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The Role of Expatriates in Facilitating Knowledge Transfer to Foreign Affiliates

René Belderbos ^(a), Shinya Suzuki ^(b),

Hiroyuki OKAMURO ^(c), Kazuhiro Asakawa ^(d)

(a) *KU Leuven, Maastricht University, and UNU-MERIT,*

(b) *Musashi University,*

(c) *Komazawa University and HIAS, Hitotsubashi University,*

(d) *Keio University*

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Hitotsubashi Institute for Advanced Study, Hitotsubashi University
2-1, Naka, Kunitachi, Tokyo 186-8601, Japan
tel: +81 42 580 8668 <http://hias.hit-u.ac.jp/>

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René Belderbos

KU Leuven, Maastricht University, and UNU-MERIT

Shinya Suzuki

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Hiroyuki Okamuro

Komazawa University and HIAS, Hitotsubashi University

Kazuhiro Asakawa

Keio University

Abstract

Multinational enterprises (MNEs) find it challenging to transfer technological knowledge to their overseas affiliates, as this transfer requires the exchange of tacit knowledge and because technological knowledge may spill over to local rivals. The use of expatriate employees may help MNEs to address these challenges, aiding in the transfer process and ensuring tighter control of this transfer. In this paper we examine under which conditions the assignment of expatriates to foreign affiliates is associated with higher levels of technology transfer by the MNE to those affiliates. Drawing on rich micro data on Japanese MNEs and their foreign affiliates, 2013-2022, affiliate fixed effect analysis confirms that expatriates facilitate knowledge transfer to foreign affiliates in particular for small and medium sized MNEs, MNEs that are technology leaders, and when an affiliate is minority-owned by the MNE or is facing rising geopolitical risks in the host country.

Keywords: Multinational Enterprise (MNE), Small and Medium sized Enterprise (SME), expatriates, foreign affiliates, technology transfer

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INTRODUCTION

Multinational enterprises (MNEs) transfer technological knowledge to their overseas affiliates to develop processes and products for local and export markets. Little is known about the firm-level determinants of such knowledge transfers, with most of the literature focusing instead on the antecedents and consequences of R&D in foreign affiliates (e.g. Song et al., 2011; Belderbos, 2003; Belderbos et al., 2008; Park and Belderbos, 2022). Ramachandran (1993) found that the level of technology transfer to foreign ventures in India was higher for wholly owned affiliates compared to joint ventures, which he attributed to the greater risks of dissipation of proprietary technology in the latter case. Hines (1995) observed that technology transferred to affiliates of U.S. firms was influenced by the tax regime, in particular the presence of withholding taxes. Wakasugi and Ito (2009), Smith (2001) and Branstetter et al. (2006) observed that the strength of the host country intellectual property rights (IPR) protection regime promotes technology licensing to foreign affiliates. In general, the returns to technology transfer are at risk if foreign affiliates are exposed to potential knowledge spillovers and misappropriation (Schmiele, 2013; Belderbos et al., 2021; Bruno et al., 2022), which may lead MNEs to reduce their knowledge transfer to foreign affiliates. Technology licensing, if it occurs, is likely to improve the (productivity) performance of the affiliate (Belderbos, Ito, Wakasugi, 2008).

One important strategy to mitigate the problems that arise from international knowledge transfer is to utilize expatriate employees sent from headquarters (Ge and Li, 2019; Berry, 2017; Yang et al. 2022; Tan and Mahoney, 2006; Belderbos and Heijltjes, 2005; Harzing and Podelko, 2016; Fang et al., 2010; Cho, 2018). Expatriates can aid the effectiveness of the transfer of (technological) knowledge and assist in the control of such transfers to avoid local knowledge leakage. Assigning expatriates from the home country headquarters to a foreign affiliate helps the MNE to exert control over operations and knowledge management. Berry (2017) finds that

US affiliates that are managed by expatriates are more likely to file for local patents for parent firm technologies, presumably because the MNE seeks to transfer and exploit the technologies in the host country. While there is initial evidence that expatriate employees aid technology transfer, it is not clear under which contingencies the use of expatriates is an effective strategy allowing MNEs to transfer technology to their foreign affiliates.

In this study, we develop and test a framework to allow for an examination of such contingencies. In our conceptualization the assignment of expatriates to aid and control technology transfer depends on 1) alternative, less costly or more effective, strategies available to manage knowledge transfer and control spillovers, 2) the value of the underlying technologies to be transferred, and 3) the likelihood that a transfer leads to knowledge spillovers and misappropriation. We argue that for smaller MNEs, reliance on expatriates may be the only feasible source of control over knowledge transfer, while large MNEs may have alternative (organizational) strategies at their disposal, such that the use of expatriate personnel has a more pronounced association with technology transfer to an affiliate of a Small and Medium Sized enterprise (SME) than for a foreign affiliate of a larger firm. Second, we argue that the costs of unwanted knowledge spillovers abroad will be greater if the MNE is a technology leader, as it has more valuable technological knowledge to transfer and protect. Third, the risks of knowledge misappropriation and difficulties in transferring technological knowledge are greater if the affiliate is a joint venture with a local firm in which the MNE lacks full management control to contain opportunistic behavior of the joint venture partner, or if there are substantial geopolitical risks in the host countries potentially threatening the technology base of the affiliate. Drawing on unique official and unpublished micro data on Japanese MNEs and their foreign affiliates in more than 40 countries, 2013-2022, affiliate fixed effect panel analysis provides support for these hypotheses.

THEORY AND HYPOTHESES

A key reason why MNEs exist is that they possess (intangible) firm-specific assets that provide the basis for competitive advantage and that can be transferred abroad for exploitation in foreign markets. Pioneering contributions by Buckley and Casson (1976) and Teece (1977) conceptualize MNEs as expanding overseas to utilize their knowledge assets in foreign markets. By transferring knowledge assets to overseas operations, multinational companies can gain a competitive advantage over local and foreign competitors (Hymer, 1960). However, such knowledge transfer across borders is not without difficulty. It requires human resources and harbors risks. First, technological knowledge usually has both codified and tacit elements. The existence of tacit knowledge renders knowledge transfer difficult even within the context of an organization (Teece, 1977, 1996; Szulanski, 1996). It requires personal interaction and dedication of human resources (Fang et al., 2010). In particular, if knowledge is to be transferred abroad, this overseas transfer exacerbates difficulties due to geographic and cultural distance (Kogut and Zander, 1992). Second, transfer may lead to undesirable spillovers to, and misappropriation by, foreign competitors (Belderbos et al., 2021; Zhao, 2006; Branstetter, 2006). Local competitors can acquire the MNE's technology by imitating the products and manufacturing processes introduced (Blomstrom and Kokko, 1998; Keller and Yeaple, 2009), by learning about MNE technologies if they share local suppliers (Javorcik, 2004), and by obtaining access to tacit knowledge by hiring employees who previously worked at the affiliate of the MNE (e.g. Sofka et al., 2014). Hence, MNEs need to employ measures to guard against knowledge spillovers and to facilitate appropriation of their technology knowledge in foreign markets.

Extant research has suggested that organizational practices of MNEs can serve to protect their

intangible assets from local misappropriation (Zhao, 2006; Alcácer and Zhao, 2012; Nandkumar and Srikant, 2016; Srikant et al., 2020; Belderbos et al. 2021). Zhao (2006) found that MNEs can rely on a segmentation of tasks involved in R&D projects across geographically dispersed R&D sites. Alcácer and Zhao (2012) suggested that such ‘internal linkage’ strategies, as identified by multi-location inventor teams, indeed reduce knowledge spillovers between collocated firms. Belderbos et al. (2021) confirm that firms adopting such an internal linkage strategy see their market value rise if they invest in weak IPR environments abroad. Yet, such intra-firm organizational strategies across dispersed R&D sites are complex and costly (Nayak et al., 2025; Seo et al., 2020) and may not be an effective option in particular for smaller MNEs that do not operate multiple R&D units.

An alternative strategy to mitigate the problems that arise from international knowledge transfer is to utilize expatriate employees sent from headquarters (Fang et al., 2010; Harzing and Podelko, 2016; Ge and Li, 2019; Berry, 2017; Yang et al. 2022; Tan and Mahoney, 2006; Belderbos and Heijltjes, 2005; Michailova et al., 2023). The literature on expatriation has attributed its use to two specific roles: coordination and control on the one hand, and knowledge creation and learning on the other hand (Belderbos and Heijltjes, 2005; Tan and Mahoney, 2006). A control and coordination view (e.g., Zeng et al., 2023; Boyacigiller, 1990; Kumar and Seth, 1998; Wang, Wee and Koh, 1998; O’Donnell, 2000) sees parent firms as seeking ways to align the affiliate’s objectives with its own. In this view, the use of expatriates is one way to control operations abroad. The appointment of expatriates to an affiliate helps to ensure that the way the affiliate is managed and operated is in line with the interest of the parent company (Geringer and Frayne, 1990; Wang, Wee and Koh, 1998) and can thus be considered as a means of headquarters supervision or as a mechanism of social control (O’Donnell, 2000). A learning perspective on expatriation (e.g., Fang et al., 2010; Harzing and Podelko, 2016; Downes and

Thomas, 2000; Bonache and Brewster, 2001) sees expatriation as a means to facilitate the transfer and creation of knowledge to develop the competitive position of the organization. The tacit nature of knowledge and best practice transfer requires in-depth knowledge, which expatriate employees sent from the home country are more likely to possess (Boyacigiller, 1990; Delios and Björkman, 2000). Interactions at the level of the individual are necessary to permit the transfer, recombination, and creation of tacit knowledge (Grant, 1996). Expatriates can as such act as ‘depots of knowledge’, which enables the transfer of intellectual capital between parent and affiliate (Belderbos and Heijltjes, 2005). At the same time, the use of expatriates is often more costly than hiring employees locally due to the additional cost of international relocation of expatriates and their families (Belderbos and Heijltjes, 2005; Delios and Björkman, 2000).

Hypotheses

In our conceptualization the role of expatriation in technology transfer depends on three contingencies: 1) the presence of alternative strategies available to the MNE to control knowledge outflows, 2) the value of the underlying technologies requiring greater control to avoid knowledge spillovers, 3) the likelihood that technology transfer leads to knowledge spillovers and misappropriation. We first develop a baseline hypothesis on the positive relationship between expatriation and technology transfer. Subsequently, we examine the three contingencies and argue that SMEs have little opportunity to deploy alternative (organizational) strategies, that technology leaders risk greater value losses of knowledge spillovers, and that joint ventures exhibit greater risks that such unwanted knowledge spillovers occur.

Expatriates are imbued with the norms, values, and practices of the company, and foreign assignments will provide them with more opportunities for career advancement within the company at home (Bonache and Brewster, 2001). They are expected to work in the affiliate to

align affiliate operations with the broader goals of the MNE in their control function, and to facilitate the transfer of knowledge in their learning function (Cho, 2018; Fang et al., 2010). The two roles of expatriates align well with the needs of effective technology transfer to affiliates. The control and coordination role (Edström and Galbraith, 1977) involves ensuring that technology transfer is controlled to avoid technological knowledge spilling over to local rivals. The knowledge and learning role aligns with the need to collaborate with local employees to transfer tacit knowledge and capabilities to the foreign affiliate (Kogut, 1988, Harzing and Podelko, 2016) for effective knowledge transfer of the technology. Hence, if an affiliate has more expatriates seconded to it relative to local employees, both the effectiveness of knowledge transfer and the control over this transfer will be enhanced, such that greater technology transfer is facilitated.

(Baseline) Hypothesis 1: *Technology transfer to a foreign affiliate is positively associated with the intensity of the assignment of expatriates to that affiliate (the expatriation rate).*

SMEs are confronted with several disadvantages regarding innovation and international activities, the so-called ‘liability of smallness (Aldrich and Auster, 1986), ranging from a lack of financial and technological resources and skills, inability to access information, to a lack of experience and credibility and negotiating power towards international partners (Eden, Levitas, and Martinez, 1997; Paul, Parthasaratha, and Gupta, 2017; Reuber and Fischer, 1997; Urata and Kawai, 2000). The experiences of expatriates could help overcome some of these barriers (Child, Karmowska, and Shenkar, 2022; Musteen, Datta, and Butts, 2014; Paul et al., 2017). In SMEs, given their less hierarchical organization due to their smallness, expatriates are likely to have direct information channels with the management board of the parent firm, allowing them to assume greater responsibility for affiliate operations and to play a more salient role in the

affiliates they are assigned to. In addition, while organizational practices and other strategies of MNEs, such as inter-unit R&D collaboration and litigation, can serve to protect their intangible assets against dissipation risks, these are typically less available to SMEs. Internal linkage strategies require a rich R&D network across multiple locations, which is not a feature of SMEs due to their limited resources. Large MNEs may also rely on other costly knowledge protection strategies (de Faria and Sofka, 2010) such as building a reputation for litigation against intellectual property rights infringements (Marx et al., 2009, Agarwal et al., 2009; Edris et al., 2024) combined with using other legal instruments such as non-compete contracts for employees (Ganco et al., 2015; Toh and Kim, 2013; Agarwal et al., 2009). Smaller MNEs generally do not have the capabilities and resources to follow such alternative strategies to aim to reduce knowledge spillovers and knowledge misappropriation (Eden, Levitas, and Martinez, 1997). Instead, their only feasible source of control over technology transfer and spillovers may be the use of expatriates. This suggests that in affiliates of SMEs, the use of expatriation is more valuable and more likely to be required to enhance technology transfer. We hypothesize:

Hypothesis 2: *The association between the affiliate expatriation rate and technology transfer to the foreign affiliate is stronger when the MNE is an SME.*

If the MNE is a technology leader it will have ample technologies to transfer, which will require a greater use of expatriates. Technology leaders are also likely to transfer more complex and frontier technologies (Belderbos, Lykogianni Veugelers, 2008) with more tacit components to transfer, which requires more transfer effort. In addition, technology leaders also have more to lose if the technology spills over to local rivals, requiring a more intensive deployment of expatriates to maintain proper control over the transfer process. This suggests that technology leadership enhances the positive role of expatriation for technology transfer. We hypothesize:

Hypothesis 3: *The association between the affiliate expatriation rate and technology transfer to the foreign affiliate is positively moderated by the strength of technology leadership of the MNE.*

The risk that knowledge transfer leads to technology misappropriation will be higher if a foreign affiliate finds itself in a situation of violent geopolitical conflict related to military activity, wars, terrorist threats. Multinational firms can respond in various ways to geopolitical risks (Andrews et al., 2025). The threat of destruction, expropriation, disappearance of engineers and other havoc the affiliate can be confronted with will require able management of parent firm interest in close communication with headquarters. This is a role that is typically assumed by expatriates. While technology transfer under circumstance of such geopolitical risk is expected to be lower, having expatriates may partially mitigate the transfer risk. Expatriates will have a more pronounced role in guarding the exploitation and ownership of technology and rendering transfer to the affiliate possible.

Hypothesis 4: *The association between the affiliate expatriation rate and technology transfer to the foreign affiliate is stronger for affiliates in host countries exhibiting stronger geopolitical risks.*

MNEs may find it more difficult to control knowledge spillovers in affiliates if these are joint ventures (JVs) with local firms, especially when the MNE only has a minority stake in the affiliate and cannot exert full control (Ramachandran, 1993). An affiliate that is not majority controlled will be less aligned in operations and management culture with the Japanese MNE, requiring more effort on the part of the MNE to transfer technology. In addition, in such joint

ventures, leakage of technological knowledge and potential misappropriation by the majority partner can become a salient issue (Jiang et al., 2024; Ramachandran, 1993). Lack of management control increase the risk of opportunistic behavior on the part of the local partner, which could for instance benefit by utilizing the technology in its own operations. It thus becomes crucial for the MNE to guard against the risk of knowledge dissipation and assign more expatriates to assume a stronger control over technology transfer. Effective knowledge transfer will require a more intensive use of expatriation. We hypothesize:

Hypothesis 5: *The association between the affiliate expatriation rate and technology transfer to the foreign affiliate is stronger for affiliates in which the MNE does not have majority control.*

DATA, VARIABLES AND MEHODS

We constructed a unique dataset of Japanese MNEs and their affiliates in foreign countries, drawing on affiliate micro data from the Basic Survey on Overseas Business Activities of Japanese firm (BSOBA) and the Basic Survey of Japanese Business Structure and Activities (BSJBSA) for parent firm traits. The BSOBA survey contains information on foreign affiliates' R&D, expatriates, royalty payments by the affiliate for knowledge transfer from the parent, and local and international sales and procurement, among others. We tracked foreign affiliates of Japanese manufacturing MNEs between 2013 and 2022, the years during which the BSOBA was available and conducted on an annual basis. The BSJBSA survey contains information on parent firm traits such as patent holdings and financial information. We augmented the data with information from external databases on county characteristics such as the country-specific Geopolitical Risk (GPR) index (Caldara and Iacoviello, 2022; Caldara et al., 2025) and the Fraser institute's Institutional Profiles Database (IPD). We restrict analysis to affiliates in which the Japanese MNE has at least a 10% ownership and for which information on technology

transfer is available. This resulted in a panel of 8,061 foreign manufacturing affiliates owned by 3,583 Japanese MNEs, leading to 31,363 observations. The affiliates are located in 42 countries/regions (Table 1) and operate in 16 manufacturing industries (Table 2).

Dependent variable

We relate the yearly value of technology transfer from a Japanese parent firm to a foreign affiliate to affiliate characteristics, parent firm characteristics, and host country characteristics. The dependent variable, technology transfer is the payment (in million yen) from a foreign affiliate to the parent firm for technology licenses and knowledge transfer - which includes payment for the technology as well as the costs involved in the transfer. Such payments have been used in prior work as an appropriate measure of technology transfer within MNEs (Branstetter et al., 2006). We log-transform the variable to reduce skewness.

Focal explanatory variables

The core independent variable is the importance of expatriate employees dispatched from the parent firm in Japan to the affiliate. Following prior studies (Fang et al., 2010) we include the ratio of expatriates to total employees in a foreign affiliate to test Hypothesis 1. We draw on BSOBA, which surveys the number of employees and the number of expatriate employees in Japanese foreign affiliates. Hypothesis 2 is tested by interacting the expatriate ratio with a dummy variable indicating whether an MNE is a small and medium-sized enterprise (SME), drawing on BSJBSA. The SME dummy takes the value of 1 if a firm has fewer than 300 employees and a capital base smaller than 300 million yen, following the definition for the manufacturing sector of the Small and Medium-sized Enterprise Basic Act in Japan. To test Hypothesis 3, a variable representing the level of technology leadership of a focal firm is included and interacted with the expatriate ratio. Technology leadership of an MNE is measured

by the logarithm of the number of patents owned by the MNE and is obtained from BSA. Hypothesis 4 is tested by interacting the expatriate ratio with a variable capturing the level of country risk in the host country.

Hypothesis 4 is tested by interacting the expatriate ratio with a measure of political risk in the host country. We use the well established GeoPolitical Risk (GPR) index of Caldara and Iacoviello (2022) based on coding of newspaper articles reporting on adverse geopolitical events and tensions.¹ For 44 advanced and emerging countries, Caldara and Iacoviello calculate the country-specific GPR index by counting the share of newspaper articles reporting on a country referring to beginning and escalation of wars, military buildups, terrorist acts, threats between states, terror threats and actual terror acts. The resulting index capture the geopolitical risks involving the country in question with a violent and military core – which are arguably among the most pronounced risks a foreign affiliate may have to deal with. The index ranges from just above zero for a maximum of close to 3.7. The highest scores in our investigation period are observed for Russian Federation in 2022. Finally, to test Hypothesis 5, we create a dummy variable Minority Joint Venture, indicating whether an affiliate is a minority-owned joint venture (< 50% equity stake). This variable is interacted with the expatriate ratio to test for Hypothesis 4.

Control variables

In addition to the main effects of SME, minority own joint venture, and parent technology leadership, we include a set of variables to control for other factors that may affect technology transfer at the affiliate, parent firm, and host country levels. At the affiliate level, we include R&D intensity, the logarithm of the number of employees as a measure of size, affiliate profits,

¹ Available at <https://www.matteoiacoviello.com/>

the local sales ratio, the local procurement ratio, affiliate age and the square of affiliate age, and a dummy variable whether the affiliate is majority owned (instead of minority owned or wholly owned). R&D intensity of an affiliate is a key determinant of technology transfer because an affiliate with technological absorptive capacity is more likely to be able to properly assimilate and utilize the technologies transferred from the parent firm (Belderbos, Ito, Wakasugi, 2008). The profit generated by the affiliate is included since more profitable affiliates could pay a larger amount of royalties in return for technology transfer. The local sales ratio is calculated as the share of local sales in total sales of a foreign affiliate, and the local procurement ratio is measured as the share of local sources of procurement in total procurement of the foreign affiliate. A higher local sales ratio could be associated with technology transfer, given the importance of the host country market. A higher local procurement ratio could be negatively associated with technology transfer from the parent because of a greater dependence on the local supply chains rather than global supply chains and intermediates from the parent. An affiliate that has been operating for longer time may have developed more affiliate resources and employee skills, such that it can receive more technology transfer from the parent firm and utilize it locally. On the other hand, affiliate experience may also lead to a more autonomous local R&D organization and less dependence on technology transfer from the parent. We therefore include both the linear and quadratic terms of affiliate age and may expect an inverted U-shaped relationship. At the parent firm level, we included the logarithm of the number of employees, as a larger parent firm could have the resources to develop a more efficient transfer system of technologies to its foreign affiliates.

At the host country level, we included the GDP growth rate and the logarithm of GDP per capita to capture market opportunities in the host country. Growing markets and markets with high income and sophisticated consumers invite MNEs to invest in better technologies to improve

products and processes. We draw on the CEPII database for information on GDP. The variable patents per capita is included to control for the technological environments of the affiliate's host country, drawing on WIPO data. Following Belderbos et al. (2021), we include as a measure of Intellectual Property Risk a risk measure consisting of the Ginarte and Park patent protection index multiplied by a measure of the strength of impartial courts. We include the corporate tax rate in the host country and may expect a positive influence, as transfer payments reduce the local tax burden (Santacreu, 2023). We draw on KPMG's Corporate tax rates table. Capital controls in the host country may be associated with obstacles to receiving royalty payments; we include a 0-10 rating based on Fraser institute's economic freedom database. When a host country labor market is rigid and labor mobility is low, risks of technology leakage caused by mobility of workers could be smaller. We included an indicator of labor market rigidity, from the CEPII's Institutional Profiles Database. We also included a measure of judicial independence from the Fraser Institute; this may facilitate legal action in the case of licensing contract breaches. Finally, we included year dummies to control for time-specific effects.

Descriptive Statistics. The descriptive statistics are shown in Table 3 and the correlations in Table 4. The average share of expatriates in total employees in the affiliates is 3.3%. Affiliates with minority ownership account for 6.7% of the whole sample, while majority-owned and wholly owned affiliates count for 23.8% and 69.5%, respectively.

Methods

We examine the relationship between technology transfer to foreign affiliates and the use of expatriate personnel using panel fixed-effect regression. Fixed effects at the affiliate level control for time-invariant unobserved heterogeneity that could drive differences in technology transfer. We note that the difficulty of finding valid instruments for expatriation and its

moderating influences precludes us from making causal inferences. The variables expatriate ratio and technological leadership were mean-centered to enable interpretation of their main effects as evaluated at the mean level of the interacted variable.

EMPIRICAL RESULTS

The results are presented in Table 5. Model 1 only contains the control variables. In Model 2, we include the expatriate ratio (Hypothesis 1). In models 3-6 we include cumulatively the three hypothesis-testing interaction terms corresponding to Hypothesis 2-5.

Model 1 shows that technology transfer is significantly associated with various traits related to parent MNEs, their affiliates, and host countries of the affiliates. We find statistically significant associations between technology transfer and affiliate size, parent firm size, affiliate profitability, technology leadership of the MNE, and local patenting per resident, in addition to an inverted U-shaped relationship with affiliate age. In model 2, the expatriate ratio has a significantly positive coefficient, confirming baseline Hypothesis 1. However, the subsequent models show that this influence is contingent on MNE and affiliate factors as argued in Hypotheses 2-5. In model 3, the coefficient of the interaction term between expatriate ratio and the SME dummy has a positive sign and is statistically significant. This finding suggests that the role of expatriates in transferring the technology is more important for SMEs than for larger MNEs, in support of Hypothesis 2.

In model 4, we examine whether the relationship between the expatriate ratio and technology transfer is affected by technological leadership of the MNE. The coefficient of the interaction term between expatriate ratio and technology leadership is positive and statistically significant. This finding suggests that the assignment of expatriates promotes technology transfer when the

MNE has a larger patent stock, supporting Hypothesis 3. In Model 5, we investigate whether country risk in the affiliate's host country moderates the relationship between the expatriate ratio and technology transfer. The interaction term between the expatriate ratio and country risk is positive and statistically significant. This indicates that expatriates play a more critical role in facilitating technology transfer when affiliates operate in environments characterized by higher country risk, consistent with Hypothesis 4. In model 6, we add the interaction term between expatriate ratio and affiliate minority ownership. It has a positive sign and is statistically significant. This finding suggests that the assignment of expatriates promotes technology transfer more strongly when the MNE only has a minority stake in the affiliate, in support of Hypothesis 5.

We examined the consistent magnitudes of the association between expatriation and technology transfer. Technology transfer increases by 10.1% with a one standard deviation increase in the expatriate ratio when the firm is an SME, while we cannot observe a significant increase in technology transfer for an average large MNE. Technology transfer increases by 18.0% with a one standard deviation increase in the expatriate ratio when an affiliate is minority-owned, while a significant increase in technology transfer is not observed for wholly or majority-owned affiliates. To illustrate the moderating influences of the continuous variables we drew Figures 1 and 2 based on the results of Model 6 in Table 5. The figures presents the proportional change in technology transfer associated with a one-standard deviation increase in the expatriate ratio, conditional on the range of values of the moderator, accompanied by 95% confidence intervals. Figure 1 shows that technology transfer increases by about 11.3% with a one-standard deviation increase in the expatriate ratio when an MNE is a technological leader (maximum value), while the increase is only 2.4% in the mean of technology leadership. The relationship becomes insignificant for values below the mean. Similarly, Figure 2 demonstrates that technology

transfer increases by 10.9% with a one-standard deviation increase in the expatriate ratio when an affiliate operates in a host country with the highest level of country risk, while the corresponding increase is only 2.4% in a location with an average level of country risk. These results indicate the considerable influence of the moderating factors on how expatriate use is associated with technology transfer to affiliates.

Supplementary analysis

We conducted supplementary analysis to examine the robustness of our findings, results of which are relegated to a separate appendix. We argued that the knowledge spillovers and misappropriation risk are salient for minority owned affiliates. In a sensitivity analysis, we also included the interaction effect of majority owned ventures (between 50 and 95 percent Japanese owned). This analysis confirmed that this interaction coefficient was not significant, in line with our argument that expatriation advantages are contingent on situations with the highest risks of knowledge leakage. Second, we distinguished between SMEs and non-SMEs using the official definition of SMEs that regards firms with more than 300 employees no longer as SMEs. We also examined if results hold when using a broader definition, of 500 employees. We find similar results if we define SMEs as firms with fewer than 500 employees.

DICUSSION AND CONCLUSION

We examined under which conditions the assignment by MNEs of expatriates to foreign affiliates is associated with higher levels of technology transfer. On average, there is a positive relationship between the assignment of expatriates and technology transfer to the affiliate. At the same time, the role of expatriation is subject to boundary conditions, since the value of expatriation to facilitate knowledge transfer and control depends on other (organizational) strategies available to the MNE to achieve the same goals, the value of the technology to be transferred, and the inherent risk that technologies transferred end up misappropriates. Hence,

the relationship is significantly moderated by MNE and affiliate characteristics. The influence of expatriation on technology transfer is stronger when the MNE is an SME and has fewer alternative (organizational) strategies at hand to guard against unwanted knowledge spillovers. The relationship is strengthened by the degree of technological leadership of the MNE, reflected in its patent applications, as more valuable technologies require more effort in the transfer process and require greater protection. The relationship is substantially and significantly strengthened if the foreign affiliate is confronted with higher geopolitical risks, potentially threatening the affiliate's hold on and exploitation of the technology transferred. Finally, the relationship is also stronger for minority owned affiliates, since the risk of opportunistic behavior and technology spillovers are more acute if the MNE cannot exert management control. We conclude that the use of expatriates helps MNEs to address the challenges related to the safe transfer technological knowledge to their overseas affiliates by aiding the transfer process and ensuring tighter control over this transfer to reduce unwanted knowledge spillovers and misappropriation. Yet the relative effectiveness of expatriation depends on the degree of ownership in the local venture, parent firm size, and MNE technology leadership.

Our theory and tests contribute to several streams of literature. We extend prior work on the antecedents of technology transfer to foreign affiliates (e.g., Ramachandran, 1993; Branstetter 2006; Belderbos, Ito, Wakasugi, 2008) by demonstrating expatriates' crucial, but contingent, role in technology transfer. We also bring new insights to the literature on expatriate assignment (Harzing and Podelko, 2016; Belderbos and Heijltjes, 2005; Yang et al. 2022; Berry, 2017; Fang et al., 2010) which has suggested and examined the role of expatriates in affiliate performance and intra-firm knowledge flows, but has not examined technology transfer and intra-firm licensing of technologies. We contribute by showing the contingencies under which expatriates are most effective in facilitating technology transfer to foreign affiliates. We add to the literature

on the internationalization of SMEs (e.g. Musteen, Datta, and Butts, 2014; Paul et al., 2017) by highlighting that expatriates play a more salient role in SMEs with fewer resources and alternative means at their possession to control knowledge transfers. Finally, we add to the nascent literature on geopolitical risk in international business (Andrews et al., 2025; Luo and Tung, 2025) by highlighting how expatriates can play a positive role in safeguarding technology transfer to foreign affiliates under rising geopolitical risk.

While our research emphasizes the important role of expatriates in safeguarding intellectual capital of the MNE when expanding abroad, we also note a number of limitations of our research. The difficulty of properly instrumenting for expatriation decisions led us to interpret the findings as associations rather than causal relationships. Second, we argued that alternative strategies that MNEs can deploy to reduce spillovers and appropriate the returns to knowledge transfer, but a lack of information prevented us from examining the occurrence of these other strategies. Third, the survey data we relied on are limited to firms with at least 50 employees, which renders our analysis less representative for the smallest SMEs – if these establish foreign manufacturing affiliates. Fourth, we did not examine dynamic aspects of the role of expatriates and knowledge transfer. One could envisage that the speed of internationalization influences the utilization of expatriates and the need for technology transfer, with experienced MNEs relying more on training of host country nationals (Belderbos and Heijltjes, 1995; Kang et al., 2022; Fang et al., 2010; Cho, 2018). Fifth, our analysis could only examine the intensity of expatriate employment in affiliates, and we could not examine heterogeneous influences of different expatriate roles and functions (Harzing and Podeloko, 2016). Finally, while we argued and found that expatriate deployment is a more powerful tool for effective knowledge transfer, future research should also study whether such transfers are indeed related to affiliate performance in terms of growth and profitability.

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Table 1. Distribution of affiliates over host countries

Country	Frequency	Percent
China	3075	38.15
Thailand	1161	14.4
United States	727	9.02
Indonesia	549	6.81
Viet Nam	533	6.61
Malaysia	322	3.99
Korea, Rep.	265	3.29
Philippines	252	3.13
India	235	2.92
Mexico	146	1.81
Hong Kong SAR, China	140	1.74
United Kingdom	92	1.14
Brazil	91	1.13
Germany	86	1.07
France	55	0.68
Canada	44	0.55
Australia	37	0.46
Netherlands	35	0.43
Italy	27	0.33
Spain	24	0.3
Russian Federation	21	0.26
Poland	20	0.25
Hungary	19	0.24
Belgium	16	0.2
Turkiye	16	0.2
South Africa	11	0.14
Others	62	0.75
Total	8061	100

Table 2. Distribution of affiliates over industries

Sector	Frequency	Percent
Food	359	4.45
Textiles	369	4.58
Wood pulp and paper	147	1.82
Chemicals	703	8.72
Petroleum and coal	28	0.35
Ceramics, Soil and Stone	176	2.18
Iron and Steel	195	2.42
Nonferrous metals	260	3.23
Metal Products	532	6.6
General Machinery	290	3.6
Production Machinery	676	8.39
Business Machinery	222	2.75
Electrical machinery	481	5.97
Information and telecommunications machinery	686	8.51
Transportation Machinery	1828	22.68
Other manufacturing	1109	13.76
Total	8061	100

Table 3. Descriptive Statistics

(obs=31,363)

Variable	Mean	Std. dev.	Min	Max
DV: Technology Transfer	2.850	2.327	0	11.443
Expatriate Ratio	0.033	0.074	0	1
SME dummy	0.388	0.487	0	1
Tech Leadership	3.918	3.382	0	11.693
Country Risk	0.567	0.732	0.006	3.690
Minority Ownership	0.067	0.251	0	1
Majority Ownership	0.238	0.426	0	1
Affiliate R&D intensity	0.006	0.053	0	4.667
Affiliate Employees	5.125	1.548	0	11.071
Affiliate Profits	0.610	4.022	-99.408	333.891
Local Sales Ratio	0.692	0.353	0	1
Local Procurement Ratio	0.656	0.333	0	1
Affiliate Age	2.748	0.643	0	4.787
Parent Employees	3.994	9.972	0	106.226
GDP Growth Rate	0.042	0.032	-0.111	0.133
GDP per capita	9.238	0.929	7.279	11.508
Patents by Residents per Population	0.418	0.608	0	3.600
IPR Risk Index	0.562	0.183	0.065	0.945
Corporate Tax Rate	25.135	4.754	9	39.076
Capital Controls	1.619	1.818	0	9.231
Labour Market Rigidity	3.085	0.600	1	4
Judicial Independence	1.899	1.601	0	4

Note: Affiliate employees, parent employees, technology transfer, and technology leadership are taken in natural logarithms.

Table 4. Correlations

(obs=31,363)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Technology Transfer (DV)																					
2 Expatriate Ratio	-0.12																				
4 SME dummy	-0.31	0.05																			
5 Tech Leadership	0.30	-0.04	-0.61																		
3 Country Risk	0.02	0.06	-0.04	0.06																	
6 Minority Ownership	-0.09	-0.03	0.02	-0.03	-0.08																
7 Majority Ownership	0.08	-0.05	-0.11	0.07	-0.09	-0.15															
8 Affiliate R&D intensity	-0.03	0.01	-0.02	0.04	0.05	0.01	-0.01														
9 Affiliate Employees	0.54	-0.43	-0.34	0.35	-0.10	-0.01	0.08	-0.01													
10 Affiliate Profits	0.19	-0.03	-0.10	0.13	0.00	0.00	0.05	0.00	0.20												
11 Local Sales Ratio	0.13	0.05	-0.04	-0.06	0.15	0.07	0.10	-0.02	-0.09	0.01											
12 Local Procurement Ratio	0.01	-0.03	0.09	-0.16	0.04	0.09	0.09	0.01	0.00	0.01	0.21										
13 Affiliate Age	0.17	-0.15	-0.09	0.12	0.14	0.03	0.01	-0.03	0.26	0.09	-0.09	-0.04									
14 Parent Employees	0.23	-0.04	-0.30	0.56	0.01	-0.02	0.06	0.06	0.27	0.13	-0.02	-0.07	0.08								
15 GDP Growth Rate	-0.04	-0.04	0.05	-0.03	-0.03	0.00	0.04	-0.01	0.04	0.00	-0.03	0.04	-0.14	0.01							
16 GDP per capita	0.02	0.12	-0.07	0.09	0.70	-0.06	-0.11	0.06	-0.19	-0.01	0.07	-0.01	0.22	0.02	-0.28						
17 Patents by Residents per Population	0.06	0.03	-0.04	0.07	0.27	0.01	0.03	0.03	-0.09	0.01	0.08	0.06	0.01	0.03	0.13	0.37					
18 IPR Risk Index	-0.04	-0.12	0.13	-0.14	-0.64	0.06	0.13	-0.05	0.14	-0.01	-0.08	0.07	-0.19	-0.03	0.28	-0.85	-0.23				
19 Corporate Tax Rate	0.06	0.01	-0.16	0.15	0.45	-0.04	-0.06	0.03	0.02	0.02	0.14	-0.03	0.02	0.08	-0.02	0.30	0.23	-0.47			
20 Capital Controls	0.04	0.12	-0.10	0.10	0.20	-0.02	-0.05	0.02	-0.13	0.00	0.02	-0.10	0.17	0.02	-0.42	0.67	0.21	-0.72	0.13		
21 Labour Market Rigidity	0.04	0.03	0.03	-0.06	0.25	-0.09	-0.02	0.00	0.04	-0.01	0.01	0.00	0.01	-0.03	-0.07	0.04	-0.40	-0.06	-0.15	-0.01	
22 Judicial Independence	0.09	0.08	-0.13	0.10	0.08	0.01	-0.04	0.00	0.00	0.02	0.08	-0.11	0.17	0.00	-0.55	0.34	-0.20	-0.56	0.18	0.71	0.14

Note: Affiliate employees, parent employees, technology transfer, and technology leadership are taken in natural logarithms.

Table 5. The Contingent role of expatriates in technology transfer to foreign affiliates: results of affiliate fixed effects estimation

DV: Technology Transfer	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Expatriate Ratio		0.4910*** (0.1900)	0.0999 (0.3422)	-0.3212 (0.2931)	-0.3687 (0.2851)	-0.4511 (0.2839)
Expatriate ratio * SME dummy			0.7088* (0.3745)	1.6465*** (0.4392)	1.7086*** (0.4191)	1.6239*** (0.4258)
Expatriate ratio * Tech Leadership				0.1939** (0.0757)	0.1916*** (0.0739)	0.1531** (0.0671)
Expatriate ratio * Country Risk					0.3599** (0.1591)	0.3653** (0.1591)
Expatriate ratio * Minority Ownership by Japanese Firms						2.1930*** (0.5523)
SME dummy	-0.0307 (0.0637)	-0.0299 (0.0637)	-0.0298 (0.0636)	-0.0250 (0.0634)	-0.0251 (0.0633)	-0.0261 (0.0633)
Tech Leadership	0.0152* (0.0092)	0.0148 (0.0092)	0.0149 (0.0092)	0.0166* (0.0092)	0.0166* (0.0092)	0.0163* (0.0092)
Country Risk	-0.0975** (0.0476)	-0.0986** (0.0476)	-0.0987** (0.0476)	-0.0974** (0.0476)	-0.1005** (0.0477)	-0.1008** (0.0477)
Minority Ownership	-0.0752 (0.1286)	-0.0746 (0.1286)	-0.0748 (0.1286)	-0.0744 (0.1286)	-0.0745 (0.1287)	-0.0449 (0.1281)
Majority Ownership	0.0474 (0.0681)	0.0478 (0.0680)	0.0481 (0.0680)	0.0485 (0.0680)	0.0486 (0.0680)	0.0476 (0.0680)
Affiliate R&D intensity	-0.0960 (0.1551)	-0.0954 (0.1548)	-0.0959 (0.1546)	-0.0974 (0.1552)	-0.0988 (0.1559)	-0.1024 (0.1557)
Affiliate Employees	0.4121*** (0.0323)	0.4345*** (0.0338)	0.4312*** (0.0338)	0.4326*** (0.0335)	0.4351*** (0.0336)	0.4386*** (0.0337)
Affiliate Profits	0.0123* (0.0066)	0.0123* (0.0066)	0.0123* (0.0066)	0.0123* (0.0066)	0.0124* (0.0066)	0.0123* (0.0066)
Local Sales Ratio	0.1886** (0.0753)	0.1863** (0.0754)	0.1883** (0.0754)	0.1874** (0.0754)	0.1858** (0.0754)	0.1858** (0.0754)
Local Procurement Ratio	0.0032 (0.0513)	0.0017 (0.0513)	0.0016 (0.0513)	0.0013 (0.0513)	0.0020 (0.0513)	0.0022 (0.0513)
Affiliate Age	0.9041*** (0.1626)	0.9084*** (0.1629)	0.9021*** (0.1627)	0.8981*** (0.1623)	0.8891*** (0.1622)	0.8856*** (0.1619)
Square of Affiliate Age	-0.1322** (0.0664)	-0.1325** (0.0664)	-0.1314** (0.0664)	-0.1313** (0.0663)	-0.1303** (0.0662)	-0.1291* (0.0662)
Parent Employees	-0.0159*** (0.0041)	-0.0158*** (0.0041)	-0.0159*** (0.0041)	-0.0156*** (0.0041)	-0.0156*** (0.0041)	-0.0156*** (0.0041)
GDP Growth Rate	0.6907* (0.3896)	0.6756* (0.3893)	0.6715* (0.3894)	0.6706* (0.3895)	0.6532* (0.3899)	0.6507* (0.3901)
GDP per capita	0.1611 (0.1179)	0.1613 (0.1179)	0.1618 (0.1178)	0.1588 (0.1178)	0.1649 (0.1178)	0.1630 (0.1178)
Patents by Residents per Population	0.0722** (0.0306)	0.0726** (0.0306)	0.0737** (0.0306)	0.0743** (0.0306)	0.0746** (0.0306)	0.0752** (0.0306)
IPR Risk Index	0.1737 (0.4784)	0.2117 (0.4785)	0.2306 (0.4789)	0.2330 (0.4796)	0.2325 (0.4795)	0.2172 (0.4794)
Corporate Tax Rate	0.0014 (0.0040)	0.0018 (0.0040)	0.0019 (0.0040)	0.0018 (0.0040)	0.0019 (0.0040)	0.0018 (0.0040)
Capital Controls	-0.0465 (0.0453)	-0.0463 (0.0452)	-0.0457 (0.0452)	-0.0457 (0.0453)	-0.0492 (0.0454)	-0.0489 (0.0454)
Labour Market Rigidity	-0.5374 (0.8049)	-0.5460 (0.7933)	-0.5383 (0.7953)	-0.5299 (0.7918)	-0.5238 (0.7876)	-0.5370 (0.7851)
Judicial Independence	0.0984 (0.1635)	0.1072 (0.1624)	0.1070 (0.1625)	0.1090 (0.1618)	0.1131 (0.1611)	0.1147 (0.1609)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.9192 (2.5875)	-1.0666 (2.5640)	-1.0855 (2.5687)	-1.0877 (2.5617)	-1.1626 (2.5530)	-1.1161 (2.5468)
Observations	31363	31363	31363	31363	31363	31363
No. of Affiliates	8061	8061	8061	8061	8061	8061
R-Squared	0.2578	0.2638	0.2651	0.2663	0.2673	0.2668

Note: Panel regression with affiliate fixed effects. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively, based on robust standard errors.

Figure 1. The magnitudes of the association between expatriation and technology transfer, conditional on technological leadership

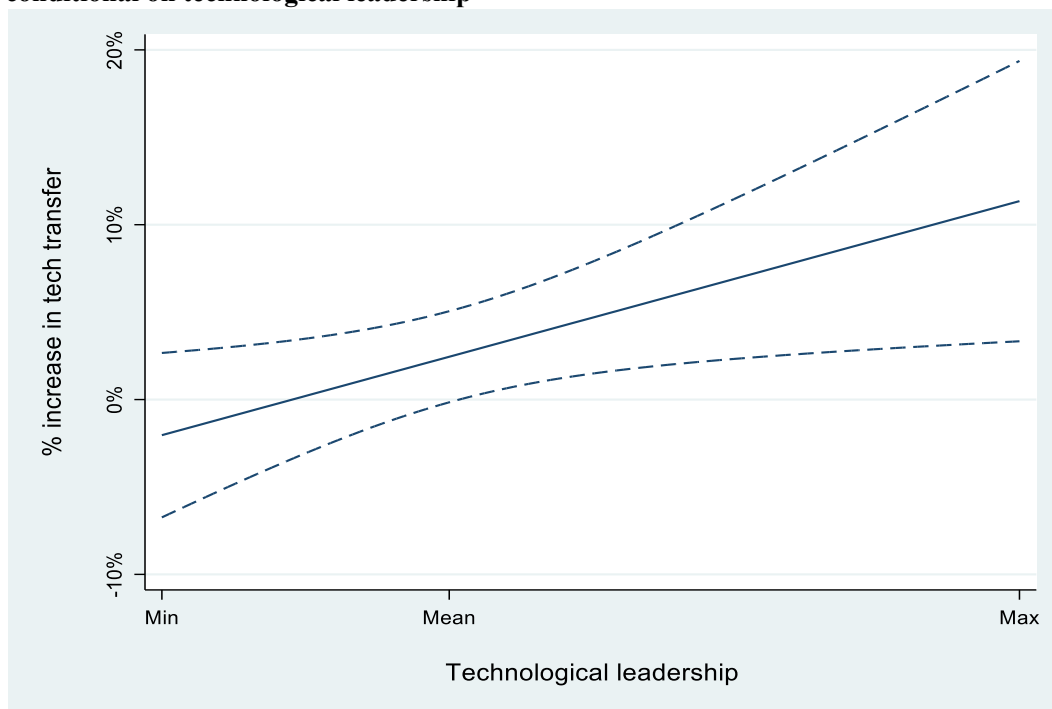
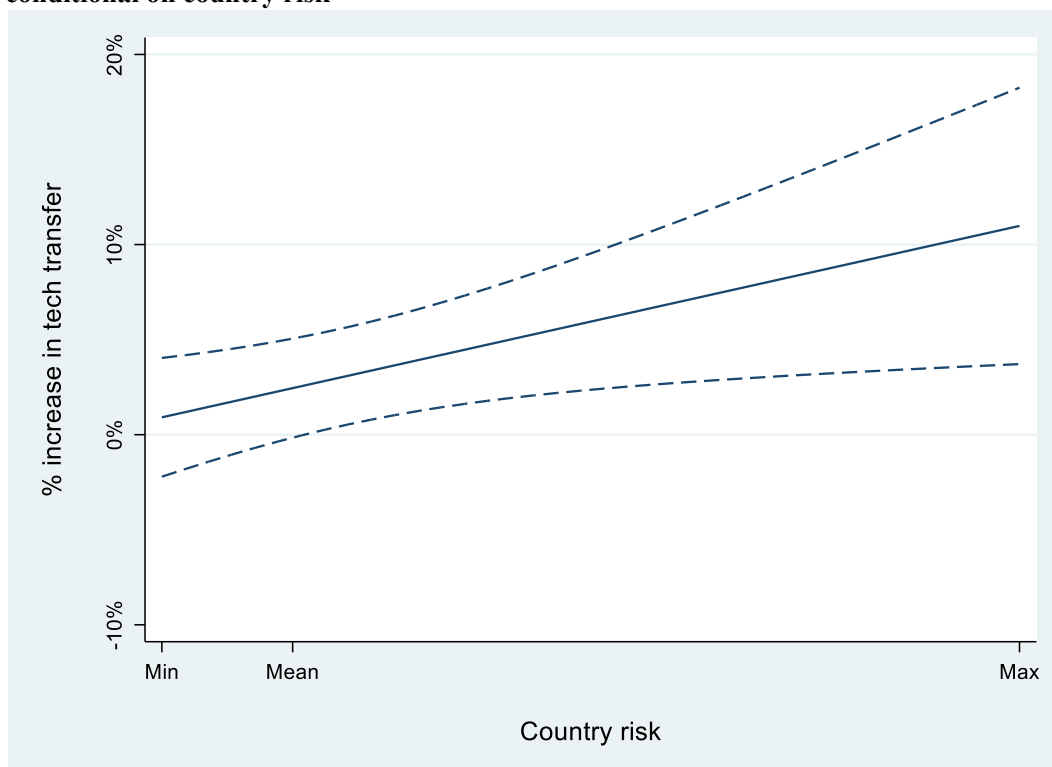


Figure 2. The magnitudes of the association between expatriation and technology transfer, conditional on country risk



Note: Proportional changes in technology transfer associated with a one-standard deviation increase in the expatriate ratio.

Appendix Table 1. The Contingent role of expatriates in technology transfer to foreign affiliates: majority ownership

Expatriate Ratio	-0.4426 (0.2960)
Expatriate ratio * SME dummy	1.6227*** (0.4269)
Expatriate ratio * Tech Leadership	0.1534** (0.0672)
Expatriate ratio * Country Risk	0.3623** (0.1634)
Expatriate ratio * Minority Ownership by Japanese Firms	2.1841*** (0.5600)
Expatriate ratio * Majority Ownership by Japanese Firms	-0.0441 (0.3125)
SME dummy	-0.0260 (0.0633)
Tech Leadership	0.0163* (0.0092)
Country Risk	-0.1007** (0.0477)
Minority Ownership	-0.0447 (0.1282)
Majority Ownership	0.0473 (0.0677)
Affiliate R&D intensity	-0.1024 (0.1557)
Affiliate Employees	0.4386*** (0.0336)
Affiliate Profits	0.0123* (0.0066)
Local Sales Ratio	0.1858** (0.0754)
Local Procurement Ratio	0.0023 (0.0513)
Affiliate Age	0.8854*** (0.1620)
Square of Affiliate Age	-0.1290* (0.0662)
Parent Employees	-0.0156*** (0.0041)
GDP Growth Rate	0.6510* (0.3901)
GDP per capita	0.1629 (0.1178)
Patents by Residents per Population	0.0752** (0.0306)
IPR Risk Index	0.2179 (0.4795)
Corporate Tax Rate	0.0019 (0.0040)
Capital Controls	-0.0488 (0.0454)
Labour Market Rigidity	-0.5378 (0.7849)
Judicial Independence	0.1148 (0.1608)
Year Dummies	Yes
Constant	-1.1134 (2.5468)
Observations	31363
No. of Affiliates	8061
R-Squared	0.2667

Note: Panel regression with affiliate fixed effects. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively, based on robust standard errors.

Appendix Table 2. The Contingent role of expatriates in technology transfer to foreign affiliates: broader SME definition

Expatriate Ratio	-0.3600 (0.2610)
Expatriate ratio * SME dummy	1.5139*** (0.3938)
Expatriate ratio * Tech Leadership	0.1315** (0.0632)
Expatriate ratio * Country Risk	0.4023** (0.1571)
Expatriate ratio * Minority Ownership by Japanese Firms	2.1858*** (0.5517)
SME dummy	-0.0591 (0.0487)
Tech Leadership	0.0158* (0.0092)
Country Risk	-0.1019** (0.0477)
Minority Ownership	-0.0449 (0.1281)
Majority Ownership	0.0480 (0.0680)
Affiliate R&D intensity	-0.1036 (0.1557)
Affiliate Employees	0.4377*** (0.0337)
Affiliate Profits	0.0123* (0.0066)
Local Sales Ratio	0.1836** (0.0754)
Local Procurement Ratio	0.0031 (0.0513)
Affiliate Age	0.8967*** (0.1627)
Square of Affiliate Age	-0.1312** (0.0664)
Parent Employees	-0.0157*** (0.0041)
GDP Growth Rate	0.6665* (0.3900)
GDP per capita	0.1648 (0.1179)
Patents by Residents per Population	0.0737** (0.0306)
IPR Risk Index	0.2037 (0.4783)
Corporate Tax Rate	0.0019 (0.0040)
Capital Controls	-0.0487 (0.0453)
Labour Market Rigidity	-0.5742 (0.7890)
Judicial Independence	0.1165 (0.1609)
Year Dummies	Yes
Constant	-1.0080 (2.5544)
Observations	31363
No. of Affiliates	8061
R-Squared	0.2630

Notes: Panel regression with affiliate fixed effects. ***, **, * indicate significance levels of 1%, 5%, and 10%, respectively, based on robust standard errors.