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# **China's Region OFDI And Innovation Performance—Examining The Effect Of Technology Gap And Absorptive Capacity**

## **1. Introduction**

### **1.1 Research background**

In 2017, the global economy and trade in goods both recorded the fastest growth rate since 2011, while the global foreign direct investment outflow was \$1.43 trillion, showing a declining trend for two years (Statistical Bulletin of China's Outward Foreign Direct Investment, 2017). To further guide and regulate the direction of foreign investment, promote sustained, lawful and healthy development of foreign investment, and effectively prevent various risks, the Chinese government increased the censorship about the authenticity and compliance towards outward foreign investment in 2017, and this made the Market entities became more mature and returned to rationality; After experiencing rapid growth since 2007, China's Outward FDI showed a negative growth for the first time, but it still ranked the third globally with \$158.29 billion (Statistical Bulletin of China's Outward Foreign Direct Investment, 2017). In this background of economic and policy environment, it is no longer clear where Outward FDI reverse spillover effect still take place and at what level nor how Chinese MNE's learning take place in host economics and whether learning outcome spills over to the home country enterprises innovation performance located in provinces of China.

The study draws upon international business (IB) theory and regional innovation systems (RIS) theory. This research take the perspective of the regional innovation performance affected by the OFDI and the factors that moderate this relationship. China is a particularly suitable empirical setting for this study. On the one hand, China has in recent years accelerated globalization of innovation by engaging in OFDI and, on the other hand, in some fields China have leapfrogged others to become important competitors in the global battle for technological leadership (Panagiotis et al., 2018).

Hence, this research proposes two questions. First, does the rapid growth of Chinese regional OFDI increase innovation performance in China? This research study is by no means the first to examine this question. Panagiotis et al. (2018), Li et al. (2016) and Ning et al. (2016) analysed the early stage of Chinese firms' OFDI from 2003 to 2010 and the impact on home country enterprises innovation. However, the rapid growth of China's OFDI not begin until 2007, accompanying the increase in investment volume is the enhanced diversity of the industries involved, investing firm ownership, and forms of investment. Therefore, with the significant evolution and strengthening government regulation of Chinas' OFDI, it is no longer clear whether impact of OFDI on the innovation performance of home economies still take place.

The second question of this study is whether the regional innovation performance effect of China's outward FDI varies according to the technology gap between a China and the host countries. As a crucial factor that affects OFID spillover, the technology gap between Source and recipient enterprises (or countries) has attracted much attention from scholars. Some literatures argue that the larger the gap the more learning and imitation opportunities the domestic enterprises will gain, others posit the opposite and argue that spillover from Outward FDI is a decreasing function of the technology gap (Thompson, 2005). They point out that a large gap indicates weak absorptive capacity to learn advanced technology. However, the above study didn't consider the impact of subjective factor and they are mainly conducted in the context of developed countries, the impact of MNEs' OFDI on home emerging countries is under-researched.

This study set the province as the unit of analysis. Due to impact of OFDI on the home country cannot be sufficiently captured at the single firm level (Li et al., 2016). Meanwhile, China is a country with many distinct regions (provinces and municipalities) for which the appropriate data are available; this enables an analysis at regional level instead of at the more aggregate national level (Li et al., 2016). For instance, employment turnover within the same province in China is much easier because of the

traditional household registration system, in comparison with that across provinces; interindustry linkages are often more intense in the same province because of local protectionism and market segmentation in China (Yang and Lin, 2012). Furthermore, great technological development and policy differences exist across provinces in China. For example, eastern China is more developed in terms of its economy and technologies than middle and western China (Luo, Xue, and Han, 2010). The above differences might accordingly result in different impact of Outward FDI on the innovation performance across provinces. The focus on provinces allows us to examine the contingency effect of the technology gap on the relationship between Chinese MNEs' OFDI and innovation performance.

To this end, this study using panel data of MNEs' OFDI from 30 Chinese provinces from 2007 to 2017. Furthermore, the study is organised as follows: in section 2, this study review the relevant literature. in section 3, this study describe the dataset and the regression model specification, explain the estimation methodology, summarise how the dependent and explanatory variables are operationalised, and present some descriptive statistics. The regression results are presented and discussed in section 4. The final section summarises the findings of the study, outlines the practical implications, and highlights the limitations.

## **1.2 Theoretical foundation**

It is customary in the international business literature to classify OFDI as either natural resource seeking, market seeking, efficiency seeking, or technology seeking (Dunning & Lundan, 2008). Numerous authors have suggested that technology seeking is an important motivation for many EMNEs, and more particularly for Chinese MNEs (Child & Rodrigues, 2005; Deng, 2009; Luo & Tung, 2007; Mathews, 2006). Child and Rodrigues (2005) and Mathews (2006) argue that Chinese firms may not be exploiting existing competitive advantages when undertaking OFDI, but may rather be trying to address their own competitive disadvantages. Furthermore, Jian and Panagiotis (2016)

pointed out that cross-border acquisitions are often used by Chinese firms to acquire strategic assets to compensate for their competitive disadvantages, while simultaneously leveraging their own distinctive ownership advantages.

Iammarino (2005) define the Regional Innovation System (RIS) is the localised network of various actors and institutions in different sectors whose activities and interactions generate, absorb, and diffuse new technologies within and outside the region (Iammarino, 2005). Furthermore, some literature pointed out that RIS composed of enterprises, universities and research institutions, intermediary service institutions and government, which participate in the technological innovation and technology diffusion. The system creates, stores, uses and transfers knowledge, skills and new products, through the government behaviour and the system specification (Fu, 2008; Yang & Lin, 2012; Fu, 2015).

Meanwhile, knowledge is considered as the essential elements and internal power of RIS development. Accelerating the identification, diffusion, sharing and capitalization of knowledge is the primary goal of the development of RIS. To certain extent, RIS theory is particularly appropriate when examining the determinants of innovation performance in the context of countries which cover huge geographical areas and where, commonly, there are substantial regional disparities in terms of economic or innovative capabilities (Fu, 2008; Yang & Lin, 2012).

There is a considerable literature suggesting that innovation performance varies not just between nations, but also between sub-national regions, such as states or provinces (Acs, Anselin, & Varga, 2002; Fritsch, 2002). This is because knowledge generation and new technology development tend to be spatially-clustered or centralized (Li, 2009) and knowledge and technical capabilities geographically-bounded, meaning knowledge spillovers tend to be localised (Cantwell and Iammarino, 2000; Cooke, Gomez, and Etxebarria, 1997). This is particularly the case in the circulating of tacit knowledge

(Breschi and Lissoni, 2001; Cantwell and Iammarino, 2000; Howells, 2002). The uneven distribution of innovative activity, moreover, is particularly apparent in many emerging economies, such as China (Sun and Liu, 2010; Wang and Lin, 2013; Yang and Lin, 2012). On the other hand, the extant literature has identified several drivers of regional innovation performance. For example, the amount of investment in R&D is recognised as the main input in the knowledge production process (Yang and Lin, 2012). Others have also found that regional intelligence (measured in terms of knowledge workers) is a strong direct and indirect driver of regional innovation (Sleuwaegen & Boiardi, 2014). Some research argued that organizational and functional aspects of a knowledge-based regional development policy are worthy of consideration, since they can be conducive to stimulating innovative behaviour in local industrial sectors (Cornett et al., 2009).

## **2. Literature review**

### **2.1 Technology gap and OFDI of the domestic economy**

The critical role of the technology gap on inward FDI spillover has been highlighted by few studies, though with inconclusive findings (Girma, 2005; Zhang et al., 2010). To the best of my knowledge, very few studies have investigated the relationship between the technology gap and reverse technology spillovers from outward FDI, particularly OFDI by emerging economies such as China. Indeed, there has been research on the relationship between OFDI and home innovation (Meyer and Peng, 2015; Narula, 2012). Furthermore, the emerging countries OFDI flows have risen considerably since 21st century and account approximately one third of global FDI flows (UNCTAD, 2017). On the other side, there is an survey studies pointed out that reasonably large proportion of this OFDI is motivated by technology and strategy seeking (Luo, and Tung, 2007; Li, 2009; Luo et al., 2010; Liu et al., 2014). Therefore, this is reasonable suppose that the OFDI may have an impact of the innovation performance in home regions.

China is a country of diversity along multiple dimensions, including technological development. If the technology gap is measured by labour productivity, according to the International Statistical Yearbook, China's average labour productivity is only 6.6 percent of that in the United States, 7.4 percent of Germany, and 8.1 percent of Japan. While the question of whether local firms can capture the benefits of reverse technology spillovers from Chinese MNEs' OFDI remains, it is even more intriguing to ask whether the effects of OFDI on productivity growth are universal for all Chinese provinces. For countries as geographically, technologically, and economically diverse as China, the reverse spillover effects of OFDI are anything but homogeneous. Empirical evidence shows that reverse spillovers can differ significantly from country to country (Bertrand and Capron, 2015; Bitzer and Gorg, 2009) because of different income levels, trade openness, technology gaps, government policies, and other characteristics. To our knowledge, no research has provided further insights regarding how technology gaps

may alter the relationship between emerging economy firms' OFDI and their home country's productivity.

Furthermore, as the technology gap between the host and home countries becomes smaller, firms in the emerging home country can better understand and recognize the value of OFDI-associated technologies and, therefore, are more likely to glean spillover effects from OFDI (Bertrand and Capron, 2015). However, the negative influence is that the technology learning opportunities for home enterprises will be reduced, and it will be increasingly difficult to learn and imitate complicated technologies. This negative effect will decrease reverse technology spillovers (Bertrand and Capron, 2015). Therefore, in OFDI, the technology gap between the host and home country will always have both positive and negative moderating effects on reverse technology spillovers from OFDI, which may lead to a nonlinear relationship between the technology gap and reverse technology spillovers in the form of domestic productivity growth.

Li, Roger, Nin and Dylan (2016), using the panel data of Chinese provinces and Generalized Method of Moments (GMM) estimation method to research the effect of OFDI on regional innovation performance. This research pointed out that OFDI brought relatively significant effect on the China domestic innovation and the foreign existence and local competition play a moderating role (Jian, Roger, Lutao and Dylan 2016). This research using a total OFDI data did not identify cross-border investment overseas destinations but, the inflows of OFDI to advance countries such as the UK and the US are likely to reverse as compared to a relatively higher level of knowledge transfer offers to other developing countries with OFDI. On the other hand, this research not distinguish the technology gaps between Chinese province and the host country.

In contrast, the extant literature has identified several drivers of MNEs innovation performance. For example, the amount of investment in R&D is recognised as the main input in the knowledge production process (Kexin 2016). Others have also found that



regional intelligence (measured in terms of knowledge workers) is a strong direct and indirect driver of regional innovation (Fu 2018, Panagiotis 2018). Jian (2016) argued that organizational and functional aspects of a knowledge-based regional development policy are worthy of consideration, since they can be conducive to stimulating innovative behaviour in local industrial sectors.

It is customary the international business literature to classify OFDI as their Nature resource seeking, Market seeking and Technology seeking (Li, 2016; Dunning, 2008). Furthermore, there are growing research study that explore the technology asset seeking is an important motivation for many MNEs (Fu, 2018; Panagiotis 2018). Furthermore, Fu and Panagiotis (2018) assert that cross-border acquisitions are often used by Chinese MNEs to acquire technology assets to improve their competitive disadvantages, while leveraging their own distinctive ownership advantages.

Furthermore, some study has been suggested that many Chinese MNEs pursue developed market acquisitions primarily to repatriate technology assets to their domestic markets. In other words, Chinese MNEs do not primarily look to compete directly in other foreign markets. Rather, they undertake OFDI to exploit acquired intangible strategic assets (technologies etc.) in their large but increasingly competitive domestic market (Cassandra 2016, Jovanka 2015, Qayoom 2018, Leman 2015). For instance, Ramsin (2018) pointed out the potential importance of foreign acquisitions for the purposes of domestic market exploitation. There is also a considerable literature, albeit mainly concerned with MNEs from advanced economies, testifying to the reverse knowledge transfer effects associated with OFDI.

## **2.2 Absorptive capacity and OFDI of the domestic economy**

The existing literature pointed out that capacity of absorptive refers to the ability of economics (or enterprises) to acquaint the external information value, assimilate this valuable information and apply it to the commercial Cohen and Levinthal. (1990).

Survey studies also believe the above theory has been applied not only to the enterprises, but also to the regional or countries (Panagiotis et al. 2018). Fu (2012) argues that embedded tacit knowledge in inward investment is not immediately available for domestic innovators, and that regional innovative performance is unlikely to benefit from inward FDI without a certain scientific base and amount of R&D experience. A higher degree of regional absorptive capacity is thus likely to be directly associated with better innovation performance. Borensztein et al. (1998) used the data from emerging countries to determine the incidence of technology spillovers through inward FDI hinges upon the level of human capital. Bernstein (2000) arrived at the same conclusions using data from the Middle East and North African countries validating earlier studies that have established a weak interaction effect of inward FDI and human capital.

On the other side, Elmawazini et al (2008) pointed out that the results not support the hypothesis that technology spillover had a positive effect on productivity increases in developing countries. This study used panel data to analyze a sample of 38 countries (both advanced and emerging countries) and concluded that absorptive capacity was measured by the human capital better than the average years of education. Moreover, Kokko (1994) analysed labour productivity of domestic manufacturing enterprises using 216 regional manufacturing data in Mexico and concluded that technological spillovers are limited in firms where there are large technology gaps.

Furthermore, Bernstein (2000), used panel data from Canadian manufacturing firms over the period of 1966 to 1991 to analyze the TFP of the firms in communication equipment. The results indicated that the spillovers from manufacturing firms from United States generated higher productivity spillovers to the Canadian firms. Similarly, Berthelemy and Demurger (2000), found that higher productivity from FDI inflows was dependent on the host country's minimum threshold level of human capital. While Lu et al (2006) established that among the 42 countries analysed using panel data over the

period of 1970 to 2000, the growth was not realized by FDI alone but that FDI coupled with infrastructure affected GDP per capita growth. In a similar manner, Li and Lu (2005) used panel data to analyze a group of 84 countries from both advanced and emerging economics over the period of 1970 to 1999. The results show that FDI promoted productivity growth both directly and indirectly through the interaction with total factor productivity, this was more evident among developing countries.

From the preceding discussion of findings from various empirical studies, it can be concluded that absorptive capacity has moderator role among inward FDI and productivity on the emerging economics. In contrast, OFDI is not very different theory than original FDI theory. However, very few studies have considered the impact of outward FDI on the innovation performance of home economies, especially in the context of absorptive capacity as moderator factor.

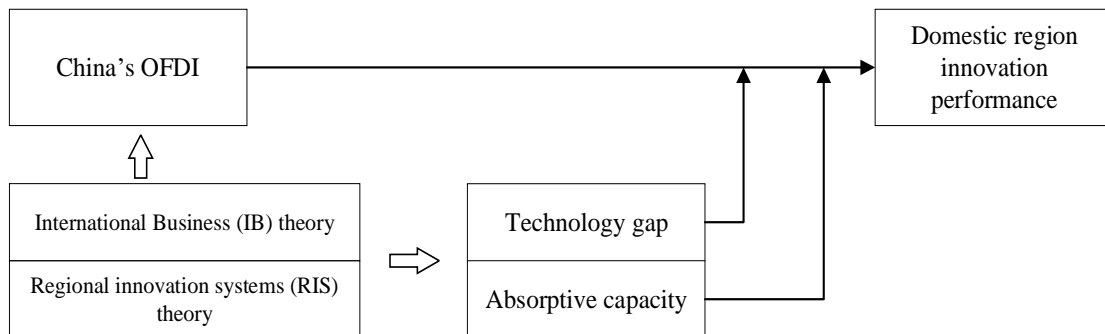


Fig 1-1 Conceptual model and theoretical framework

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