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Intangible resources, agglomeration effect of FDI intensity, and firm performance: Evidence from chinese semiconductor firms

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Intangible Resources, Agglomeration Effect of FDI Intensity, and Firm Performance: Evidence from Chinese Semiconductor Firms

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ABSTRACT

This study analyzes the impact of intangible resources on firm performance in an emerging economy context. Intangible resources are considered essential to firms' competitive advantage; however, we argue that firms' intangible resources can be negatively related with performance in emerging economies, due to their weak intellectual property rights protection. Furthermore, we incorporate the resource-based view and geographical agglomeration perspective to propose that geographical locations with dense foreign direct investment can affect the appropriability of intangible resources, thereby moderating the relationship between intangible resources and firm performance. We find empirical evidence to support our argument by examining 70 semiconductor firms in China from 1999 to 2006 period.

Keywords: intangible resources, intellectual property, agglomeration, foreign direct investment, emerging economy

Introduction

Resource-based view (RBV) suggests that firm-specific resources are essential to firms' competitive advantage (Barney, 1996; Rumelt, 1984; Wernerfelt, 1984). However, the sources to superior performance vary with different types of resources.. Generally speaking, intangible resources underlie a firm's superior performance most likely (e.g., Amit & Schoemaker, 1993; Dierickx & Cool, 1989; Itami, 1987). For example, Hitt, Bierman, Shimizu and Kochhar suggest that "intangible resources are more likely than tangible resources to produce a competitive advantage" (2001: 4). Although the positive relationship between intangible resources and firm performance is an accepted premise (Bontis, Keow & Richardson, 2000; Choo & Bontis, 2002; Juma & Payne, 2004), not much empirical study supports this relationship (Juma & Payne, 2004). In fact, existed empirical analysis shows controversy over the effect of intangible resources on firm performance. Villalonga (2004) suggests that intangible resources can lock firms into persistent disadvantages except its positive impact on their competitive advantage. Juma and Payne (2004) also indicate that intangible resources may not directly affect a firm's financial performance for many years and there is an unclear relationship between intangible resources and firm performance.

Furthermore, ranging from the intellectual property rights of patents, trademarks, copyright and registered design; contracts; trade secrets; knowledge; networks; reputation and organizational culture, intangible resources require legal protection, such as patent laws and copyright laws, for firms to obtain appropriate return from their investment (Hall, 1992). Evidently a favorable institutional environment enables firms to appropriate return on intangible resources investment, thus encouraging innovations. For example, Chen and Puttitanun (2005) posit that strong intellectual property right (IPR) protection encourages domestic innovation activities. Meanwhile, weak IPR facilitates the imitation of technologies, ineffectively restrains the unfair competition such as the replication of trade secrets, patents and other intellectual capital of rivals, thus leading to negative performance of innovation firms. However, most of current research investigates the relationship of intangible resources and firm performance in developed countries, which has established a supportive intellectual property

environment. Relatively few study examine those firms in emerging countries, which are countries that experience a rapid pace of economic development (Arnold & Quelch, 1998) and demonstrate greater environmental volatility than developed market economies (Boisot & Child, 1996; Peng, 2002). One important source of the volatility arises from their lack of appropriate and well-developed institutional infrastructures, which consequently results in the underdeveloped IPR protection in terms of enactment and enforcement (Peng, 2002; Rawski, 1994). Because the relationship between intangible resources and competitive advantage is built on the premise that firms are able to appropriate part of the value created by their intangible resources (Villalonga, 2004), the inadequate IPR framework in emerging economies put great challenges on this premise of the RBV implication.

Except the influence of institutional environment on firms' value appropriation, firms and industries could also influence institutional environments because organizations and institutional environments interact with each other (North, 1990; Powell & DiMaggio, 1991; Scott, 2001) and "permeate one another both cognitively and relationally" (Child, 1994: 12). Since the formal constraints (political and judicial rules, economic rules, and contracts) of the institutional framework in emerging countries fail to regulate opportunistic activities effectively, informal constraints such as organizations' codes of conduct, norms of behavior, and convention, could come into play (North, 1990). Numerous studies suggest that firms within geographical agglomerations would be confronted by different external environment than those outside the agglomeration (e.g., Saxenian, 1990; Wheeler, et al., 1998). Due to the agglomeration effect, organizations' power over local environments could be higher as a whole rather than as a series of fragmented companies. However, previous research on agglomerated organizations primarily focused on the economic growth or knowledge spillover effect (e.g., Huggins, 2008; Roelandt & den Hertog, 1998; Sternberg, 1999), whereas not much research examines whether geographical agglomeration could affect the effect of firms' intangible resources on their performance from a macro-environmental perspective.

In response to these underdeveloped areas, we propose two research questions in this study: (1) What is the relationship between intangible resource and a firm's performance under the circumstance of relative weak intellectual

property right protection? (2) Does geographical agglomeration affect the relationship between local firms' intangible resources and firm performance? In particular, we focus on high technology firms in China because the number of high-tech firms in China has increased dramatically in the past two decades. Further, many firms in emerging economies, especially those in high technology industries, seek to increase intangible resources to enhance their competitive advantage (Kumar, 2009). Besides, China has been the world largest foreign direct investment (FDI) recipient among emerging countries since early 1990s and most of these inflows concentrated in east coastal regions such as Guangdong, Jiangsu, Shanghai and Zhejiang province. This study empirically tests that geographical agglomeration, defined as the density of competing firms in a local geographic area, influences the effect of local firms' intangible resources on their performance (Porter, 1990a, 1990b). We first review the literature available on intangible resources and its relationship with firm performance. Then we focus on the role that geographical agglomeration may have on the relationship between local firms' intangible resources and performance. Hypotheses are developed on the basis of the review and discussion. Based on the analysis of 70 Chinese firms in an 8-year-period in semiconductor industry across the country, empirical results are obtained. Finally, conclusions are made and the areas of future research are discussed.

THEORETICAL BACKGROUND AND HYPOTHESES

Intangible Resources and Firm Performance in Weak IPR Environments

There is an increasing consensus among strategy scholars that in current knowledge-based economy intangible resources are crucial drivers of firms' competitive advantage (e.g., Gross, 2001; Haanes & Fjeldstad, 2000). It is important for organizations to effectively develop, allocate, and deploy intangible resources to generate competitive advantage. There are a variety of definitions for intangible resources (e.g., Conner & Prahalad, 1996; Fernández et al., 2000; Itami, 1987; Kogut & Zander, 1992). In general, intangible resources include assets such as intellectual property rights of patents, trademarks, copyright and registered design; contracts; trade secrets; public knowledge such as scientific works; the

people dependent or subjective resources of know-how; networks; organizational culture, and the reputation of product and company (Hall, 1992).

Despite covering the variety types of assets, intangible resources require legal protection in common (Hall, 1992). For instance, trademark is a distinctive sign by a business organization or other legal entity to identify and distinguish firms' products and/or services from those of other entities. The legal protection afforded by trademark can prevent a firm avoiding unfair competition from its rivals. In addition, firms' product innovations are protected by patent and copyright system. A well developed patent and copyright system enables the inventor firms to possess exclusive rights for a limited period of time, protect the embodiment of an inventive idea, and give the creator exclusive rights in relation to that work, including its publication, distribution and adaptation. The legal protection of intangible resources helps a business to obtain an economic advantage from a formula, practice, process, design, instrument, pattern, or compilation of information which is not generally known or reasonably ascertainable. Evidently it is significant for firms to have a favorable legal context to protect their intellectual property (trade marks, patents, copyright, and registered designs), contracts and trade secrets, which can be crucial to the well-being of the firm. In addition, although "reputation has little significance in a legal context other than the redress obtainable with respect to libel and defamation" (Hall, 1992: 138), the brand name, which encapsulated the reputation of the company or products, needs to be protected.

In developed countries with strong IPR protection, some researchers empirically find that intangible resources are associated with competitive advantage (e.g., Villalonga, 2004). Juma and Payne (2004) find that intangible assets accumulated by firms are related to firm performance, but they have negative effect on operational performance and positive effect on market performance. Despite the differences in the empirical results, the RBV implication of the relationship between intangible resources and firm performance is built on the premise that the owners of the firm are able to appropriate the value created by intangible resources (Villalonga, 2004).

However, this premise may not be valid for emerging countries, which are characterized by their lack of legal framework to protect intellectual property (Peng

& Heath, 1996). Although the governmental policies in these economies are in favor of economic liberalization and the adoption of free market systems (Arnold & Quelch, 1998; Wright, Filatotchev, Hoskisson & Peng, 2005), the formal constraints of institutional framework from the planning regime have been weakened during the transitions and the necessary property rights-based legal framework of a market-based economy is still under construction (Clarke, 1991; Litwack, 1991). As such, firms still confront the risks by relative weak legal environment. Since the lack of an adequate legal framework as formal constraints would lead to high transaction costs (North, 1990) and a sharp rise of opportunistic behavior (Meyer, Estrin, Bhaumik, & Peng, 2009; Peng & Heath, 1996), firms have great difficulty appropriating the return of their investment on intangible resources because the deserved benefit can be eroded quickly by rivals from borrowing or copying their intellectual property or reputation. Further, intangible resources do not turn into immediate positive operational performance (Juma & Payne, 2004). Some research estimates an eight-year time lag before intangible resources show evidence of good performance (Biggadike, 1979; Edvinsson & Malone, 1997). Since firms cannot guarantee the appropriate return in the future, their investment on intangible resources may lock firms into disadvantages and firms' performance will not reflect the value of intangible resources. Thus, we argue that:

> ***Hypothesis 1****: There will be a negative relationship between intangible resources and firm performance of high-tech firms in emerging countries.*

FDI intensity and Geographical Agglomeration Effect

Recently many emerging economies have strengthened their IPR regimes as their accession into the WTO and agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS), which puts necessary and mandatory obligations to incorporate minimum standards of IPR protection in various aspects. Although emerging economies vary in their implementation of IPR reform, their IPR reform has been found to encourage local innovation, attract inbound FDI, and maximize a country's economic growth potential (Maskus, 2000).

Considered by most international firms as their preferred investment destination, emerging markets attract FDI from multinational enterprises (MNEs) originated from both developing and developed countries. FDI inflows to emerging countries increased to record high levels as evidenced by more than $500 billion in 2006 (Economist Intelligence Unit, 2008). MNEs increasingly seek to access various local advantages such as cost advantage, the attractive potential markets, and the abundant supply of human capital in emerging countries to improve their innovative competences (e.g., Davis & Meyer, 2004; Foss & Pedersen, 2002; Frost, 2001; UNCTAD, 2005). Meanwhile, local firms benefit from FDI in gaining access to advanced technology and intellectual property through their interactions with technologically advanced foreign MNEs (Di Benedetto, Calantone, & Zhang, 2003). For example, many firms in emerging economies rely on external sources to increase their stock of intangible resources to develop creative products and improve market performance (Wind & Mahajan, 1997).

The increasing inflows of FDI and their interaction with local firms in a certain geographical location formulate a densely populated and competitive environment, which provides all firms both opportunities and pressures to innovate and experiment with new technological knowledge (Beaudry & Breschi, 2003). Firms can benefit from such geographical agglomeration from lower firm costs (Cannon & Homburg, 2001) to the development of new products (Rosenkopf & Almeida, 2003). It has been recognized that geographical agglomeration may help firms acquiring knowledge and developing innovations among high-tech firms and improving firm performance (e.g., Gilbert, McDougall & Audretsch, 2008; Ganesan, Malter & Rindfleisch, 2005; Huggins, 2008; Sternberg, 1999). However, despite our understanding on knowledge spillover effect (e.g., Jaffe, 1986; Jaffe, Trajtenberg, & Henderson, 1993) and interfirm rivalry effect (e.g, Porter, 1990a, 1990b) of geographical agglomeration, not much research examines the impact of geographical agglomeration on the institutional environment of the region in which firms are embedded. In this study, we suggest that in geographical locations with high intensity of FDI, the agglomeration effect could enhance firm performance through improving local institutional environment.

In densely populated areas, the increased exchanges among the economic units would call for an adequate legal framework that enforces property right protection (North, 1990). In emerging countries, previous formal constraints for planned economy have been weakened while the formal constraints for market-based economy have been lacking (Peng & Heath, 1996). Since it takes a long time to build legal infrastructure (Clarke, 1991; Litwack, 1991; Peng & Heath, 1996), under such circumstances, informal constraints such as codes of conduct, norms of behavior and convention play a larger role in regulating economic activities (North, 1990). As such, informal constraints can "have considerable influence over both the behavior of individuals and firms, as well as the generation of new formal constraints" (Peng & Heath, 1996: 504). In particular, high FDI intensity in certain geographical location may stimulate local firms to follow well-recognized informal constraints.

First of all, the high inflows of FDI can to some extent impact the informal constraints of a region through changing firms' behavior. FDI inflows affect the market structure of the industry, stimulate competition, and crowd out less efficient firms (Dunning & Fortanier, 2007). To compete with foreign firms, local firms need to enhance their indigenous organizational capabilities and have to rely on accelerated innovations to differentiate their products that confer strategic advantages (Eisenhardt & Martin, 2000). Thus, the intensity of FDI can present unique opportunity to shape the appropriability regime of emerging economies because local firms are forced to enhance their capability of independent innovation than imitation to survive in the fierce competition.

Second, geographically agglomerated organizations formulate a cluster (Porter, 1998). The geographical agglomeration enables firms to have frequent face-to-face contact with suppliers, buyers, research institutes, alliance members and competitors (Audretsch, 1998; Rosenfeld, 1997), thus developing strong relational ties with other organizations in the cluster (Harrison, 1992; Ganesan et al., 2005). According to Etzioni & Etzioni (1999), trust and reciprocity can be enhanced by close physical proximity. On the one hand, communication and trust help firms within geographical agglomeration avoiding opportunism and competing fairly to improve their collaboration in the long term; on the other hand, taking

advantage of other firms' intellectual property may result in the break of long term relationship, which damages a firm's reputation and even threats its survival in the cluster. As a result, the potential consequences of participating in unfair competition can restrain firms from inappropriate behavior.

Third, firms within geographical agglomeration are often considered as a whole rather than a series of fragmented companies in tapping into local advantages (Roelandt & den Hertog, 1998). The agglomerated firms have relative higher bargaining power vis-à-vis the government to improve the enforcement of IPR protection than those fragmented firms. Therefore, the pressure of fair competition, trust and informal constraints among firms and the strong bargaining power to government in geographical locations with high FDI intensity could prevent firms from behaving opportunistically in weak IPR environment, thus supporting them to take advantage of valuable intangible resources.

> ***Hypothesis 2****: Geographical locations with high FDI intensity will be positively moderating the relationship between intangible resources and firm performance in high-tech firms of emerging countries.*

METHODS

Sample and Data Sources

We tested our hypotheses on a sample of Chinese semiconductor firms from the China semiconductor industry association (CSIA) in the period from 1999 to 2006[1]. Given the theoretical framework for this study, the choice of semiconductor industry is appropriate for two reasons. First, as a knowledge-intensive industry, semiconductor industry demands a healthy intellectual property protection system. For this reason, semiconductor industry has been broadly used as the empirical context to examine intangible assets (e.g., Almeida, 1996) and its role on firm performance in developed countries (e.g., Megna & Klock, 1993). Second, China's semiconductor industry is growing very rapidly in recent years but has developed

[1] The reason for us to examine the period starting from 1999 is that our major data source—the accounting statements of listed companies in China were gradually becoming standardized in a real sense from 1998 onwards. On January 27, 1998, the Ministry of Finance promulgated Document No. 7, the "Accounting System for Shareholding Companies: Accounting Items and Accounting Statements". It stipulated that, from January 1998 onwards, all listed companies must prepare their accounts in accordance with the new system. To avoid potential inconsistencies during the change of accounting statement practices, we start our panel data from 1999.

its unique market conditions from the world market—not only in the costs and price of products, but also in the formats and standards that the world market requires (Chesbrough, 2005). We chose China as our study site because as the largest and fast-growing emerging economy, China is well-known for its weak IPR enactment and enforcement where its legal system is under developed, the concept of IPR is relatively new, and IPR protection does not rank high in the world[2].

Our list of semiconductor firms for the sample was drawn from China Semiconductor Industry Association (CSIA). CSIA is the largest semiconductor firm association in China. Currently CSIA consists of 530 companies and nonprofit organizations that engage in researching and developing, manufacturing semiconductors and related solid- state devices. To compile our sample, we matched the list of semiconductor firms in CSIA to that in the China Stock Market Trading Database (CSMAR). Our final sample consists of 70 Chinese semiconductor firms for which full data was available in the period from 1999 to 2006. These firms are from 19 provinces/municipalities in China. A detailed geographic distribution of these firms is listed in Table 1.

Variables and Measurement

Dependent variable. In measuring firm performance, we employ an accounting-based proxy—return on assets (ROA), which is defined as the ratio of operating profit to total assets. Accounting-based performance measures have been well utilized in the research to investigate the relationship between intangible assets and firm performance (Juma & Payne, 2004; Villalonga, 2004). Villalonga (2004) adopted return on assets (ROA) as the dependent variable in examining the effect of intangible assets on firm performance. Similarly, Juma and Payne (2004) used both ROA and ROI as performance proxies to study the effect of intellectual capital on high-tech startup firms' performance. In this study, we do not use ROI to measure firm performance due to the unique accounting report practices in China. As Sun and Tong (2003) pointed out, China's regulatory rules allow listed companies to have rights issuing up to 30% of outstanding stocks annually. Many

[2] According to the Global Competitive Report, 2008-2009, China ranked 54 out of 134 worldwide in its property rights protection (World Economic Forum, 2009).

firms take advantage of this rule to raise additional equity capital even if they have no investment opportunities. Total equity would increase dramatically in such cases, which poses major problems when using the common profitability measures such as ROI. Therefore, ROA is a better profitability and performance measure in the context of Chinese firms.

Intangible resources: we use Tobin's q to assess the value of intangible resources possessed by our sample firms. Tobin's q has been used as a measure of the value of intangible resources by various studies (Hall, 1993; Sougiannis, 1994; Lev, 2001; see Villalonga, 2004 and Kumar, 2009 for a review). The basic rationale of this measure is as follows. Since the total market value of a firm V is the sum of the value of tangible assets (T) and the value of intangible assets (I). i.e., V= T + I. Dividing throughout by T we can get: V/T = 1+ I / T, in which V/T represents firm Tobin's q, while I/T indicates the ratio of the value of intangible resources possessed over tangible assets. Thus, the higher the Tobin's q, the more valuable the intangible resources possessed by a firm. The main advantage of Tobin's q over conventional measures of intangible resources, such as R&D intensity and advertising intensity, is that the latter two can only reflect technological and marketing efforts respectively but do not capture the value of other competencies that may also be subject to resource appropriation, such as manufacturing capabilities (Kumar, 2009). Particularly for Chinese high tech industries, which tend to achieve competitive advantages through superior manufacturing capabilities, Tobin's q can serve as a more comprehensive proxy for firm intangible assets. Furthermore, given the limitation of the CSMAR data, there is a considerable amount of missing data for R&D and advertising expenditures. Given these concerns, we use Tobin's q to capture the value of intangible resources.

Tobin's q is estimated as the sum of firm's market value of equity and the book value of total debt divided by the book value of total assets (Chung & Pruitt, 1994; Perfect & Wiles, 1994). Based on Chinese listed company's equity structure reality, we calculate Tobin's q as the sum of total liability and preferred stock at liquidating value divided by book value of total assets.

Geographic agglomeration: To measure the agglomeration effects with FDI intensity on the competitive landscape and the institutional environment of a

certain region, we employed the geographical FDI intensity of each province in which our sample firm's headquarters are located. Geographic FDI intensity was calculated as the total FDI received divided by the total GDP created by the province in a given year. The FDI data are derived from State Administration for Industry and Commerce and the GDP data are derived from National Bureau of Statistics of China.

We also control for firm characteristics that may affect firm performance. We compute firm size by taking the logarithm of total assets. This transformation was necessary to normalize these data. We expect that firms with a larger size can take advantage of economies of scale therefore more effectively transfer intangible assets into competitive advantage. We control for firm age by measuring the number of years elapsed from the firm's initial public offering. We expect that firms with more experiences in semiconductor business are more likely to establish unique skills and routines to avoid IPR violation and to appropriate profits from intangible assets than young firms. We also control for firm long-term investment. As for firm size, we use logarithm function to normalize long-term investment. We expect that long-term investment can help firms sustain their competitive advantage overtime.

Last, we control for the improvement of IPR protection in China after its WTO entry. According to the intellectual property protection index first developed by Ginarte and Park (1997), the IPR protection score for China was 2.12 in 1995[3]. In the recent update of the index, in which Ginarte and Park have further expanded the index for 122 countries from 1960 to 2005, China scores 4.08 in 2005. Given the progress of IPR protection in China after its entry into the WTO, we create a dummy variable, post-WTO, to control for the institutional improvement of IPR in China. The variable is coded as 1 for observation year after 2001, and coded as 0, otherwise.

Statistical Approach

[3] The index is constructed based on five elements of patent law: extent of coverage, membership in international agreements, provisions for loss of protection, enforcement mechanisms, and duration of protection. Each element is scored on a 0-1 scale, and the intellectual property protection variable is a sum of the five values for a given country.

Given the nature of our sample, which comprises 70 semiconductor firms over the time frame from 1999 to 2006, we utilize xtreg function in Stata to analyze our panel data[4]. Since some firms were listed after 1999, our sample is an unbalanced panel data and has a total of 551 observations. The main advantage of panel data models is its flexibility in modeling differences across individual units and the increase precision of estimators than OLS model (Greene, 2003). We use the Hausman test to determine estimation procedure between Fixed Effects Model (FEM) and Random Effects Models (REM). The Hausman test the null hypothesis that the individual specific effects are uncorrelated with the other regressors in the model (Hausman, 1978; Park, 2006). If the null hypothesis is rejected, the Fixed Effects is a better choice because the Random Effects estimation would lead to obtaining biased estimators. When the Hausman test does not reject the null hypothesis, Random Effects estimation is more appropriate because it lead to more efficient results (Greene, 2003).

RESULTS

Table 1 reports descriptive statistics and a correlation matrix for the variables used in our empirical analysis. We analyzed potential multicollinearity by calculating the variance inflation factor scores for the variables, and the analysis suggested that multicollinearity was not a concern for our study.

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Insert Table 1 about here
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Table 2 presents the estimation results for the panel data on the factors affecting firm performance. Model I is a baseline specification that only consists of the control variables, Model II augments this specification with the hypothesized independent variables, and Model III further includes the interaction effect between intangible resources (Tobin's q) and geographic FDI intensity. We adopted fixed effects model as the estimation method for these models, because the Hausman tests rejects the null hypothesis that the coefficients estimated by the efficient

[4] The Stata xtreg function estimates cross-sectional time-series regression models.

random effects estimator are the same as the ones estimated by the consistent fixed effects estimator (χ^2=41.35, 33.42, 35.22 with p value <0.001 for all the models). It suggests that fixed effects model is more appropriate for the study.

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In Model I, firm size has a positive and significant effect on performance ($p<0.001$); while firm age has a negative and significant effect on performance ($p<0.01$). The coefficient on post-WTO is negative and significant ($p<0.05$), suggesting Chinese semiconductor firms faced a more fierce competition after the entry of WTO. These results are largely consistent across the three models. Also all three models are highly significant at the $p<0.001$ level for the F score, and the increase of Adjusted R^2 across the three models indicates that adding the independent variables and interaction effect to the basic model significantly improve the overall explanatory power.

In Hypothesis 1, we argued that Chinese high-tech firm's intangible resources will have a negative effect on firm performance. The negative coefficient on the variable Value of Intangible Assets in Model II provides empirical support for H1 ($p<0.05$). Specifically, the result for the variable suggests that Chinese semiconductor firms with a high intangible assets value relative to its tangible assets tend to achieve lower return on assets.

We also hypothesized that the geographic FDI intensity will positively moderate the effect of intangible resources on firm performance (i.e., H2). The result for the interaction variable Q* FDI Intensity in Model III is consistent with this prediction ($p<0.001$), thus supporting H2. Specifically, when Chinese semiconductor firms located in geographic clusters with high FDI investment, they can better leverage intangible resources to improve firm performance.

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To better illustrate the interaction effect of our results, we divide our sample into three sub-samples based on geographic FDI intensity and to contrast the

effects of intangible assets on firm performance between the top and the bottom 1/3 of the sample. The top 1/3 of the sub-sample are firms located in high FDI intensity provinces/cities (i.e., Guangdong, Jiangshu, Shanghai, and Zhejiang); the bottom 1/3 of the sub-sample are firms located in low FDI intensity provinces (i.e., Anhui, Gansu, Henan, Jilin, Shanxi, and Sichuan). As illustrated in Figure 1, on average firms located in high FDI intensity regions have a high level of performance than firms located in low FDI intensity regions. In addition, the relationship between intangible resources and firm performance is positive for firms located in high FDI intensity regions; while the relationship is negative for firms located in low FDI intensity regions.

DISCUSSION AND CONCLUSION

This study makes two theoretical contributions. First of all, we argue that although intangible resources are essential to firms' competitive advantage, in light of the weak intellectual property protection environment, they can negatively affect firms' financial performance. By integrating resource-based view with institutional perspective (Meyer et al., 2009), this study enhances current understanding of the relationship between intangible resources and firm performance with evidence from a different institutional environment. Second, with globalization barriers to entry into emerging markets become less stringent, emerging markets continually attract FDI from MNEs. Prior studies have examined the circumstances under which local firms benefit from the presence of MNEs from the micro-analytical aspects such as knowledge spillover and technology transfer (e.g., Buckley, Clegg, & Wang, 2002; Crespo & Fontoura, 2007). The macro-level institutions, in particular the impact of the country IPR protection that is closely related to intangible resources appropriation has been relatively under-explored. We argued that FDI from MNEs in a dense geographical area could improve the appropriability regime of the local environment thus favorably supporting firms' appropriation of intangible resources investment. Therefore, we provide a fine-grained analysis of the relationships among geographical agglomeration, institutional environment and the resource-based perspective.

Empirically we chose China as our study context because the country has become the world's largest and fastest-growing emerging economy and it has become one of the largest emerging market destinations of FDI (UNCTAD, 2005). To capture the effect of the dynamic evolution of the emerging country's institutional environment on firms' performance, we tested semiconductor firms from 1999 to 2006 period, including both the pre-WTO and post-WTO period. We found that Chinese firms faced a more fierce competition after its entry into WTO. Furthermore, by dividing our sample into sub-samples on geographic FDI intensity, we found that the effect of firms' intangible resources intertwines with their geographic locations to improve financial performance. These findings imply that firms that are located in high FDI geographic location are more likely to benefit from investing in intangible resources. In light of the weak enactment and enforcement of the IPR in emerging markets (Peng, 2002), studies on intangible resources management in emerging market may need to incorporate institutional-, industry-, and firm-level factors to conduct a more comprehensive analysis.

To the best of our knowledge, our study is the first to extensively investigate the influence of intangible resources on firm performance in an emerging economy context. In light of the emergent research on the knowledge management of firms originated from emerging economies (Lu, Tsang, & Peng, 2008), we provide insights to complete current conceptual analysis of the relationship between intangible resources and firm performance as well as how FDI from foreign countries can affect the institutional environment of emerging markets.

Our study provides important implications for practitioners. For managers in emerging economies, it is essential to understand that when the institutional environments are far from satisfactory, firms not only need to internalize their technology structures to substitute for inadequate external IPR protection (Zhao, 2006), but also need to take advantage of geographical locations especially those with high FDI intensity to gain benefits of knowledge spillover, employee mobility and more importantly improved institutional environment that protect their investment in intangible resources with enhanced performance.

As with all research, there are limitations to this study. First, we investigate intangible resources as a whole instead of examining the relative importance of the

contribution made by each item of intangible resources to the overall success of business. Future research could be conducted to identify the top ranking of the contributions of the different intangible resources across time and industry. It will help to further explore how to effectively manage and develop intangible resources to achieve sustainability. A second concern is the representation of this study. Our study is based on one industry in a single country; care must be taken in generalizing the implications. Although we believe that our results could be generalizable outside the China context given the continuous institutional environment improvements in most emerging markets, we must realize the possibility that China could be a special case regarding the intertwined effects of intangible resources and foreign investment intensity on firm performance. We therefore encourage more studies to extend our understanding of the effect of intangible resources on firm performance from emerging economies.

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TABLE 1. Geographic distribution of sample firms in China

Provinces / Municipalities	Number	Percentage
Anhui	1	1.43
Beijing	4	5.71
Chongqing	1	1.43
Fujian	5	7.14
Gansu	1	1.43
Guangdong	17	24.29
Guizhou	1	1.43
Hebei	2	2.86
Henan	2	2.86
Hubei	2	2.86
Hunan	2	2.86
Jiangsu	4	5.71
Jilin	1	1.43
Liaoning	2	2.86
Shandong	4	5.71
Shanghai	10	14.29
Shanxi	1	1.43
Sichuan	4	5.71
Zhejiang	6	8.57

TABLE 1. Descriptive statistics and correlation matrix [a]

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. ROA	-0.002	0.237							
2. Value of Intangible Resources (Q)	0.168	0.277	-0.266***						
3. Geographic FDI intensity	0.534	0.921	0.107*	0.083*					
4. Firm Size	21.204	1.028	0.219***	-0.376***	-0.005				
5. Firm Age	9.004	4.288	-0.205***	0.081†	-0.284***	-0.058			
6. Long-term Investment	16.622	5.394	-0.004	-0.026	-0.089*	0.378***	0.120***		
7. Post-WTO	0.635	0.482	-0.150***	0.104*	0.079@	0.094*	0.425***	0.103*	--

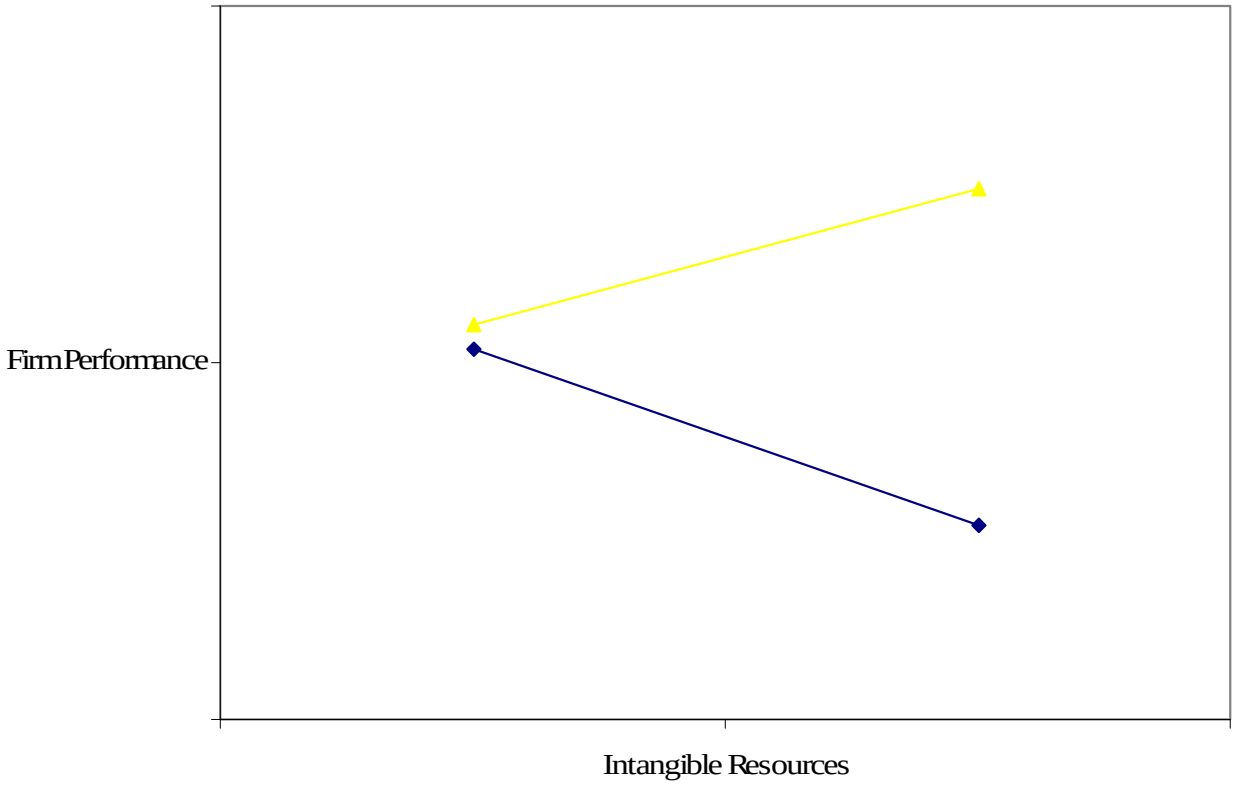
[a] N=551. † p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

TABLE 2. Regression results for ROA [a]

Variable	Model (I)	Model (II)	Model (III)
Intercept	-1.284***	-0.879**	-0.879**
	(0.256)	(0.262)	(0.262)
Firm Size	0.067***	0.048***	0.045***
	(0.012)	(0.012)	(0.012)
Firm Age	-0.008**	-0.006*	-0.006*
	(0.003)	(0.003)	(0.003)
Long-term Investment	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)
Post-WTO	-0.053*	-0.078*	-0.091**
	(0.023)	(0.034)	(0.033)
Value of Intangible Resources (Q)		-0.104**	-0.308***
		(0.038)	(0.047)
Geographic FDI Intensity		0.065	0.005*
		(0.168)	(0.002)
Q*FDI Intensity			0.021***
			(0.003)
F	21.56***	17.26***	22.82***
Adjusted R^2	10.02	14.35	21.04
Hausman Test [Fixed Effects Model (FEM) vs. Random Effects Model (REM)]	FEM	FEM	FEM
X^2	41.35***	33.42***	35.22***

[a] N=551. Standard errors appear in parentheses.
† p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

FIGURE 1. Illustration of the interaction effect between intangible resources and geographic FDI intensity on firm performance



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