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# Chinese Returnees and High-tech Sector Outward FDI: The Case of Changzhou

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# ABSTRACT

# Chinese Returnees and High-tech Sector Outward FDI: The Case of Changzhou[1]

The rapid growth and high levels of internationalization by Chinese firms, raise a natural interest in the study of the factors which have led the notable international presence of Chinese firms. To contribute to this effort, we use data from the 2008-10 survey of China's High-tech firms, conducted by the Chinese Ministry of Science and Technology, to estimate the determinants of Chinese firm outward FDI (OFDI). In our analysis, the primary independent variables include high-tech intensity, human capital acquisition, and institutional factors. We have also controlled for various firm characteristics such as firm age, total value of fixed assets, and firm ownership. Estimation from our fixed-effects model uncovers a number interesting patterns in OFDI outcomes. Most notable, among the significant determinants of OFDI, the number of Chinese returnees employed by a firm seems to be more important than tax reduction policies. Further, the effects of the Chinese returnees have a stronger effect on non state-controlled firms than they do for state-controlled firms. This finding is intuitive, since the Chinese returnees who were trained in the West have an understanding of product markets, labour markets, financial markets, language and business culture, and trade laws in both China and the West. Their unique skill sets and knowledge appear to serve as an important catalysts in the growth of OFDI and internationalization by Chinese firms.

JEL Classification:     F21, M16, F23

Keywords:     OFDI, Chinese firm internationalization, panel data

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# 1. Introduction

The growth of outward foreign direct investment (OFDI) by Chinese firms represents an important development in globalization process which has attracted considerable interest from academics and businesses alike. The annual growth rate of Chinese OFDI has accelerated in recent years, reaching 67 percent between 2004 and 2010. In 2008, China's OFDI stock totalled $184 billion and the investment outflows reached $56 billion, an annual record. In spite of the global financial crisis, this record was broken again in 2010 when the OFDI outflows reached $59 billion (OECD 2013). The exceptional pace of internationalization by Chinese Firms (ICF) in the global markets has attracted academic attention which has sought to understand the antecedents and outcomes of this phenomenon as well as its implications for Chinese growth and the world economy.

The dramatic growth in OFDI is tied to multiple firm decisions, which are related to a variety of motives: acquiring strategic resources/assets, adopting advanced technologies, attracting global talent, avoiding trade barriers and high tariffs (Deng 2007; 2013; Boisot and Meyer 2008). The magnitude of the international activities of Chinese firms, as well as the global consequences, have spurred an interest in scientific inquiry to learn more about these developments.   (Ando and Kimura 2015; Huy 2015; Kodama and Inui 2015). Research to date has primarily focused on four important factors which have contributed to the ICF: firm level and industry level antecedents (long-term strategic considerations), transaction-specific antecedents (more ad-hoc and project/issue specific factors), and

institutional factors. The firm-level antecedents of the ICFs, for example, are the focus of scholarly work which focuses on the basic strategic considerations of firms. The recent incorporation of the **resource-based view** (RBV) of the firm (Barney 1991) into the studies of the ICF has highlighted the importance of firm-specific characteristics as relevant factors in the ICFs (Cui and Jiang 2009; Deng 2007; Rui and Yip 2008). According to this theory, Chinese firms choose to engage in international activities to enhance their individual value or competitiveness, and their choices largely depend on firm specific attributes such as size, resources, and experience.

The second theory, known as the **industry-based view** (Porter 1980), posits that the design and implementation of a firm's internationalization strategy is primarily determined by the competitive environment in which the firm operates. When describing **transaction-specific antecedents**, scholars emphasize the transactional factors that are more ad-hoc and project/issue specific than the firm- and industry-specific antecedents of the ICF which are long-term relationships that extend across a range of issues. As firm-specific advantages also include transactional advantages, such as firms' capabilities to manage internal and external relationships. For example, Morck et al. (2008) posit that Chinese SOEs developed sophisticated measures to manage their operations in China that were of use as they expanded abroad into economies with similar institutional environment; familiarity of similar institutions enabled them to a achieve large returns on their outward foreign investments. Boist and Meyer (2008) also report that Chinese firms will compare the relative costs and benefits of crossing international borders with those of

crossing provincial borders within China as they evaluate the net impact of international activities on their competitive performance and strategy.

Finally, research on **institutional theory** (IT) argues that a firm's strategic choices are fundamentally influenced both by formal rules and informal cultural norms and values when they operate domestically or in host countries (North 1990; Oliver 1997; Scott 2001). Given the extent of state control of the Chinese economy (Meyer and Peng 2005; Nolan and Zhang 2002), the institutional environment is likely to have had far-reaching effects on the ICF. Accordingly, scholarly in this literature emphasizes the influence of home country institutions and the role of Chinese government, in particular (e.g. Lieberthal and Herberg 2006; Wang 2002; Wong and Chan 2003).

## 2. Chinese returnees and firm internationalization

Coincident with this phenomenon is increasing return of overseas Chinese students back to their homeland. As the Chinese economic growth accelerated in the past decade, many Chinese returnees joined Chinese enterprises in pursuit of superior economic and employment opportunities. Following China's reform and opening in 1978, 1.09 million Chinese who studied abroad have returned home. In recent years, there has been an increasing tendency for Chinese overseas students to return after they finish their studies. More than 800,000 have returned in the last five years, with the annual number growing at an average rate of 36 percent each year. A total of 272,900 Chinese students returned home after finishing their education abroad in 2012, up 46.6 percent from 2011.

Figures 1 and 2 display the volume of FDI, OFDI and the number of Chinese returnees over time. Although FDI and OFDI both took off around 2005, shortly after China joined the WTO in 2001, the rate of FDI growth appears to have slowed in recent years, while the growth OFDI regained strength from 2011-12. This is consistent with the trend of growth in number of Chinese returnees since 2004. We hypothesize that the return of overseas Chinese may have played a critical role in the accelerated growth of OFDI since 2004. This is supported by the growing OFDI and Chinese firm internationalization literature and the anecdotal evidence on mergers and acquisitions (e.g. China National Offshore Oil Corporation's bids for Unocal and Nexen) and IPOs by Chinese firms (e.g. WebEx and Vimicro), which were facilitated by the Chinese returnees. Chinese returnees have been found to play a leading role in many elements of China's "going out" strategy (Tsai 2015). This important role can be manifested through one or more of the following functions: (1) the listing Chinese firms overseas; (2) the introduction of venture capital mechanisms; (3) the managements of Multi-national Corporations (MNCs) in China; and (4) the conduct of outbound mergers and acquisitions (Wang et al. 2011).

Some consider the scarcity of professional managerial talent endowed with an understanding foreign markets and the ability to handle cross-cultural challenges to be the most important obstacle to China's globalization ambitions (McKinsey 2008). Chinese returnees offer a viable alternative to this bottleneck. Due to their overseas education and work experience, their superior understanding of the world market, and their cross-

cultural competency, make Chinese returnees particularly well-suited for leading China's globalization efforts.

Another major barrier which complicates the internationalization efforts of Chinese firms is the difficulty in establishing the requisite global business connections. Until recently, SOEs were only exposed to international marketplace through their joint ventures based in China, while private firms tended to be under-resourced and discriminated against in many areas, including their access to the financial support which is needed for global operation. Thus, Chinese returnees may enjoy an edge over SOEs and private enterprises in China, due to their ability to maintain personal and professional networks in their former host country (Wang et al. 2011).

The third reason which impeded the internationalization of Chinese firms was the fact that both SOEs and private firms often suffered from a degree of "liability of foreignness" in the global marketplace. SOEs may face political backlash from competitors or other players due to their close affiliation with the government, while private Chinese firms tend to have difficulty gaining international exposure because they are not considered as legitimate players in the international market. As a result of their Western education and training returnees may enhance a firm's perceived legitimacy, especially when the returnees serve as the owners or/and CEOs of the Chinese firms. In addition, returnee entrepreneurs can better market their products or services internationally as they avail themselves of their overseas connections and networks.

In sum, Chinese returnees may enhance firm internalization goals, regardless of the mechanism. When firms pursue an internationalization strategy that is motivated by resource concerns, the acquisition of strategic resources including valuable overseas talents and advanced technologies is critical. Similarly, if firms are seeking larger international market for their goods and services, Chinese returnees can serve important role because they possess the necessary connections and also understand the market mechanisms from both sides of the border. For those firms driven by institutional factors in home country and host country, the talents of Chinese returnees may provide unique advantages since they are well-positioned to bridge the knowledge in cultural, legal, and policy contexts. Due to the similarity of the predictions coming from each of these theoretical argument, and evidence from various case studies, we hypothesize that increases in the number of Chinese returnees will lead to increasing values of FDI Outflow by Chinese firms.

Since the 2000s, it is clear that Chinese returnees have played an important, if not leading role in China's ICT sector OFDI activities. Tsai's (2015) analysis of the composition of senior leadership (CEO or Chair) based on company websites, SEC filings, and NASDAQ Data (NASDAQ 2015) discovered that out of the 30 Chinese companies listed on NASDAQ, only one did not have any returnees among its senior leadership or management group and one-third were led by returnees (Tsai 2015, Table 1). Although companies listed on NYSE extend beyond ICT, it is interesting to note that there is a similar percentage of returnees in management groups (35.4 percent), and among CEOs and Chairs (28.6 percent).

The following high-profile business cases illustrate the critical role played by Chinese

returnees in the internationalization of Chinese firms and outward FDI.


## 2.1 CNOOC/Nexen M&A case

Chinese takeovers in North America were often met with fears of job cuts and the loss of

control over local assets. When CNOOC made a surprise $18.5 billion bid for the U.S.

energy firm Unocal in 2005, the U.S. government had a strong negative reaction.

Members of the Congress, backed by Chevron lobbyists, termed the acquisition a

dangerous energy grab by China and a threat to national security. The American

government decided to amend the energy bill to include an extensive review by the

Secretaries of Defense, Energy, and Homeland Security if Unocal were to consider the

deal. Unnerved by the controversy, CNOOC withdrew its offer.


Instead of giving up, the Chinese company changed its board and in 2011 Yang Hua

assumed the role of Director and President of CNOOC. Business-savvy and western-

educated with a MBA from MIT, Mr. Yang understood the political and business climate

in North America and began a soft approach to the acquisition of foreign energy firms.

Soon after his promotion, Mr. Yang bought Opti Canada, a bankrupt oil sands producer,

for $2.1 billion (Steger, 2012). The acquisition of this firm served the dual purpose of

familiarizing CNOOC with oil sands extraction as well as giving them a foot on the

ground so they could become better acquainted with local communities, business leaders,

and government. As Nexen was a partner in Opti Canada's Long Lake project, Fang Zhi,

the general manager of the project, who was also Western-trained with a MBA from University of Birmingham (later moved to Nexen as CEO in 2014), began cultivating friendly business relations with Nexen and within a year of purchasing Opti, CNOOC was set on acquiring the larger Canadian company.

The senior management started by evaluating the political climate.  In 2012, during a visit to Beijing by Prime Minister Stephen Harper, Wang Yilin, CNOOC's chairman, took the opportunity to meet with Canada's Finance Minister Joe Oliver during the trip and proposed the possibility of CNOOC's expansion in Canada's oil and gas industry. Oliver approved the request and the company soon began drafting a letter of offer for Nexen.

Mr. Yang's friendly approach followed by a higher offer price was crucial to the acquisition's success. To mitigate fears of foreign ownership, CNOOC promised Nexen would remain a Canadian company, which the company achieved by purchasing a minority stakeholder position, moving its Americas headquarters to Alberta, listing the company on the Toronto stock exchange, and maintaining Nexen's senior management with the addition of a few CNOOC employees (The Economist 2012). Before the deal was announced, CNOOC also took time to informally meet with local officials where Nexen operated, including in Canada, the United States, the United Kingdom, and Nigeria.

This "soft power" approach enabled the deal to be completed without a hitch, as CNOOC succeeded in making the largest Chinese acquisition to date. Since that time CNOOC has

become a lauded employer in Canada and in 2015, CNOOC was recognized as one of Canada's Top 100 Employers for its excellent work environment which has emphasized the importance of cross cultural learning and for being a leader in Canadian workplace benefits (Jermyn 2016).

## 2.2 BGI/Genomics M&A case

The Western-educated founders of BGI-Shenzhen have a particularly unique approach to doing business in China that has simultaneously put them at odds with Beijing while catapulting them onto the global stage. The firm was founded in 1999 and immediately set its focus on outward expansion. By securing 1 percent of the Human Genome Project in that year, BGI became the only company from a developing country to take an ownership stake in the project. In 2003, when the company partnered with the prestigious Chinese Academy of Sciences, the Western business style of senior management irked the university. While the four founding members were all highly educated as the recipients of PhDs from overseas, they had also all dropped out of high school in the midst of China's Cultural Revolution. Since this experience gave them distaste for Chinese education, the company began hiring college dropouts, choosing to educate them in their own in-house college instead, which can grant degrees via affiliation with respectable universities in China. Since the CAS' insistence on a traditional approach slowed the company, the two split by 2007. Although the loss of funding forced BGI to severely cut its staff, the firm's involvement in international projects provided it with important global recognition (Sender 2015).

BGI-Shenzhen is far removed from the traditional model of work organization in China. All workers, including the CEO and President, work in cubicles on the main floor. Pay is low but employees are ambitious and given latitude to pursue projects. Most workers are in their early 20s and heading international projects. Recently, the CEO and president stepped aside to put new workers in charge as a means of giving life to the organization. The firm is privately funded and has avoided government connections, which the Chinese government has allowed because of BGI's global success (Sender 2015).

In 2012, BGI bought U.S.-owned Complete Genomics for $117.6 million. While there was some backlash, as its U.S.-competitor Ilumina tried to ruffle feathers by suggesting the deal could have "nefarious" consequences, BGI's outstanding history overcame those fears (Timmerman 2013). Partnerships with American giants such as The Gates Foundation helped seal the deal on the Complete Genomics acquisition and landed the company a base in Massachusetts as it rebranded itself as BGI Americas in 2012 (Chen, 2013). This merger secured the Chinese company's place as the largest genome center in the world, and reduced its reliance on Ilumina for manufacturing sequencing instruments. In the same year, the company partnered with several universities in Denmark and set up BGI Europe in Copenhagen. Since its humble beginning in 1999 the firm has become a major innovator in the field with over 900 publications, contracts with 17 of the world's top 20 pharmaceutical companies, and constant innovation of its cutting-edge technologies.

**2.3 The Baidu case**

Baidu is one of China's most globally recognized companies. As the leading search engine in China, Baidu has sought to expand its customer base and is actively seeking to acquire relevant firms the world over. To facilitate its integration with global markets Baidu has set up research and development centers in the United States, Singapore, and Japan, and is currently working on a fourth in Brazil, while also operating offices in Thailand, Egypt and Indonesia. As Baidu seeks to expand its base, it has also bought stakes in firms including Uber (United States), PopIn (Japan), and Peixe Urbano (Brazil), to name a few.

The success and growing appetite of this firm is attributed to one man, founder and CEO Robin Li. Mr. Li came from a fairly impoverished background but his keen intelligence catapulted him to the United States, where he obtained his master's degree at the University of Buffalo. Working for a division of Dow Jones, Li was a strong innovator in search engines, which eventually brought him to Silicon Valley. There he teamed up with Eric Xu, a well-connected biochemist, and the two were able to raise significant funds from venture capitalists. With more than $11 million in the bank, Li and Xu moved to Beijing, and in 1999 Baidu was created.

During his time in the United States, Li closely watched the dotcom breakthrough and was able to bring many ideas he observed to China. After seeing the success of Overture, a Californian company that correlated ads with search results and before Google did, Li incorporated this model into Baidu, thus ensuring the search engine's profitability

(Barboza 2006). By keeping an eye on global innovations, Baidu has managed to stay on top by bringing breakthrough apps, like Uber, to China, and continuing to show its commitment to leading the Chinese tech industry.

Understanding the strict and often censorious Chinese culture, government culture has proven to give Baidu a distinct advantage in their home market. While Google and Yahoo are vying for a piece of the pie in the Chinese market, Baidu has been able to remain number one by letting government censors, that regularly blocks foreign internet companies, oversee its website.

Yet Baidu's appetite does not end in China. "International expansion is a priority for Baidu," declared Johnson Hu, Baidu's head of global business, during the Brazil press conference (Nomiyama 2014). With the purchase of firms like Peixe Urbano, an online-discount company, and its commitment to invest $50 million in Brazil over the next three years, Baidu is revealing its hunger for a global presence.

By staying ahead of technological innovations in China and the United States, Robin Li has become the richest man in China and created the world's number two search engine, an engine that won't stop turning to reach even higher status.

## 3. From "Brain Drain" to "Brain Gain" to "Brian Circulation"

The Chinese education policy that encourages Chinese students to study abroad was heavily criticized in the 1980s because most of the students chose to stay in the host countries after graduation. This is characteristic of the earlier "Brain Drain" theory of migration first developed in the 1970's by the Columbia scholar Jagdish Bhagwati (Bhagwati and Hamada 1974). In this theory, advanced economies attract and retain talent from developing countries at low cost, thereby constraining the development capacity of the sending nations. However, this argument has been countered by Chicago scholar Robert Lucas and others in the 1980s (Lucas and Stark 1985) who argue that migration of talented individuals from developing nations ultimately advances economic development in the sending countries, since the talented migrants send remittances to their home countries, share information and technologies, and boost bilateral trade between the origin and destination countries. This is the so-called "Brain Gain" argument.

At the onset of the 21st century, Berkeley scholar Anna Lee Saxenian proposed a new migration framework called "Brain Circulation" (Saxenian 2000). Regardless of their final destination, migrant workers can benefit both host and home countries if their human capital is utilized effectively. When the economies and industrial structures of two countries are differential or complementary, the "win-win" effect of "Brain Circulation" arises from the interacting relationship: "Brain Circulation," as a bridge between resources that are being exchanged, brings industrial opportunities to countries that lack

capital and technology but possess labor and natural resources, while it swells industries from advanced countries which possess capital and technology but lack labour and natural resources. Through the whole process, "Brain Circulation" eventually also offers opportunities for talented migrants to advance their careers, as was the case for waves of Chinese students who returned to their homeland from the beginning of the 21st century, as China joined the World Trade Organization (WTO) in 2001.

An example of this complementarity can be seen between China and Canada. Canada has abundant natural resources, advanced technologies, and high-quality education, while China's complementary assets include abundant human resources and a huge product market. At a time when the world had not fully recovered from the 2008 financial recession, China played an important role in the economy of Canada, where the recovery was fragile. In the meantime, Canada has been a very strong producer and exporter of resources to China. The economies of the two countries are highly complementary, with a largely untapped potential for further collaboration. Chinese immigrants and diasporas are well positioned to cooperate with Canadian firms as well as Canada's national, regional, and local governments to promote bilateral trade and investment and to create new science and technology partnerships.

The Chinese government launched an official drive to recruit experts from abroad starting in 2008 by offering favorable policies in terms of taxation, insurance, housing, settlement for spouses and children, career development, research projects and government awards. As of last year, more than 1,100 top-level experts have been recruited to work in China

under the program (China Daily 2013). As shown in Figure 2, the number of Chinese returnees has increased rapidly in recent years. A case study by Kenney et al. (2013) has noted how returnee entrepreneurs have contributed to the growth of high-tech industries in China. However, entrepreneurs only account for a small portion of the Chinese returnees. Many other returnees have played an important role in the internationalization process of Chinese firms. However, empirical studies in the area are very scarce due to data limitations. Information on Chinese returnees at the firm level is considered to be one of the crucial determining factors of Chinese firm internationalization, but the empirical literature to date has not been based on such firm-level micro data.

[Figure 2 about here]

In this paper, we analyze the factors affecting OFDI by studying a panel of high-tech firms in a prefectural city in costal China. It is important to gain insights into the determinants of outward FDI by China's high-tech firms, given the increasingly important role of high-tech firms in China as well as Chinese government's active role in industrial upgrading (Government of China 2006). Since the data used in this paper are drawn from micro-level data on firms in Jiangsu province, we argue that the firms in the sample possess similar resource endowments and face a common regional regulatory environment. As such we focus on the effects of individual firm characteristics and a handful of firm-specific institutional factors on the value of firm-level FDI. In particular, we are interested in the potential impact of the Chinese returnees on OFDI and these effects may differ by firm ownership. The rich array of the firm-level data allows us to

17

examine our research questions by using estimation techniques including the traditional

OLS model and a firm fixed effects model. We argue that the government initiative in

implementing the overseas talent recruitment program since 2008 allows us to treat firm-

level attraction of returnees as exogenous, while the firm fixed-effect model enables us to

deal with the potential for omitted variable bias. However, the weakness of this data set is,

we do not have information on the host country for outward FDI from China.

## 4. Data and methods

Our data are based on the 2008-10 survey conducted by the Chinese Ministry of Science

and Technology, which covered all firms located in National High-Tech Development

Zones as well as those recognized as high-tech firms by local governments. The purpose

of this survey was to improve the management practices of the "Torch Program", which

aims to stimulate high-tech firms in China with innovation clusters, technology business

incubators, seed funding, and a venture guiding fund. Our sample covers all high-tech

firms in Changzhou city, which includes two county-level cities (Liyang, Jitang), and five

districts (Gaoxing, Wujing, Tianling, Zhonglou, and Qiqu). Changzhou is a prefectural

city in Jiangsu Province in the affluent Yangtze Delta region of China. It borders the

provincial capital of Nanjing to the West and is not far from Shanghai, the main

metropolis in the area. Since it is representative of other large coastal cities in Eastern

China, which account for a significant proportion of the country's economic output,

Changzhou provides a good location for gaining a deeper understanding of China's

outward FDI. Departing from the existing literature, our dataset enables us to focus on the

internationalization of the Chinese high-tech firms rather than focusing on resource-based firms.

## 4.1 Main dependent and independent variables

Our main dependent variable *OFDI*, is defined as the Total Amount of Outward FDI (in 1,000 Chinese Yuan). Our independent variables include firm characteristics, high-tech intensity, human capital acquisition, and institutional factors as described below.

Since the dependent variable here is left-censored by zero, tobit model should be considered first. However, tobit and probit model estimates with unconditional fixed-effects are biased. Therefore, we have created a binary dependent variable OFDI and rerun the fixed effects model based on the panel data[2], in addition to a fixed effect model with a continuous OFDI dependent variable. As demonstrated in the paper, controlling for firm fixed effects is critical in our analysis. The results can change significantly if fixed effects are omitted. In contrast, the results from the OLS model are quite similar to those from the probit or ordered probit model (Ferrer-i-Carbonell and Frijters 2004). First, we estimated a linear fixed effects model using continuous dependent variable *OFDI*. Then we re-estimated the fixed effects model using the binary *OFDI* dependent to investigate the determinants of firm decisions to undertake outward FDI. In doing so, we are able to control firm fixed effects without estimation bias from tobit or probit model estimates.[3]

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[2] By doing so, we can investigate the determinant of the probability of firm's making outward FDI as Eickelpasch and Vogel (2009) did in their paper, while controlling for firm fixed effects.

[3] According to a happiness study by Ferrer-i-Carbonell and Frijters (2004), the results can change substantially without controlling individual fixed effects for the model with ordinal dependent variables.

## 4.2 Firm characteristics

Our firm characteristics variables include *Firm age* (age of the firm), *FixedAssets* (total value of fixed assets), *TechPersons* (number of technological personnel), *PerWage* (average wage of the firm) and ownership structure dummies including *SOE* (state-owned or stated controlled enterprises), *Collective* (collectively-controlled ent*erprise), Private (privately-controlled enterprises), HKTM (enterprises invested by Hong* Kong, Taiwan or Macau assets), and *Foreign* (foreign invested or foreign-controlled enterprises).

## 4.3 High-tech intensity

The variables we use to measure a firm's high-tech intensity include *TechRev* (revenue generated from technology / total revenue), *HTechRev* (high-tech product sales revenue/total product sales revenue) and *Patents* (number of patents held).

## 4.4 Acquisition of valuable human resources

Variables measuring acquisition of valuable human resources include *Returnees* (number of Chinese returnees) and *ForExperts* (number of foreign experts imported). Although this dataset is quite unique in providing such information as the acquisition of valuable human resources, we have limited information of the quality of those returnees or foreign experts.

**4.5 Institutional factors**

A number of institutional factors have been included in the model such as *HTechZone* (a dummy variable indicating entry status into the High-tech Development Zone, 1=Yes, 0=No), *Taxreduction* (total amount of tax exemption / (total amount of tax paid + total amount of tax exemption)) and *TechTaxRed* ((tax exemption for high-tech firms + R&D tax exemption + technology transfer tax exemption)/ total amount of tax exemption).

**5. Results**

Tables 1 and 2 report summary statistics for the main dependent and independent variables in the model. We can see from table 2 that the majority of high-tech firms are private firms rather than SOEs, which suggests that this study could shed new light on the nature of outward FDI by Chinese firms. In particular, it appears that the motivation for "going out" in this study is driven by market forces rather than government intervention.

We first estimate the determinants of Chinese firm OFDI by including the major independent variables while controlling for a number of firm characteristics. Our Ordinary Least Square (OLS) regression results are reported in Table 3. Column 1 provides estimates from the benchmark specification; column 2 is expanded to include industrial dummy variables. The specification is augmented further in model 3 which adds interaction terms between ownership types and number of returnees, RT (column 3). In order to examine the role of returnees on firm's making outward FDI in the sense of

extensive margin, we add model 4 where the dependent variable is Chinese High-tech firms' probability of making outward FDI.

We measure institutional factors in a number of ways. First, entry into the high-tech development zone may result in various competitive advantages that may benefit the internationalization activities of the Chinese firms, such as favourable policies and regulations (including subsidies to rent) that encourage the firms acquire and develop advanced technologies from both the domestic and international market, knowledge spillover from peer organizations, attraction of specialized employees, and availability of suitable supplies. However, it is not known whether entry into special high-tech zones has a positive and significant effect on firm-level OFDI. We used two variables to measure the special tax treatment in the form of reductions. The first is the proportion of tax reductions to the sum of the total amount of taxes paid plus the total amount of tax reductions. The other is the percentage of tax reductions given to technological development and R&D to the total amount of taxes paid. While the coefficient on the tax reduction variable is negative and insignificant, the coefficient assessing the importance of the variable, which measures the proportion of tax reduction to the technological development and R&D, reveals that this factor is a positive and significant determinant of OFDI by Chinese firms. We also use indicator variables for firms' ownership type since they may be viewed as institutional factors. In particular, we interact our ownership indicator variables with the number of returnees. The rationale for this choice is the possibility that firms of different ownership types may have different incentive schemes, and thus, may experience different OFDI outcomes based on their employment of

22

returnees. The differences between the OLS and fixed-effects results suggest that OLS regression suffers from selection bias. This problem could be driven by unobserved firm characteristics which predisposed some firms to enter the high-tech development zone and to undertake higher larger OFDI.

## 6. Major findings and discussion

As discussed, we first estimate the determinants of OFDI using conventional OLS techniques, and next estimated our model through a fixed-effects model which exploits the longitudinal nature of the data as it controls for individual firm heterogeneity.

### 6.1 The OLS model

Our estimates, which uncover a positive association between our firm measure of *technological personnel* and firm OFDI suggests that returnees affect firms through human resource and talent management strategies. This connection may operate if the number of Chinese returnees, who were educated in the Western countries and also know both Chinese and international markets, foster the expansion of Chinese firms into the global market, including increased outflows of foreign direct investment (FDI). Since the coefficient on Returnees is not significant, it is possible that the impact of overseas returnees on total amount of OFDI might differ significantly among different firms.

From a practical standpoint, we are interested in the differential effect of returnees on firms of various ownership types. Consequently, we introduce interactive terms in Model

3, which interact the ownership variables with the number of returnees. According to Brambor, Clark and Golder (2006), the marginal effect of interacted terms and their significance should not be read directly from the regression result listed in Model 3. Thus, we report the marginal effect of Chinese returnees by firm ownership type, as implied by Model 3, in table 5. Our results show that only Chinese returnees who were employed by private firms had significant effect in increasing OFDI. The marginal effects in model 1 to model 3 reflect both intensive margin and extensive margin. Model 4 shows the marginal effect with extensive margin only, where it indicates that private high-tech firms are more likely to make OFDI than SOES, which deviates from most of the existing literature suggesting that in the high-tech sector firms outward FDI decision is more market oriented. However, there is no significant difference of the role of Chinese returnees across firms with different ownership types as Model 4 in Table 5 indicates. That is to say, Chinese returnees could help private high-tech firms make more outward FDI other than exerting higher probability of making outward FDI. The role of Chinese returnees in OFDI is more pronounced at the intensive margin rather than extensive margin.

## 6.2 The fixed-effects model

When we estimate a fixed-effects model our results, which are shown in Table 4, reveal a number of interesting patterns which provide insight into the factors which shape OFDI. In terms of firm characteristics, we find that firms that have operated for a longer time, undertook larger amounts of OFDI. This suggests that older firms, which may be more experienced and resourceful may be better positioned for engagement in

internationalization activities. When we compare the significant determinants of OFDI, the number of Chinese returnees in the firm (*Returnee*) appears to be more important than tax reduction policies (*Taxreduction* or *TechTaxRed*). Furthermore, the effects of the Chinese returnees were most pronounced for non state-controlled firms as compared with state-controlled firms (Model 3 in Table 4). The marginal effects reported in Table 5 indicate that Chinese returnees significantly increased OFDI by private firms. This is intuitive since the Chinese returnees who were trained in the western countries understand the product market, labour market, financial market, language and business culture, trade laws in both China and West. Their unique skill sets and knowledge may serve to catalyze OFDI and internationalization of Chinese firms. In contrast, the number of Chinese returnees employed by SOEs is significantly and negatively related to OFDI. This might be explained by the fact that SOEs are more domestic market oriented than the private firms.

Our results also show that although the amount of fixed assets is positively associated with the OFDI, the opposite is true for the amount of firm-level intangible assets. One possible explanation is that "going out" introduces firm scale effects while the calculated value of intangible asset is based on the domestic market rather than international market. Itis also possible that firms with more intangible assets are less likely to engage internationalization strategies due to unobserved firm characteristics, such as political connections and resources, which would help firms to grow and expand domestically. Future study in the literature should examine this possibility as high-quality data on related firm characteristics become available. Model 4 in Table 5 echoes the findings

from the OLS model, as we again find that the role of Chinese returnees on high-tech firms' OFDI decisions are more significant on the intensive margin other than on the extensive margin.

## 7. Policy and practical implications

China has adopted a number of policy initiatives to facilitate its transition from a low-cost manufacturing to an innovation-based economy. The programs have included government investment in R&D, targeted especially to the state-controlled enterprises; tax reductions for high-tech firms, and tax subsidies which target R&D activities and technology transfer. These policies have worked to increase the number and quality of high-tech firms in China, but it is the foreign-educated workers in these firms who have facilitated the OFDI of Chinese firms. However, the tax reductions and tax subsidies targeting R&D activities are not significant determinants of the OFDI compared to the number of Chinese returnees. We also find that the effects of Chinese returnees are more pronounced in the non state-controlled firms than the state-controlled firms. What's more, Chinese returnees mainly help high-tech firms make more OFDI other than showing higher probability of making outward FDI. Interestingly, the number of foreign experts imported plays little or no role in affecting the OFDI of Chinese firms. This might be due to the fact the importing foreign experts would alleviate the needs of going aboard by Chinese firms.

Our results lead to a number of significant policy implications. First, our empirical work shows that talent attraction and management policies may be more effective in the promotion of outward FDI by Chinese firms than are policies such as tax subsidies which seek to increase the internationalization of Chinese firms.  These differential effects may be observed since tax policies are more targeted, according to governmental decisions, while talent attraction and management policies are more efficient since they are more focused on the role of the market.  In terms of talent attraction and management policies, our results suggest that the government should not take biased position in favor of the state-controlled enterprises. However, such biased policies were frequently practiced in China, through such channels as granting quotas in *Hukou* (household registration). As overseas returnees without Hukou are usually not entitled to social security benefits or their children's access to public schools, such polices of prejudices present barriers in attracting and retaining Chinese returnees, thus are not conducive in facilitating the internationalization strategy of the Chinese firms.

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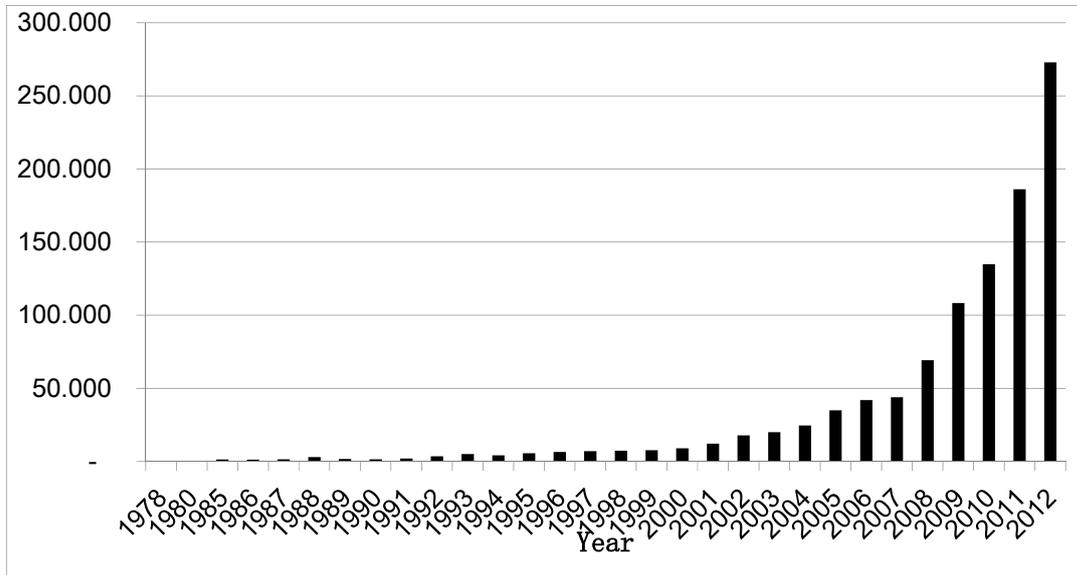
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**Figure 1. Amount of inflow and outflow of FDI in China, by year (USD, Billions)**
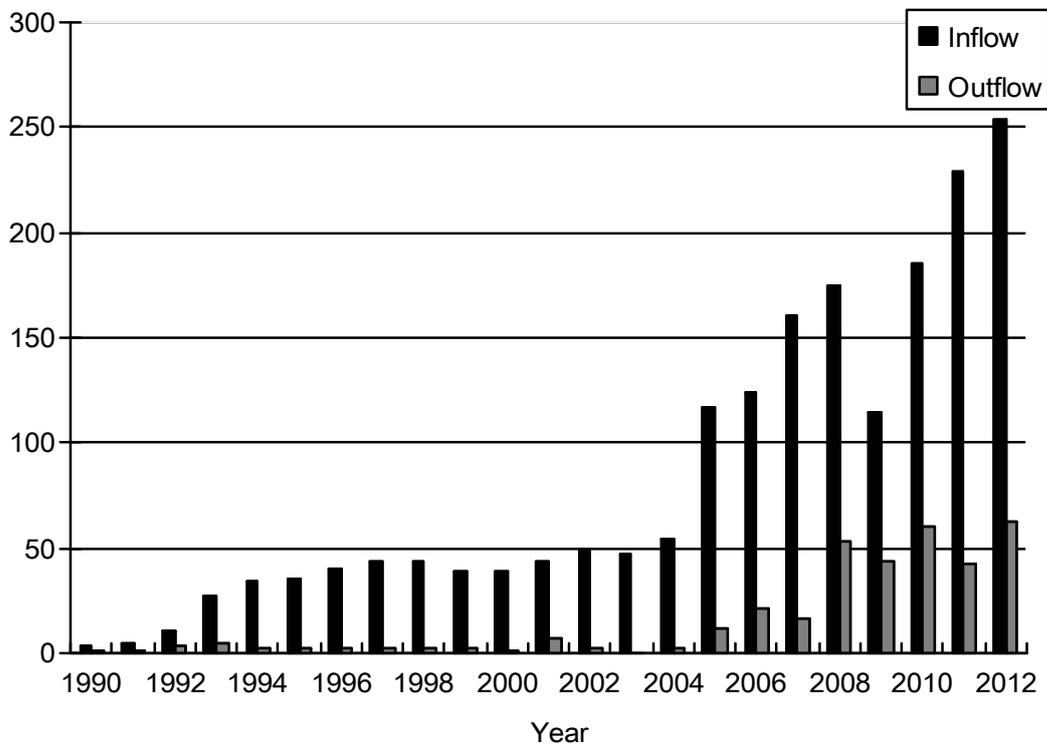


*Source: "Foreign Direct Investment (FDI) Statistics - OECD Data, Analysis and*

*Forecasts", OECD, Various Years.*

**Figure 2. Number of Chinese returnees by year**



*Source: China Statistical Yearbook 2012 (Beijing).*

**Table 1. Returnee representation in management of NASDAQ-listed Chinese companies (as of 15 July 2015)**

| NASDAQ Technology Companies | CEO and Chair | Management Group | Management w/Overseas Experience | % w/Overseas Experience | Positions | IPO Year |
|---|---|---|---|---|---|---|
| SINA | Yes | 4 | 3 | 75.0% | COO,CFO,VP | 2000 |
| Sohu | Yes | 10 | 5 | 50.0% | CFO,VP,HR | 2000 |
| 51job | Yes | 11 | 3 | 27.3% | VP | 2004 |
| Kong Zhong Corporation | No | 2 | 2 | 100.0% | CFO,CIO | 2004 |
| Actions Semiconductor | Yes | 2 | 0 | 0.0% | N/A | 2005 |
| Baidu | Yes | 9 | 4 | 44.4% | President,CFO,VP | 2005 |
| Vimicro International | Yes | 3 | 1 | 33.3% | CFO | 2005 |
| eFuture Information Technology | No | 7 | 3 | 42.9% | CFO, Director, VP | 2006 |
| AirMedia Group | No | 7 | 2 | 28.6% | CFO,PR | 2007 |
| China Sunergy | No | 3 | 2 | 66.7% | CTO, VP | 2007 |
| JA Solar Holdings | No | 3 | 2 | 66.7% | CFO,CTO | 2007 |
| Vision China Media | No | 4 | 1 | 25.0% | VP, | 2007 |
| China Information Technology | No | 8 | 2 | 25.0% | CFO and CTO | 2008 |
| ChangYou.com | Yes (co-CEO) | 3 | 1 | 33.3% | CFO | 2009 |
| Cleantech Solutions International | No | 4 | 1 | 25.0% | Indep. Director | 2009 |
| ChinaCache International | No | 2 | 2 | 100.0% | President, CFO | 2010 |
| ChinaNet Online Holdings | No | 12 | 3 | 25.0% | COO,CTO,CFO | 2010 |
| Kingtone Wirelessinfo Solution Holding Ltd | No | 2 | 0 | 0.0% | NA | 2010 |
| SGOCO Group | Yes (CEO) | 5 | 1 | 20.0% | Audit | 2010 |
| Sky-mobi Limited | No | 4 | 1 | 25.0% | Fin'l Director | 2010 |
| 21Vianet Group | No | 6 | 3 | 50.0% | CFO,COO,VP | 2011 |
| Jiayuan.com International | Yes (Chair) | 6 | 2 | 33.3% | VP and ID | 2011 |
| YY | No | 3 | 1 | 33.3% | GM | 2012 |
| China Mobile Games & Entertainment Group | No | 7 | 2 | 28.6% | CFO,Exective VP, | 2012 |
| Sungy Mobile | No | 2 | 2 | 100.0% | COO,CFO | 2013 |
| IDreamSky Technology | No | 3 | 1 | 33.3% | CFO | 2014 |
| Momo | No | 6 | 1 | 16.7% | CFO | 2014 |
| Weibo Corporation | No | 2 | 1 | 50.0% | CFO | 2014 |
| Xunlei | Yes | 3 | 2 | 66.7% | GM,CFO | 2014 |
| Wowo Limited | No (3) | 7 | 1 | 14.3% | CFO | 2015 |
| **Total** | **10(32)** | **150** | **55** | **36.7%** | | |

*Sources: Compiled by* Tsai, K. 2015. "Elite Returnees in Beijing and Bangalore:

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(ICCS), Oxford University, August 6-7, 2015.

**Table 2A. Descriptive statistics**

| Variables | Description | Obs | unit | Mean | Std. Dev. |
|---|---|---|---|---|---|
| OFDI | Total Amount of Outward FDI | 700 | 1000 yuan | 4233.362 | 25349.88 |
| TechRev | Revenue from technology/Total revenue | 700 | | 0.012 | 0.075 |
| HTechRev | High-tech Product Sales Revenue/Total Product Sales Revenue | 699 | | 0.767 | 0.226 |
| TechPersons | Number of technological personnel | 700 | Person | 90.231 | 117.103 |
| Returnees | Number of Chinese Returnees | 700 | Person | 0.646 | 3.006 |
| ForExperts | Number of Foreign Experts Imported | 700 | person | 0.623 | 4.361 |
| Patents | Number of Patents | 700 | Item | 1.869 | 3.907 |
| HTechZone | Entry into the High-tech Development Zone | 700 | | 0.427 | 0.495 |
| Taxreduction | Total Amount of Tax Exemption/ (Total Amount of Tax Paid + Total Amount of Tax Exemption) | 692 | | 0.151 | 0.160 |
| TechTaxRed | (Tax exemption for high- | 687 | | 0.072 | 0.112 |

| | | | | | |
|---|---|---|---|---|---|
| | tech firms + R&D tax exemption + Technology transfer tax exemption)/ Total Amount of Tax Exemption | | | | |
| FirmAge | Firm Age | 698 | Year | 12.030 | 8.056 |
| FixedAssets | Total value of fixed assets | 700 | 1000 yuan | 68080.4 | 220317.5 |
| Intangble | Total value of intangible assets | 700 | 1000 yuan | 9872.817 | 21537.09 |
| PerWage | Average wage | 700 | 1000 yuan | 36.427 | 24.315 |

**Table 2B. Descriptive statistics (Ownership type)**

| Variable | description | Freq. | Percent |
|---|---|---|---|
| SOEs | State-controlled | 55 | 8.69 |
| Collective | Collective firms | 48 | 7.58 |
| Private | Private firms | 458 | 72.35 |
| HKTM | Hong Kong /Taiwan/Macau- invested firms | 33 | 5.21 |
| Foreign | Foreign invested firms | 39 | 6.16 |
| Total | | 633 | 100 |

**Table 3. Ordinary Least Squared (OLS) estimates**

|  | (1) | (2) | (3) | （4） |
|---|---|---|---|---|
| Taxreduction | -6256.5 | -4267.5 | -5349.3 | -0.132 |
|  | (7787.8) | (8069.6) | (8066.5) | (0.0985) |
| TechTaxRed | 6546.5 | 1353.3 | -1022.4 | 0.270* |
|  | (12655.6) | (12990.2) | (13012.9) | (0.160) |
| Returnees | 869.1 | 1033.6 | -7058.0* | -0.0635 |
|  | (777.7) | (802.9) | (4249.3) | (0.0528) |
| ForExperts | -349.4 | -462.0 | 242.0 | 0.0108 |
|  | (465.4) | (529.6) | (582.4) | (0.00654) |
| TechRev | 2042.5 | 5469.0 | 6543.5 | 0.0403 |
|  | (15195.8) | (17235.0) | (17208.8) | (0.192) |
| HTechRev | 3919.8 | 2900.6 | 4672.3 | 0.0806 |
|  | (4779.7) | (5029.3) | (5050.7) | (0.0607) |
| TechPersons | 28.75** | 29.79** | 16.29 | 0.000108 |
|  | (13.17) | (13.54) | (14.25) | (0.000175) |
| Patents | 932.7*** | 651.4** | 608.8* | 0.0164*** |
|  | (288.2) | (314.7) | (314.1) | (0.00365) |
| HTechZone | 5664.1** | 5973.4** | 5708.7** | 0.0547* |
|  | (2206.7) | (2334.3) | (2343.7) | (0.0280) |
| Firm age | 213.1 | 200.9 | 210.8 | -0.00123 |
|  | (135.6) | (139.9) | (139.4) | (0.00171) |

| | | | | |
|---|---|---|---|---|
| Collective | 6817.0 | 4978.4 | 1217.6 | 0.270*** |
| | (5357.0) | (5647.8) | (6218.5) | (0.0750) |
| Private | 6293.1 | 4148.0 | 1047.8 | 0.182*** |
| | (4136.6) | (4381.7) | (4568.9) | (0.0547) |
| HKTM | 502.3 | 508.4 | -1355.8 | 0.0207 |
| | (6026.7) | (6260.3) | (6676.1) | (0.0810) |
| Foreign | 1379.6 | 114.4 | -932.2 | 0.114 |
| | (5939.3) | (6121.3) | (6328.0) | (0.0776) |
| FixedAssets | -0.0215* | -0.0259* | -0.0112 | -0.000 |
| | (0.0115) | (0.0135) | (0.0156) | (0.000) |
| Intangible | 0.362*** | 0.364*** | 0.373*** | 0.000*** |
| | (0.0764) | (0.0839) | (0.0860) | (0.000) |
| PerWage | -17.20 | -21.91 | -27.01 | 0.0002 |
| | (52.38) | (54.37) | (54.18) | (0.0007) |
| Year dummy | Yes | Yes | Yes | Yes |
| Industrial | | | | Yes |
| dummy | No | Yes | Yes | |
| RTxCollect | | | 12086.4* | 0.133 |
| | | | (7131.9) | (0.0882) |
| RTxPrivate | | | 9322.4** | 0.0623 |
| | | | (4349.4) | (0.0541) |
| RTxHKTM | | | 7298.6 | 0.0655 |
| | | | (5209.5) | (0.0645) |

| | | | | |
|---|---|---|---|---|
| RTXForeign | | | 4783.9 | 0.0361 |
| | | | (4362.8) | (0.0540) |
| Constant | -13522.2** | 58.69 | 2110.4 | -0.157* |
| | (6445.1) | (13240.5) | (13337.6) | (0.0824) |
| Observation | 617 | 617 | 617 | 617 |
| adj. R-sq | 0.090 | 0.076 | 0.084 | 0.094 |

*Note:*

*For columns 1-3 the dependent variable is OFDI; for column 4, it's the probability of making outward FDI.*

*Standard errors in parentheses; \*, \*\*, \*\*\* indicate significance at the 10 percent, 5 percent and 1 percent levels respectively.*

**Table 4. Fixed-effects estimates**

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Taxreduction | 2205.6 | 2102.6 | -3151.7 | -0.120 |
|  | (9968.8) | (10009.6) | (9798.5) | (0.130) |
| TechTaxRed | 7640.7 | 8879.9 | 8790.0 | 0.134 |
|  | (13716.0) | (13777.1) | (13532.7) | (0.180) |
| Returnees | 3129.3*** | 3100.8*** | -15914.1*** | -0.0546 |
|  | (1023.2) | (1019.7) | (4257.4) | (0.0566) |
| ForExperts | -470.3 | 519.6 | 999.9 | 0.0112 |
|  | (583.4) | (649.1) | (640.1) | (0.0085) |
| TechRev | -3050.4 | -2983.1 | -789.5 | -0.0211 |
|  | (18032.8) | (18924.3) | (18389.1) | (0.244) |
| HTechRev | 3076.2 | 6523.8 | 10433.7* | -0.000638 |
|  | (6080.8) | (6373.9) | (6246.0) | (0.0830) |
| TechPersons | 13.21 | 7.042 | -4.499 | -0.000 |
|  | (27.01) | (27.09) | (26.74) | (0.0004) |
| Patents | 515.3 | 437.3 | 402.1 | 0.00578 |
|  | (619.9) | (623.9) | (607.6) | (0.0081) |
| HTechZone | 3412.5 | 4719.5 | 3858.0 | 0.357* |
|  | (15078.8) | (15297.8) | (14861.6) | (0.197) |
| Firm age | 2916.1** | 2796.2* | 2241.6 | 0.0406** |
|  | (1478.1) | (1463.5) | (1427.5) | (0.019) |
| Collective | 1289.6 | 2416.4 | -13371.5 | 0.0452 |

| | | | | |
|---|---|---|---|---|
| | (13321.3) | (13381.0) | (13994.9) | (0.186) |
| Private | 659.8 | 1548.5 | -16589.9 | -0.0589 |
| | (13437.9) | (13674.8) | (13867.5) | (0.184) |
| HKTM | -4.591 | 1666.1 | -9001.1 | -0.176 |
| | (14972.9) | (15053.6) | (15218.2) | (0.202) |
| Foreign | 2240.5 | 4242.5 | -15129.5 | -0.0076 |
| | (13926.9) | (14001.7) | (15067.8) | (0.200) |
| FixedAssets | 0.0160 | 0.114*** | 0.113*** | -0.000 |
| | (0.0226) | (0.0361) | (0.0352) | (0.000) |
| Intangble | -0.790*** | -0.986*** | -0.944*** | 0.000 |
| | (0.123) | (0.136) | (0.133) | (0.000) |
| PerWage | -100.2 | -146.1** | -164.4** | 0.000 |
| | (64.17) | (67.12) | (65.33) | (0.001) |
| Year dummy | Yes | Yes | Yes | Yes |
| Industrial dummy | No | Yes | Yes | Yes |
| RTxCollect | | | 19455.8** | 0.0531 |
| | | | (8667.3) | (0.115) |
| RTxPrivate | | | 20738.4*** | 0.0629 |
| | | | (4383.4) | (0.0582) |
| RTxHKTM | | | 14375.8*** | 0.0710 |
| | | | (5335.9) | (0.0709) |
| RTXForeign | | | 16791.8** | 0.128 |

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  |  |  | (7123.7) | (0.0946) |
| Constant | -26886.9 | 13527.2 | 36376.7 | -0.559 |
|  | (21443.6) | (48489.7) | (47346.6) | (0.629) |
| Observation | 617 | 617 | 617 | 617 |
| R-sq | 0.147 | 0.215 | 0.268 | 0.567 |

*Note:*

*For columns 1-3 the dependent variable is OFDI; for column 4, it's the*

*probability of making outward FDI.*

*Standard errors in parentheses; \*, \*\*, \*\*\* indicate significance at the 10*

*percent, 5 percent and 1 percent levels respectively.*

**Table 5. Marginal effect of Chinese returnees**

|  | OLS (model 3) | OLS (model 4) | FE (model 3) | FE (model 4) |
|---|---|---|---|---|
| SOEs | -7057.99* | -0.06353 | -15914.1*** | -0.05462 |
|  | (4249.263) | (0.052846) | (4257.386) | (0.056559) |
| Collective | 5028.379 | 0.069139 | 3541.737 | -0.00149 |
|  | (5755.135) | (0.071156) | (7626.416) | (0.101315) |
| Private | 2264.405** | -0.00126 | 4824.259*** | 0.008241 |
|  | (945.536) | (0.011591) | (1078.021) | (0.014321) |
| HKTM | 240.641 | 0.001926 | -1538.26 | 0.016407 |
|  | (2962.458) | (0.036807) | (3391.12) | (0.04505) |
| Foreign | -2274.12 | -0.02746 | 877.6981 | 0.073103 |
|  | (1633.868) | (0.019941) | (5505.769) | (0.073143) |

*Note: Standard errors in parentheses; *, **, *** indicate significance at the 10 percent, 5 percent and 1 percent levels respectively.*