{(L)} \times FEspeedK_{it}^{(M)}$	H7e					-0.007 (-5.74)***		
$GAP_{it}^{(S)} \times FEspeedK_{it}^{(H)}$	H7f						-0.012 (-1.53)	
$GAP_{it}^{(S)} \times FEspeedK_{it}^{(M)}$	H7f							0.002 (0.19)
Adjusted R2		0.741	0.727	0.727	0.727	0.743	0.728	0.727
Δ R2		0.14	0.001	0.001	0.001	0.16	0.001	0.001
F-statistic		136.345***	0.999	0.196	0.145	154.206***	3.232*	0.084

Note: *, **, and *** denote significance at 10%, 5%, and 1% levels respectively. Figures in parentheses are t statistics. Foreign entry speed is measured by the growth of foreign capital share within the industry where LOEs operate.

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