THE ‘INSIDER’ AND ‘OUTSIDER’ EFFECTS OF FDI TECHNOLOGY SPILLOVERS: SOME EVIDENCE FROM CHINA

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ABSTRACT

The paper distinguishes between FDI as an ‘insider’ and FDI as an ‘outsider’ to domestic firms in an industry or domestic firms in a locality within a transition economy, and examines the difference between technology spillovers from insider FDI and technology spillovers from outsider FDI in China. The paper finds that FDI as an industrial insider as well as a regional insider tends to produce positive technology spillovers, whereas FDI as an industrial outsider as well as a regional outsider tends to produce negative technology spillovers. In particular, FDI located in the advanced coastal region tends to adversely affect the productivity of domestic firms located in the interior region no matter whether the domestic firms are located in the same industry as the FDI. The patterns of FDI technology spillovers help explain the radical change in industrial structure and the widening regional gap that China has been experiencing in recent decades.

JEL Classifications: M1, M2, O1 and O2
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INTRODUCTION

Starting from the late 1970s, centrally planned economies began to shift from de-linking to re-linking with the global market, and opened up to foreign direct investment (FDI) from market economies (Tian 1996). They therefore started, one after the other, the transition from a plan-based to a market-based economy. China has been by far the largest FDI recipient of inward FDI, and the most successful in economic performance among all transition economies. The apparent correlation between FDI inflows and economic growth triggered off a fascinating discussion on how FDI affects transition economies. While there was little dispute on the positive effect of FDI inflows on the national economy as a whole, there were profound disagreements over the impact of FDI on the productivity of domestic firms in transition economies. A central issue in the debate is whether and how FDI generates positive or negative technology spillovers to the domestic firms (Zhang, Li, Li & Zhou 2010; Li, Zhang & Lyles 2013; Zhang, Li & Li 2014).

The literature on FDI technology spillovers was very inclusive. Some scholars maintained that FDI generates positive technology spillovers to the domestic firms through competition, demonstration and employee training, while others pointed to negative FDI technology spillovers in the form of market stealing and skill stealing (Görg & Strobl 2001; Aitken & Harrison 1999). In line with the theoretical ambiguity, empirical research has produced mixed results about FDI technology spillovers. Some studies, particular the pioneering works by Globerman (1979), Blomstrom and Persson (1983), Blomstrom (1986), Blomstrom and Wolff (1994), and Kokko (1994, 1996), showed evidence of positive technology spillovers from FDI to domestic firms. Other studies, including Djankov and Hoekman (2000) and Kathuria (2000), found that FDI negatively affected the productivity of domestic firms. The same mixed results were found in empirical studies on FDI technology spillovers in China (Li, Liu & Parker 2001; Liu, Parker, Vaidya & Wei 2001; Buckley, Clegg & Wang 2002; Liu 2002; Hu & Jefferson 2002; Tian, Lin & Lo 2004; Tian 2007; Sun 2010; Lin, Lee & Yang 2011; Zhang, Li, Li & Zhou 2010; Wang, Wei, Liu, Wang & Lin 2014; Zhang, Li & Li 2014). The theoretical and empirical ambiguity seems to indicate that the effect of FDI technology spillovers is likely to be contingent on a variety of factors.
The present paper argues that one of the likely contingent factors is the distinction between FDI as an insider and FDI as an outsider to individual domestic firms. For instance, FDI in industry A is considered as insider FDI by domestic firms in industry A, but outsider FDI by domestic firms in industry B. Similarly, FDI in location X is considered as insider FDI by domestic firms in location X, but outsider FDI by domestic firms in location Y. Failing to make this distinction, most extant studies have largely focused on intra-industry FDI technology spillovers, and ignored inter-industry FDI technology spillovers and thus the technology spillovers from *industrial outsider FDI*. Similarly, extant studies have largely focused on national level FDI technology spillovers, and neglected cross-region FDI technology spillovers within a nation and thus the difference in technology spillovers between *regional insider FDI* and *regional outsider FDI*.

To fill this research gap, the present paper distinguishes industrial outsider FDI technology spillovers from industrial insider FDI technology spillovers on the one hand, and regional outsider FDI technology spillovers from regional insider FDI technology spillovers on the other. The paper explains why the distinction between insider FDI and outsider FDI is important to a transition economy like China. Using firm-level data of National Industrial Enterprise Survey collected from China, the study empirically tests hypotheses about technology spillovers from insider FDI and outsider FDI. The study finds that FDI as an industrial insider as well as a regional insider tends to produce positive technology spillovers to domestic firms, whereas FDI as an industrial outsider as well as a regional outsider tends to produce negative technology spillovers to domestic firms. FDI located in the advanced growth pole in the coast region tends to adversely affect the productivity of domestic firms located in the backward periphery in the inland region no matter whether the domestic firms are located in the same industry as the FDI. The findings unveil some important patterns of FDI technology spillovers in a transition economy like China, and help explain the radical change in industrial structure and the widening regional gap in China in the transition process.

In what follows, we first review the literature and develop hypotheses about the effect of technology spillovers from insider FDI and outsider FDI in section 2. In section 3, we introduce the methodology and data we use in empirical tests. In section 4, we interpret the results. In section 5, we discuss the findings and conclude the paper.

**THEORETICAL ANALYSIS AND HYPOTHESES**

FDI technology spillovers are a type of externalities. FDI technology spillovers occur when the presence of FDI affects the productivity of domestic firms, the full value of which cannot be internalized by FDI (Blomström, Kokko & Zejan 2000). Positive FDI technology spillovers arise when the presence of FDI helps improve the productivity of domestic firms whereas negative FDI technology spillovers happen when the presence of FDI reduces the productivity of domestic firms. Positive FDI technology spillovers may take place in three ways. First, competition from foreign invested enterprises (FIEs) forces domestic firms to reform management styles and update production technology in order to increase their competitive capabilities. Secondly, domestic firms are exposed to the products, production technology and management know-how of the FIEs with which they have an upstream or downstream linkage, and can learn by observing the intangibles demonstrated by the FIEs. Thirdly, FIEs train their employees who may later move to domestic firms with learnt skills (Eden, Levitas & Martinez, 1997; Aitken & Harrison 1999; Blomström, Kokko & Zejan 2000; Görg & Strobl 2001). Negative FDI technology spillovers may take place in two ways. The first is market stealing. That is, FIEs draw away demand from domestic firms, and force them to cut down production. Domestic firms thus suffer from a productivity decline since they have to spread the fixed cost over a smaller amount of products (Aitken & Harrison 1999). The second is skill stealing. That is, FIEs attract away the best workers from domestic firms, leaving them with less skilled employees. This causes a decline in productivity in domestic firms (Girma, Greerway & Wakelin 2001). The positive and negative FDI technology spillovers may offset one another, and the net effect of FDI technology spillovers is a result of the balancing out of the opposite spillovers forces.

There is a good reason to argue that technology spillovers produced by FDI as an industrial and/or regional insider tend to be positive. Aitken and Harrison (1999: 612) noted that the benefits from FDI may be received ‘first by neighboring domestic firms, and perhaps gradually spread to other, more distant domestic firms’. The proximity advantage exists at both the industrial and regional levels. Domestic firms directly located in the same industry or the same location as FIEs have closer interactions with these FIEs than domestic firms located in other industries and other locations, and therefore may benefit more from the positive competition, demonstration, and employment training effects of positive technology spillovers from FDI. For domestic firms located in the same industry and/or the same location as FIEs, therefore, the positive FDI technology spillovers may be strong enough to offset the negative market stealing and skill stealing effects. We therefore propose hypotheses 1 and 2 about the effect of technology spillovers from FDI as an industrial insider and/or a regional insider in general.

*Hypothesis 1.* FDI is likely to positively affect the productivity of domestic firms located in the same industrial sector.
Hypothesis 2. FDI is likely to positively affect the productivity of domestic firms located in the same industrial sector in the same region.

In contrast, technology spillovers produced by FDI as an industrial outsider and/or regional outsider tend to be negative. As an industrial outsider, FDI may generate particularly strong market stealing and skill stealing effects. The cross-industry market stealing could occur, for instance, when FIEs affect consumer preference directly through the goods or services they produce. Before the entry of FIEs, let’s assume, a consumer in the host country may have a consumption bundle (a1, a2), with a1 being TV and a2 being all the other goods. If FIEs enter the TV sector and produce cheap and quality TV sets, the consumer may feel a TV set is more attractive and begin to save to buy it. The amount of income that is spent on other goods decreases. In this case, the consumer’s preference changes and the consumer now has a new consumption bundle (b1, b2), with b1 (TV) consuming a larger portion of her/his budget than before. Obviously, an inter-industry market stealing occur when domestic firms outside the TV industry suffer from a decrease in the demand for their products and services and, therefore, a reduction in productivity owing to the change in consumer preference caused by the entry of FIEs in the TV industry. Arguably, the cross-industry market stealing is especially evident in transition economies where domestic firms were primarily located in industries producing out-of-date goods as compared with their counterparts in advanced countries before these economies were opened up to FDI.

Similarly, the cross-industry skill stealing could occur when MNC affiliates draw away skilled workers from domestic firms in other industrial sectors. This cross-industry skill stealing could be particularly strong in transition economies where FIEs normally pay their employees a much higher level of salary than domestic firms, and where working skills are generally poorer and less industry-specific than those in technologically advanced countries. Even in the case of workers with more industry-specific skills, the low level of salary in domestic firms makes it very attractive for them to give up the industry-specific skills and learn new skills in FIEs in other industrial sectors.

As a regional outsider, FDI may generate particularly strong market stealing and skill stealing effects. Cross-region market stealing could occur when the goods and services produced by FIEs located in one region displace those produced by domestic firms located in another region, leading to a decrease in demand for the goods and services produced by domestic firms in the other region. As a result of the effect of market stealing, domestic firms in the other region would suffer from a decrease in productivity as they now have to spread the fixed cost to a smaller amount of products. Cross-region skill stealing could occur when FIEs located in one region attract educated and skilled workers away from domestic firms located in another region, and thus adversely affect the productivity of domestic firms located in the other region. We therefore propose hypotheses 3 and 4 about the effect of technology spillovers from FDI as an industrial outsider and/or a regional outsider in general.

Hypothesis 3. FDI is likely to negatively affect the productivity of domestic firms located in another industrial sector.

Hypothesis 4. FDI is likely to negatively affect the productivity of domestic firms located in another industrial sector in another region.

Arguably, the cross-region market stealing and skill stealing effects are particularly evident in a transition economy like China due to the economic and productivity gap between the advanced growth pole in the coast region and the underdeveloped periphery in the inland region, and the concentration of FIEs in the coast growth pole. To begin with, domestic firms in the backward periphery in the inland region normally have a much lower level of productivity than their counterparts in the advanced growth pole in the coast region, and are vulnerable to the adverse effect of market stealing because the low quality of their products and the high costs of their production make it very hard for them to compete with FIEs in the growth pole in the coast region no matter whether or not they are located in the same industrial sector as FIEs.

Moreover, owing to large differentials in productivity, infrastructure and living standards between the advanced growth pole in the coast region and the backward periphery in the west inland region, domestic firms in the backward periphery in the inland region are particularly vulnerable to the adverse effect of skill stealing because it is very easy for FIEs in the advanced growth pole in the coast region to attract skilled workers away from domestic firms in the backward periphery in the inland region no matter whether or not they are located in the same industrial sector as the FIEs. There is a popular saying in China, ‘peacocks are flying to the southeast’, to describe how talents are attracted away from the backward periphery in the inland region to the advanced growth pole in the coast region where the majority of China’s FDI is located. On balance, therefore, we would expect a negative effect of technology spillovers from FDI located in the advanced growth pole in the coast region on domestic firms in the backward periphery in the inland region regardless of whether or not these domestic firms are located in the same industrial sector as the FDI. We therefore propose hypothesis 5 about the technology spillovers from FDI located in the coast region to domestic firms located in the inland region in particular.
Hypothesis 5. FDI located in the coast region is likely to negatively affect the productivity of domestic firms located in the inland region no matter whether or not they are located in the same industrial sector as the FDI.

EMPIRICAL MODEL, VARIABLES AND DATA

In the empirical estimation, we first followed Aitken and Harrison (1999) to develop a conventional empirical model of FDI productivity spillovers at the national level using basic log-linear production functions in the form:

\[ Y_{ijr} = C + \beta_1 FDI_{industrialinsider} + \beta_2 X_{ijr} + \epsilon_{ijr} \]  

where log output \( Y \) for firm \( i \) in sector \( j \) and region \( r \) at time \( t \) was a function of a vector of inputs \( (X) \) and foreign presence in an industrial sector (\( FDI_{industrialinsider} \)) that captured the effect of industrial insider FDI technology spillovers. The vector of inputs, \( X \), included two variables: the log of capital input \( (K) \) and the log of labour input \( (L) \). \( C \) represented the constant. In order to capture the effect of technology spillovers of FDI as industrial insider, industrial outsider, regional insider, and regional outsider, we expanded the model to include five additional variables. \( FDI_{industrialinsider} \) & \( \text{regional insider} \) represented foreign presence in the industrial sector in the region where a domestic firm is located. \( FDI_{industrialinsider} \) & \( \text{regional outsider} \) represented foreign presence in the industrial sector outside the region where a domestic firm is located. \( FDI_{industrialoutsider} \) represented foreign presence outside the industrial sector where a domestic firm located. \( FDI_{industrialoutsider} \) & \( \text{regional insider} \) represented foreign presence outside the industrial sector in the region where a domestic firm is located. \( FDI_{industrialoutsider} \) & \( \text{regional outsider} \) represented foreign presence outside the industrial sector and outside the region where a domestic firm is located. Therefore, the empirical model to be estimated in the form:

\[ Y_{ijr} = C + \beta_1 FDI_{industrialinsider} + \beta_2 FDI_{industrialinsider} & \text{regionalinsider} + \beta_3 FDI_{industrialoutsider} \]  

\[ + \beta_4 FDI_{industrialoutsider} & \text{regionaloutsider} + \beta_5 FDI_{industrialoutsider} & \text{regionalinsider} \]  

\[ + \beta_6 FDI_{industrialoutsider} & \text{regionaloutsider} + \beta_7 X_{ijr} + \epsilon_{ijr} \]  

where \( \beta_1 \) indicated the effect of industrial insider FDI technology spillovers at the national level. \( \beta_2 \) indicated the effect of industrial insider and regional insider FDI technology spillovers. \( \beta_3 \) represented the effect of industrial outsider and regional insider FDI technology spillovers. \( \beta_4 \) represented the effect of industrial outsider and regional outsider FDI technology spillovers. \( \beta_5 \) represented the effect of industrial outsider and regional insider FDI technology spillovers.

We then moved a step further to estimate an altered version of equation 2 for the inland region sample in the form:

\[ Y_{ijr} = C + \beta_1 FDI_{industrialinsider} & \text{inlandinsider} + \beta_2 FDI_{industrialinsider} & \text{inlandoutsider} \]  

\[ + \beta_3 FDI_{industrialoutsider} & \text{inlandoutsider} & \text{inlandinsider} \]  

\[ + \beta_4 FDI_{industrialoutsider} & \text{inlandoutsider} + \beta_5 X_{ijr} + \epsilon_{ijr} \]  

where \( FDI_{industrialinsider} & \text{inlandinsider} \) represented foreign presence in the industrial sector in the inland region where a domestic firm is located. \( FDI_{industrialinsider} & \text{inlandoutsider} \) represented foreign presence in the industrial sector outside the inland region where a domestic firm is located (i.e. the coast region). \( FDI_{industrialoutsider} & \text{inlandinsider} \) represented foreign presence outside the industrial sector in the inland region where a domestic firm is located. \( FDI_{industrialoutsider} & \text{inlandoutsider} \) represented foreign presence outside the industrial sector outside the inland region where a domestic firm is located (i.e., the coast region). Therefore, \( \beta_1 \) indicated the effect of technology spillovers of industrial insider and regional insider FDI in the inland region. \( \beta_2 \) indicated the effect of technology spillovers of industrial outsider and regional insider FDI in the inland region. \( \beta_3 \) represented the effect of technology spillovers of industrial outsider and regional outsider FDI in the inland region. \( \beta_4 \) represented the effect of technology spillovers of industrial outsider and regional outsider FDI in the inland region. The specifications allowed us to examine the effect of technology spillovers from FDI in the growth pole in the coast region on domestic firms in the backward periphery in the inland region.

Similarly, we further estimated an altered version of equation 2 for the coast region sample in the form:

\[ Y_{ijr} = C + \beta_1 FDI_{industrialinsider} & \text{coastinsider} + \beta_2 FDI_{industrialinsider} & \text{coastoutsider} \]  

\[ + \beta_3 FDI_{industrialinsider} & \text{coastoutsider} + \beta_4 X_{ijr} + \epsilon_{ijr} \]
+β_{FDI_{industrialoutsider}}X_{ijr}+β_{FDI_{industrialoutsider}coastinsider}X_{ijr}+ε_{ijr}

where $F_{D\text{I}_{\text{industrialinsider}coastinsider}}$ represented foreign presence in the industrial sector in the coast region where a domestic firm is located. $F_{D\text{I}_{\text{industrialinsider}coastinsider}}$ represented foreign presence in the industrial sector outside the coast region where a domestic firm is located (i.e. the inland region). $F_{D\text{I}_{\text{industrialoutsider}coastinsider}}$ represented foreign presence outside the industrial sector in the coast region where a domestic firm is located. $F_{D\text{I}_{\text{industrialoutsider}coastinsider}}$ represented foreign presence outside the industrial sector outside the coast region where a domestic firm is located (i.e., the inland region). Therefore, $β_1$ indicated the effect of technology spillovers of industrial insider and regional insider FDI in the coast region. $β_2$ indicated the effect of technology spillovers of industrial insider and regional outsider FDI in the coast region. $β_3$.represented the effect of technology spillovers of industrial outsider and regional insider FDI in the coast region. $β_4$.represented the effect of technology spillovers of industrial outsider and regional outsider FDI in the coast region. The specifications allowed us to examine the effect of technology spillovers from FDI in the backward periphery in the inland region on domestic firms in the advanced growth pole in the coast region.

The data were obtained from the National Industrial Enterprise Survey compiled by China National Bureau of Statistics (CNBS) for the period from 1996 to 1999. This was a period when China accelerated economic reform and opening-up to FDI, and thus a period that reflected the reality of China’s transition process. The sample included 11324 firms in each year, of which 1166 are foreign invested enterprises. The data of the 1166 FIEs were used to produce variables representing foreign presence. As the focus of the study was on the spillover effect of FDI on domestic firms, the 1166 FIEs were included in the sample for regression analysis. Consequently, the sample included 1158 domestic firms only in each year. A number of observations were deleted because of missing information about the firm’s output, capital or employment. The reduced sample became a unbalanced panel dataset, including 36220 domestic firm observations for the four year period. For comparison purposes, we broke the sample into two sub-samples for the inland region and the coast region, respectively. Sample 1 for the coast region included 26060 domestic firm observations, and sample 2 for the inland region included 10160 domestic firm observations.

The data contain detailed information about firm-level output and input. We used the value added for output ($Y$), the capital stock for capital input ($K$) and the number of employment for labour input ($L$), respectively. The value added was deflated on the basis of the 1990 constant price. Furthermore, following Aitken and Harrison (1999), we deflated the capital stock by the GDP deflator. We used the foreign share in capital to proxy for foreign presence. We also used the foreign share in output and foreign share in employment, respectively, as alternative measures of foreign presence in robustness tests. The Chinese official industry classification was different from the international standard, and we reclassified all the firms in our samples into four-digit industrial sectors according to International Standard Industry Classification (ISIC). Summary statistics of major variables are reported in Table 1.

<table>
<thead>
<tr>
<th>Name of variables</th>
<th>Observation</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Y</td>
<td>36220</td>
<td>9.46</td>
<td>1.47</td>
<td>2.20</td>
<td>16.52</td>
</tr>
<tr>
<td>Log K</td>
<td>36220</td>
<td>11.12</td>
<td>1.17</td>
<td>2.87</td>
<td>17.73</td>
</tr>
<tr>
<td>FDI_{industrial insider}</td>
<td>36220</td>
<td>6.89</td>
<td>1.02</td>
<td>1.95</td>
<td>12.24</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; regional insider</td>
<td>36220</td>
<td>0.12</td>
<td>0.11</td>
<td>0</td>
<td>0.95</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; regional outsider</td>
<td>36220</td>
<td>0.11</td>
<td>0.09</td>
<td>0</td>
<td>0.88</td>
</tr>
<tr>
<td>FDI_{industrial outsider}</td>
<td>36220</td>
<td>0.11</td>
<td>0.10</td>
<td>0</td>
<td>0.89</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; regional outsider</td>
<td>36220</td>
<td>0.12</td>
<td>0.11</td>
<td>0</td>
<td>0.90</td>
</tr>
<tr>
<td>FDI_{industrial outsider} &amp; regional outsider</td>
<td>36220</td>
<td>0.11</td>
<td>0.08</td>
<td>0</td>
<td>0.91</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; inland insider</td>
<td>10160</td>
<td>0.10</td>
<td>0.09</td>
<td>0</td>
<td>0.87</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; inland outsider</td>
<td>10160</td>
<td>0.15</td>
<td>0.13</td>
<td>0</td>
<td>0.95</td>
</tr>
<tr>
<td>FDI_{industrial outsider} &amp; inland insider</td>
<td>10160</td>
<td>0.09</td>
<td>0.07</td>
<td>0</td>
<td>0.86</td>
</tr>
<tr>
<td>FDI_{industrial outsider} &amp; inland outsider</td>
<td>10160</td>
<td>0.14</td>
<td>0.11</td>
<td>0</td>
<td>0.87</td>
</tr>
<tr>
<td>FDI_{industrial insider} &amp; coast insider</td>
<td>26060</td>
<td>0.14</td>
<td>0.10</td>
<td>0</td>
<td>0.84</td>
</tr>
<tr>
<td>FDI_{industrial insider} in coast outsider</td>
<td>26060</td>
<td>0.10</td>
<td>0.08</td>
<td>0</td>
<td>0.83</td>
</tr>
<tr>
<td>FDI_{industrial outsider} &amp; coast insider</td>
<td>26060</td>
<td>0.15</td>
<td>0.12</td>
<td>0</td>
<td>0.91</td>
</tr>
<tr>
<td>FDI_{industrial outsider} &amp; coast outsider</td>
<td>26060</td>
<td>0.09</td>
<td>0.07</td>
<td>0</td>
<td>0.85</td>
</tr>
</tbody>
</table>
As the sample was an unbalanced panel dataset, we employed the ordinary least squares (OLS) approach in the empirical estimation with White’s correction for heteroscedasticity. Before running the regression, we needed to consider some econometric issues. The first issue was related to possible omission of unobserved variables, such as firm-specific, industry-specific and time-specific factors that were unknown to the econometrician but known to the firm. These factors may affect the estimated coefficient of FDI technology spillovers. To address the problem, we followed Haskel, Preira and Slaughter (2002) to use first differencing as well as industry dummies and year dummies in the regression. The second issue was related to possible endogeneity of the explanatory variables. The decision on production, capital and labour inputs was, for instance, likely to be made on the basis of productivity. If this were the case, the estimated coefficient of FDI technology spillovers could be biased. To address the problem, we used the lagged value of all the explanatory variables that are suspected of being endogenous in the regression.

**REGRESSION RESULTS**

The regression results are reported in Table 2. We began with an estimation of equation 2. As shown in column 1, the coefficient of industrial insider FDI was positive and statistically significant (β = 0.58, p < 0.05), indicating that FDI presence had a positive impact on the productivity of domestic firms located in the same industrial sector. The results supported hypothesis 1. The coefficient of industrial insider & regional insider FDI was positive and statistically significant (β = 0.97, p < 0.01), indicating that FDI presence had a positive impact on the productivity of domestic firms located in the same industrial sector in the same region. The results supported hypothesis 2. The coefficient of industrial insider & regional outsider FDI was positive though statistically insignificant, indicating that FDI presence had no significant impact on the productivity of domestic firms located in the same industrial sector outside the region. The coefficient of industrial outsider FDI was negative and statistically significant (β = -0.43, p < 0.01), indicating that FDI presence had a negative impact on the productivity of domestic firms located in another industrial sector. The results supported hypothesis 3. The coefficient of industrial outsider & regional insider FDI was negative through statistically insignificant, indicating that FDI presence had no significant impact on the productivity of domestic firms located in another industrial sector within the region. The coefficient of industrial outsider and regional outsider FDI was negative and statistically significant (β = -0.89, p < 0.01), indicating that FDI presence had a negative impact on the productivity of domestic firms located in another industrial sector in another region. The results supported hypothesis 4.

**TABLE 2 INSIDER AND OUTSIDER EFFECTS OF FDI TECHNOLOGY SPILLOVERS**

(DEPENDENT VARIABLE: LOG OF OUTPUT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>National Sample</th>
<th>Interior Region Sample</th>
<th>Coast Region Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.89 (1.41)</td>
<td>0.81 (1.32)</td>
<td>0.98 (1.62)</td>
</tr>
<tr>
<td>K</td>
<td>0.75 (84.22)***</td>
<td>0.73 (81.3)***</td>
<td>0.79 (86.45)***</td>
</tr>
<tr>
<td>L</td>
<td>0.27 (34.38)</td>
<td>0.31 (36.23)</td>
<td>0.26 (33.25)</td>
</tr>
<tr>
<td>FDI_industrial insider</td>
<td>0.58 (2.08)**</td>
<td>0.97 (2.53)***</td>
<td></td>
</tr>
<tr>
<td>FDI_industrial insider &amp; regional insider</td>
<td>0.52 (1.45)</td>
<td>-0.26 (1.56)</td>
<td></td>
</tr>
<tr>
<td>FDI_industrial outsider</td>
<td>-0.43 (-3.15)***</td>
<td>-0.89 (4.26)***</td>
<td></td>
</tr>
<tr>
<td>FDI_industrial insider &amp; regional insider</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI_industrial outsider &amp; regional outsider</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI_industrial insider &amp; inland insider</td>
<td>0.39 (2.15)**</td>
<td>-0.67 (-2.45)***</td>
<td>0.41</td>
</tr>
<tr>
<td>FDI_industrial insider &amp; inland outsider</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
We then estimated equation 3 for the inland region sample. The coefficient of industrial insider & inland insider FDI was positive and statistically significant (β = 0.39, p < 0.05), indicating that foreign presence positively affected the productivity of domestic firms in the same industrial sector in the inland region. The results further supported hypothesis 2. The coefficient of industrial insider and inland outsider FDI was negative and statistically significant (β = 0.67, p < 0.01), indicating that foreign presence in the coast region negatively affected the productivity of domestic firms located in the same industrial sector in the inland region. The results supported hypothesis 5. The coefficient of industrial outsider and inland insider FDI was positive though statistically insignificant, indicating that foreign presence had no significant impact on the productivity of domestic firms in another industrial sector in the inland region. The coefficient of industrial outsider and coast outsider FDI was negative and statistically significant (β = -0.94, p < 0.01), indicating that foreign presence in the coast region negatively affected the productivity of domestic firms in another industrial sector in the inland region. The results further backed up hypothesis 5.

Finally, we estimated equation 4 for the coast region sample. The coefficient of industrial insider & coast insider FDI was positive and statistically significant (β = 0.82, p < 0.01), indicating that foreign presence positively affected the productivity of domestic firms in the same industrial sector in the coast region. The results further supported hypothesis 2. The coefficient of industrial insider & coast outsider FDI was positive though statistically insignificant, indicating that foreign presence in the inland region did not have any significant impact on the productivity of domestic firms located in the same industrial sector in the coast region. The coefficient of industrial outsider & coast insider FDI was positive through statistically insignificant, indicating that foreign presence had no significant impact on the productivity of domestic firms in another industrial sector in the coast region. The coefficient of industrial outsider and coast outsider FDI was negative and statistically significant, indicating that foreign presence in the inland region negatively affected the productivity of domestic firms in another industrial sector in the coast region. The results further supported hypothesis 4.

To test robustness of the results, we used the foreign share in output and the foreign share in employment as alternative measures of foreign presence, and reran the regressions. The results remained virtually unchanged.

**DISCUSSION**

**Main Findings**

In a transition economy like China, as found in the study, FDI as both industrial insider and regional insider are likely to produce positive technology spillovers to local firms, and FDI as both industrial outsider and regional outsider are likely to produce negative technology spillovers to local firms. In particular, FDI located in the advanced growth pole in the coast region is found to have a negative effect on the productivity of domestic firms in the backward periphery in the inland region, no matter whether or not the domestic firms are
located in the same industrial sector as the FDI. The findings help explain the radical change in industrial structure and the widening regional disparities that China has been experiencing since 1978.

In regards to the change in industrial structure, FIEs set up by multinationals from market economies bring in advanced technology and management know-how in the industries in which they make direct investment. The FDI helps domestic firms in these industrial sectors upgrade technology to catch up with their counterparts in market economies due to the positive intra-industry FDI technology spillovers to domestic firms as found in the study. Meanwhile, the FDI draws away market demand and talents from other industrial sectors, particularly those controlled by the central government such as banking, energy, and natural resources due to the negative inter-industry FDI technology spillovers to domestic firms found in this study. Industrial sectors with heavy FDI such as electronics, home appliance, and automobile developed very rapidly in China, and have become the pillar manufacturing industries in the country. This change in industrial structure is particularly evident in the advanced coast region where the majority of inward FDI is located.

As regards the widening regional gap, the concentration of inward FDI in the coast region leads to radical changes in the industrial structure and rapid economic growth in this region due to the positive within-industry and within-region FDI technology spillovers to domestic firms as found in the study. However, domestic firms in the backward periphery of the inland region suffer from negative technology spillovers from FDI located in the coast region due to the cross-region market stealing effect and the skill stealing effect as found in the study. The inland region witnessed a slower change in industrial structure and a lower rate of economic growth as compared to the coast region. Consequently, the gap between the coast and the inland regions has widened enormously in China since 1978. The ratio of GDP per capita of the coast region to that of the inland region grew, for instance, from 1.61 in 1978 to 2.61 in 2013. The findings of the study points to an important source of the widening of the regional disparities in an emerging economy like China.

Managerial Implications for Multinationals

The widening regional gap is a source of political, social and economic instability, and threatens the growth potentials and the social wellbeing of transition economies. Multinationals from market economies need to consider whether they should invest in emerging economies in a socially responsible way in order to bring about good social consequences. Obviously, FDI that helps to narrow the regional disparities between the rich and the poor in transition economies can lead to good social consequences as compared to FDI that contributes to the widening of the regional disparities. One way to narrow the regional disparities is to increase investment in the backward region, rather than the advanced region in transition economies. If multinationals do so, as indicated in the study, the backward region will suffer less from the negative technology spillovers of outsider FDI, and benefit more from the positive technology spillovers of insider FDI.

To the contrary, multinationals tend to invest in the advanced region rather than the backward region in transition economies. In China, for instance, about 85% of the accumulated FDI over the past three decades have been located in the advanced coast region which accounts for only 14% of China’s total land area. Only 15% of the accumulated FDI have been located in the inland region which accounts for 86% of China’s total land area. A most important reason for multinationals to make FDI in the advanced coast region is the apparent market potential the region can offer as compared to the backward region – consumers in the advanced region have more income to buy the goods and services produced by multinationals. Under the pressure of intense competition, multinationals often focus on short-term corporate profitability in making FDI in transition economies, and fail to take into account the social responsibility they need to take.

It is important for multinationals to take an innovative approach to addressing profitability and the responsibility dilemma they face in transition economies. Porter and Kramer (2011) advised companies, including multinationals, to create shared value in business operations. According to the shared value perspective, the investment multinationals make in the backward region in transition economies may not necessarily reduce profitability. The poor people in the backward region are at the bottom of the pyramid. There is a wide range of opportunities for multinationals to make FDI in the backward region to produce goods and services to meet the needs of this large group of consumers. The FDI made in the backward region can not only produce good consequences for the poor region, but also increase profitability for multinationals.

Policy Implications for the Host Country Government

Ironically, governments of transition economies often encourage multinationals to invest in the advanced region through preferential policy incentives, and do not adopt effective policies to attract FDI to the backward region. In many transition economies, the government aims to promote economic growth so that the nation can catch up with advanced economies as quick as possible. For this purpose, the government wants multinationals to invest in the advanced region with favorable factor endowments in order to maximize the economic benefits from FDI. Only when social and political pressures build up in the economic development process does the government begin to encourage, often reluctantly and ineffectively, multinationals to invest in the backward region. In China, for instance, the government adopted preferential policies to attract FDI to the advanced coast region in 1979,
and did not adopt preferential policies to attract FDI to the backward inland region until 2000. By 2000 the Gini coefficient had reached more than 0.40 in China. Widened regional disparities between the advanced coast region and the backward inland region contributed very much to the widening of social inequalities in China. Under mounting social pressure, the Chinese government launched a grant plan for western region development to address the issue of widening regional inequalities. The new policy initiatives of the Chinese government have not been effective in attracting FDI to the backward inland region.

Governments of transition economies need to understand that sustained development involves not only rapid economic growth but also social justice. Rapid economic growth based on widening disparities cannot be sustained. Due to widening disparities, for instance, social tension has been accumulating in China. This may lead to disastrous economic and social consequences. The increased separatist movements in the far west of China, especially, Tibet and Xinjiang, are arguably related to the widening of regional disparities between the advanced growth pole in the east coast region and the backward periphery in the west inland in this country. Government of transition economies should take effective policy measures to encourage multinationals to invest in the backward region before it is too late. In particular, governments need to invest in infrastructure to improve the investment environment in the backward region.

Conclusion
Our study distinguishes between insider FDI and outsider FDI at both the industrial and the regional level. The study finds important difference in technology spillovers between FDI as an insider and FDI as an outsider to domestic firms. The study unveils an important source for the rapid change in industrial structure and the widening regional gap in a transition economy like China. Findings of the study have implications for multinationals in making FDI in transition economies, and implications for governments of transition economies in making public policy toward inward FDI.

REFERENCES


