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RESEARCH NOTE

Bilateral political tension and the signaling role of patenting in a host country

Nan Zhou[1] · Jiatao Li[2] · Jue Wang[3]

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Abstract

The current increasing volatility in international politics makes it more important to understand how multinational enterprises respond to political tension between host and home countries. This paper explains the impact of macro-level bilateral political tension on micro-level strategy of multinationals in the host country. We developed the idea that patenting may be used to signal a firm's commitment and contribution to the host country's economy and development. Data on 437 large multinationals and interviews with senior managers of 20 foreign subsidiaries in China show that patenting local innovation does indeed help an investing firm signal its usefulness to the host country government. It can thus serve as a response to bilateral political tension. The relationship between political tension and local patenting also depends on the relative trade dependence of the home and host countries and on the investing firm's technology level and its stake in China. The greater the dependence of an MNE and its home country government on the host country, the more likely patenting of local innovations would increase in times of bilateral political tension.

Keywords Political tension · Patenting · Signaling · Multinational firms · China

Introduction

Firms do not operate in a frictionless world. The growing importance of political considerations and their unpredictability increasingly challenge the managers of multinationals (MNEs) (Grodal & O'Mahony, 2017). Political tension manifests as "disagreement over policy issues, hostility between leaders, and negative public sentiment" (Davis & Meunier, 2011: 628). Political risk influences all MNEs operating in a host country, but political tension mainly applies to MNEs from a home country in a tense political relationship with the host country. Some level of political tension is not unusual, but in the era of de-globalization, political tensions are more common than before. That poses new challenges for MNEs.

Despite their importance, scholarly understanding of how political tension influences MNEs' strategies remains limited (Aguilera, Henisz, Oxley, & Shaver, 2019). Most scholarly work has focused either on normal relationships or on extreme cases such as war (e.g., Li & Vashchilko, 2010). However, political tension could even determine the survival of an MNE subsidiary, so it is therefore important to understand its influence and how MNEs can respond.

This study investigated one potential response: patenting. It tested the idea that when bilateral political tension arises between the home and a host country, an MNE might patent more local innovations in the host country as a signal of its usefulness to local stakeholders, seeking to enhance its legitimacy. The resource-dependence perspective was then applied to explore the moderating roles of several factors

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✉ Jue Wang
juewang8236@swufe.edu.cn

Nan Zhou
zhounan38@hotmail.com

Jiatao Li
mnjtli@ust.hk

[1] Advanced Institute of Business, School of Economics and Management, Tongji University, 1500 Siping Road, Shanghai 200092, People's Republic of China

[2] Management Department, School of Business and Management, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong

[3] School of Business Administration, Southwestern University of Finance and Economics, 555 Liu Tai Da Dao, Wenjiang District, Chengdu 610030, People's Republic of China

which might influence that effort's probability. Specifically, the two economies' trade inter-dependence, the firm's innovation capacity, and its stake in the host country were tested as potentially important moderators. The intuition was that the greater the dependence of an MNE and its home-country government on the host country, the greater should be the need for the MNE to use patenting of local innovations as a response to bilateral political tension.

These ideas were tested using data describing the subsidiaries of 437 large MNEs in China during the 1992–2020 period. In addition, 48 senior managers from 20 foreign subsidiaries in China were interviewed about the topic. The findings help to clarify the impact of political relations on MNEs and their responses. They show that patenting of local innovations can serve as an effective response, and they also offer a new understanding of the value of patenting.

It is important, however, to keep in mind that China as a host country is in many ways an exceptional case. China is a large market, and it plays an important role in global supply chains. Exiting from it would not be an option for many MNEs, making patenting a particularly useful response in this case. The study's findings may apply in other large economies such as the U.S. and E.U., but perhaps less well in smaller economies where an MNE can exit more easily.

Research background

There have been previous investigations of the impact of political relationships on firm strategy (e.g., Li, Van-Assche, Li, & Qian, 2022), but most have considered only how MNEs might benefit from good host country–home country relationships (Li, Meyer, Zhang, & Ding, 2018). War has received some scholarly attention, but not more normal worsening of bilateral relationships. In an era of de-globalization, deteriorating or sustained poor political relations between two countries has become more likely. Given the potentially significant impact of political tension on MNEs, how they might best respond should be examined. That was the aim of this study.

One primary motive for patenting is of course to shield a firm's competitive advantages from imitation. Besides protection, however, firms could also file patents as a signal (Somaya, 2012). They can signal a firm's ability to innovate and that it has potentially useful or valuable technology (Levitas & McFadyen, 2009). That could signal the firm's quality to stakeholders such as investors (Somaya, 2012) and alliance partners (Larson, 1992), but this study focused on another type of signaling. The intuition was that patenting could potentially enhance an MNE's legitimacy in the eyes of a host-country government by signaling the firm's willingness and ability to contribute to local innovation. This study thus examined the possibility that MNEs might use patenting to respond to bilateral political tension.

China's legal system nominally protects trademarks, patents, and copyrights. China has joined all the major international intellectual property rights-related conventions. Although it is gradually improving, China's legal system in fact remains relatively weak. In practice, patents are sometimes not really enforceable (Cheng, 1998). As a result, patenting in China can instead lead to local illegal imitation if a patented product appears profitable (You & Katayama, 2005). Weak intellectual property rights (IPR) protection implies that MNEs patenting in China likely have other purposes such as signaling in mind.

Hypothesis development

Political tension and patenting

When an MNE invests in a foreign country, it steps into an implicit contract with the host-country government under which the latter is expected to protect the investor and refrain from expropriating its property (Asiedu, Jin, & Nandwa, 2009). The host-country government should provide institutional support for the MNE's operations (Kobrin, 1987). When political tension arises between the host and home countries, the host-country government's interests may begin to diverge from those of an MNE to the extent that the MNE is seen as representing the national interests of its home country (Gilpin, 1975). MNEs from a home country involved in political tension must therefore anticipate a lack of institutional support from the host-country government. They may even receive distinctly unfavorable treatment (Bundy, Pfarrer, Short, & Coombs, 2017).

If political tension escalates, wise managers may consider divestment (Blake & Moschieri, 2017), but a firm will not take such a dramatic step lightly. MNEs in China need to consider the size of the Chinese market and China's role in the global value chain (Hatani, 2009). They need other ways to respond to political tensions.

A host-country government may hesitate to treat an MNE unfavorably if doing so would impede local innovation. Local innovation generates new knowledge which can sometimes have great value. It can to some extent determine an economy's competitiveness (Dodgson, 2009). Astute politicians will therefore seek to enhance local innovation for the sake of the economy (Zhou, Velamuri, & Dauth, 2017).

When a host-country government contemplates which MNEs to punish in the context of political tension, there is information asymmetry between the government and the firms regarding the firms' contributions to local innovation. MNEs can signal such capability to the government by patenting their local innovations. Local innovation is costly

because it requires a firm to invest in local R&D and train local researchers (Beise, 2004), which takes much time and effort. That is what makes it an effective signal.

Sending signals through patenting local innovations calls for support from an MNE's headquarters. When political tensions arise, the headquarters may shift the assignment of IP ownership from the parent to its subsidiary so that the foreign subsidiary can have more autonomy and tools to respond to the challenges brought by the political tension. In other words, it might give the foreign subsidiary a supply of available patents to serve as a signal.

To summarize, a host-country government might hesitate to subject an MNE to unfavorable treatment if its local subsidiary has signaled its ability to innovate locally. That is how patenting local innovations could serve as a useful response to bilateral political tensions.

Hypothesis 1 (H1) An MNE's patent applications pertaining to local innovations in a host country increase with the level of bilateral political tension between the host and its home country.

Resource dependence theory suggests some factors which might influence the relationship between patenting and political tension (Pfeffer & Salancik, 1978). When the host country depends on the home country and/or its MNEs for resources, it is in a weak position. The MNEs then have less need to signal their usefulness. One such factor is general economic power. As Hirschman (1980: 16) has observed, "Power to interrupt commercial or financial relations with any country, considered as an attribute of national sovereignty, is the root cause of the influence or power position which a country acquires in other countries."

However, it is necessary to consider both the home country's dependence on the host country and the host country's dependence on the home country because they may not be symmetric. When the home country has a dependence advantage over the host country, it can threaten to reduce or terminate economic exchanges. Such a threat is more convincing the greater the host country's dependence. In that case, home-country MNEs will have less need to signal through patenting. The same logic applies in reverse when the host country holds the better cards. Home-country MNEs are then more influenced by bilateral political tensions and signaling might then be very helpful.

Hypothesis 2a (H2a) The relationship between bilateral political tension and an MNE's patenting of local innovation in a host country is weakened when the host country depends heavily on the firm's home country.

Hypothesis 2b (H2b) The relationship between bilateral political tension and an MNE's patenting of local innovation in a host country is strengthened when its home country depends heavily on the host country.

Resource dependence theory also predicts that when the host country relies on an MNE for key resources, the firm holds the whip hand. When an MNE invests in a host country, often one of the most important resources it can bring is better technology. Knowledge spillover through demonstration effects and employee turnover can then help the host country substantially (Zhang, Li, Li, & Zhou, 2010). The better the technology an MNE can offer, the more opportunities the host country has to acquire the technology to enhance industry competitiveness, and the more dependent the host-country government will be (Lall, 1990). That tends to give high-technology MNEs greater safety when political tension arises. It is less influenced by political tension and less motivated to use patenting as a signal.

Hypothesis 3 (H3) The relationship between bilateral political tension and an MNE's patenting of local innovations is weaker when the MNE's level of technology is higher.

An MNE's dependence on the host country is also influenced by how much investment in the host country is at stake. A heavily committed MNE is in a less favorable position. MNEs rely on the host country for resources such as labor and raw materials. The larger their stake in the host country, the more they depend on the host country for resources. To make things worse, large size attracts greater public attention and government intervention because of the firm's great economic significance and high visibility (Moon & Lado, 2000). MNEs invested heavily or with numerous subsidiary operations in a country are thus more influenced by political tensions between the host and home countries and their motivation to use patenting to minimize the impact of political tension is stronger.

Hypothesis 4 (H4) The relationship between bilateral political tension and an MNE's patenting of local innovation is strengthened when the MNE's subsidiaries in the host country are numerous.

Methods

Data

These hypothese were tested using data describing the patenting by large MNEs in China. China is an appropriate setting because most large MNEs actively engage in patenting in China. The necessary data are available from 1992, so the sample period was from 1992 to 2020. The Fortune Global 500 listings for 1995 (the first), 2000, 2010, and 2020 were used to

identify the MNEs active in China with the largest sales volumes. A total of 853 non-Chinese MNEs appeared in the lists.

Information about the firms' patent applications came from the incoPat patent database. It has compiled more than 100 million pieces of patent information from 117 official patent offices and business vendors. For each MNE, the incoPat database was searched to identify any patent applications it filed in China. Either the parent MNE or a subsidiary could be the applicant. The search produced 1,181,929 patent applications filed by 474 MNEs between 1992 and 2020.

Data describing the MNEs were extracted from the Osiris database, which covers nearly 80,000 publicly listed companies worldwide. It offered financial information for 444 of the 853 MNEs. Because certain country-level data were missing, this yielded a total of 437 MNEs and 10,380 firm-year observations from 1992 to 2020 as the final sample.

Measures

The dependent variable in the analyses was *number of local patent applications,* which was the number of invention patent applications filed by a local subsidiary of an MNE that were the first applications for a given technology globally. The inventor's location was used to identify local inventions.

The main predictor variable was *political tension* in a country's relationship with China. The data came from a foreign relations dataset developed by the Institute of International Relations at Tsinghua University (Yan, 2010; Yan & Zhou, 2004). It traces the bilateral relationships between China and major countries from 1950 to 2020 on a monthly basis. It has been used to measure bilateral relations between China and other countries by scholars in areas such as economics (Du, Ju, Ramirez, & Yao, 2017) and international relations (Davis, Fuchs, & Johnson, 2019). The details of how tension was quantified are explained in Appendix 1.

The computation yielded the continuous variable *political tension*. Its value was the absolute value of the change in bilateral relations between an MNE's home country and China if the bilateral relations score decreased by at least one point during a year. Its value was zero otherwise. A one-point change represents a substantial deterioration in bilateral relations. For example, the China–US score in December 2015 was 1.6, but −0.5 in December 2016. The score dropped by 2.1 points in 1 year when Donald J. Trump became the U.S. president, thus the value of *political tension* between the U.S. and China in 2016 was 2.1. Version 5.0 of the Militarized Interstate Dispute database was also searched for relevant events. Table A1.2 in Appendix 1 summarizes the political tensions identified using those data sources and involving home countries with MNEs in the sample.

Four moderators were included in the modeling. Economic dependence is usually measured in terms of trade dependence (Ross, 2019). A home country's trade dependence on China (D_h) was represented by the home country's imports from China and its exports to China as a proportion of the home country's GDP. China's trade dependence on a home country (D_c) was computed similarly. The China import and export data came from the United Nations' Comtrade database. The GDP data were from the World Development Indicators compiled by the World Bank. Following the lead of Gulati and Sytch (2007), a spline specification was used to measure the direction of asymmetry and differentiate between the dependence advantage of a home country and that of China (Johnston, 1997). That allowed exploring possible variations in the effect of a dependence advantage that a single variable approach would not be able to uncover. *Home country's dependence advantage* was quantified by subtracting the dependence of a home country on China from the dependence of China on that home country ($D_c - D_h$) if $D_c > D_h$, and was taken as zero otherwise. *China's dependence advantage* was computed similarly.

Patenting should of course depend to some extent on *R&D intensity.* That was quantified using R&D spending as a proportion of a firm's operating revenue in the previous year (Kong & Su, 2021). Then, *host-country subsidiary* was another candidate predictor. It was the number of subsidiaries that an MNE had in China. The more subsidiaries the greater an MNE's stake in China.

Various other potentially important predictors were also included in the analyses. *Return on assets (ROA)*, *current ratio*, *firm age*, *firm size*, and *time in China* described the parent firms. An MNE with a better *ROA* or *current ratio* may have had more resources to commit to applying for patents. *Firm age* was the number of years since an MNE's inception. Longer experience should allow an MNE to accumulate more resources, making it more likely to file patent applications. *Firm size* was considered potentially important because larger firms have more resources to support local patenting. The natural logarithm of an MNE's total assets was used to quantify firm size. *Time in China* was the number of years since an MNE first entered China. Longer operations in China might increase the probability that an MNE would invest in local R&D leading to patent applications.

The level of IPR protection in China might also be important. The IPR protection score in "Report on China's Intellectual Property Development" released by China's National Intellectual Property Administration was used to quantify it. A higher IPR protection score might encourage MNEs to innovate in China and file for patent protection.

Some home-country factors were also considered as potential predictors. *GDP growth* was the annual percentage rate of GDP growth at market prices in constant local currency. Slow GDP growth at home should encourage MNEs to place more emphasis on foreign markets. *Openness* was net FDI inflows (new investment inflows less disinvestment)

as a percentage of the economy's GDP. The data came from the World Bank's World Development Indicators.

At the industry level, *number of competitors* was the logarithm of the number of firms in China in the same four-digit industry classification (using China's industry coding). For firms operating in multiple industries, the industry in which the most revenue was generated was used. The data were gathered from industry statistics and statistical yearbooks. The stiffer the local competition, the more likely that an MNE would file local patent applications to protect its competitiveness.

Industry and year dummies were also included in the analyses. The industry dummies were based on the two-digit industry classification reported in the Osiris dataset.

Modeling

The dependent variable, the number of local invention patent applications, was a non-negative integer, but approximately 50% of that variable's observations were zero. The data were over-dispersed, so zero-inflated negative binomial models were therefore evaluated. The *zinb* command in the Stata software was used in the analyses. To account for the longitudinally clustered nature of the data, they were clustered by MNE when running the regressions, using Stata's cluster option to generate robust standard errors.

Results

Table 1 shows the means, standard deviations, and correlations describing the variables. All significant correlations were below 0.40, which suggests that there was no serious multicollinearity problem. The largest variance inflation factor among the regression models was 3.15, which is below the recommended cutoff of 5 (Ryan, 1997).

Table 2 tests for any relationship between political tension and patenting of local innovations. The dependent variable is *number of local patent applications*. Model 1 is the baseline model, which includes only control variables. *Political tension* was added in Model 2. Its coefficient is positive and significant ($p = 0.002$), which shows that MNEs in China are more likely to patent local innovations when political tension between their home country and China is more serious. The coefficient remained positive and significant in models 2–6. Therefore, H1 is supported. Using the coefficients in Model 2, the expected number of local patent applications by an MNE would increase by 33.63% if *political tension* between its home country and China increased from zero to one, holding all the other variables in the model constant.

Models 3–7 employ alternative independent variables. Models 3 and 4 test different ways of identifying the political

Table 1 Descriptive statistics and correlation matrix

	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Number of local patent applications	1.94	17.57	1.00													
2	Political tension	0.21	0.71	0.03	1.00												
3	Home country's dependence advantage	0.03	0.04	−0.07	−0.08	1.00											
4	China's dependence advantage	0.01	0.02	0.15	0.00	−0.37	1.00										
5	R&D intensity	2.26	4.48	0.08	0.03	0.04	−0.04	1.00									
6	Host-country subsidiary	4.63	13.63	0.10	−0.01	−0.06	0.04	0.03	1.00								
7	ROA	6.52	8.03	0.01	−0.03	0.10	−0.08	0.08	−0.04	1.00							
8	Current ratio	1.45	1.82	0.00	0.02	0.01	0.01	0.10	−0.01	0.02	1.00						
9	Firm age	55.07	44.68	0.06	0.01	−0.23	0.08	0.07	0.09	−0.04	−0.05	1.00					
10	Firm size	16.96	1.31	0.11	0.08	−0.27	0.13	0.08	0.05	−0.03	0.06	0.17	1.00				
11	Time in China	4.57	8.01	0.14	0.20	−0.30	0.33	0.12	0.06	−0.03	0.01	0.18	0.26	1.00			
12	IPR protection	144.82	123.29	0.09	0.27	−0.38	0.40	0.03	0.00	−0.06	0.02	0.11	0.39	0.29	1.00		
13	GDP growth	1.85	2.54	−0.02	−0.04	0.17	−0.03	−0.03	0.00	0.17	−0.02	−0.15	−0.21	−0.19	−0.31	1.00	
14	Openness	0.43	0.58	0.01	−0.07	−0.18	0.10	0.01	0.02	0.05	−0.01	0.04	0.01	−0.01	0.00	0.08	1.00
15	Number of competitors	10.04	10.84	0.06	−0.05	0.37	−0.29	0.01	−0.05	0.08	0.00	−0.22	−0.29	−0.22	−0.37	0.19	−0.14

$N = 10{,}158$. Pearson correlations, two-tailed. Correlations with an absolute value ≥ 0.021 are significant at the 0.01 level of confidence.

Table 2 Coefficients of zero-inflated negative binomial regressions predicting patent applications (main effect)

	Model 1	Model 2 IV = change in bilateral relations score in tension period	Model 3 0.5 as the threshold defining a tense period	Model 4 1.5 as the threshold defining a tense period	Model 5 IV = change in bilateral relations score	Model 6 IV = percentage change in bilateral relations score	Model 7 IV = value of the bilateral relations score if the score is < 0
Political tension		0.29 (0.09) [0.002]	0.33 (0.11) [0.003]	0.33 (0.10) [0.001]	0.12 (0.06) [0.034]	0.08 (0.02) [0.000]	0.09 (0.05) [0.088]
Control variables							
Home country's dependence advantage	−3.78 (5.45) [0.488]	−2.81 (5.46) [0.607]	−3.80 (5.38) [0.481]	−3.54 (5.38) [0.510]	−4.22 (5.39) [0.434]	−4.72 (5.40) [0.382]	−2.85 (5.46) [0.601]
China's dependence advantage	9.80 (5.06) [0.053]	10.38 (4.94) [0.036]	10.46 (4.94) [0.034]	10.29 (4.95) [0.038]	9.90 (4.97) [0.046]	9.82 (5.19) [0.059]	9.89 (4.98) [0.047]
R&D intensity	0.03 (0.02) [0.050]	0.03 (0.02) [0.041]	0.03 (0.02) [0.040]	0.03 (0.02) [0.044]	0.03 (0.02) [0.049]	0.04 (0.02) [0.046]	0.03 (0.02) [0.050]
Host-country subsidiary	0.06 (0.04) [0.123]	0.06 (0.04) [0.109]	0.06 (0.04) [0.099]	0.06 (0.04) [0.101]	0.06 (0.04) [0.104]	0.06 (0.04) [0.114]	0.06 (0.04) [0.106]
ROA	0.02 (0.01) [0.008]	0.01 (0.01) [0.009]	0.01 (0.01) [0.010]	0.01 (0.01) [0.009]	0.02 (0.01) [0.007]	0.02 (0.01) [0.008]	0.02 (0.01) [0.008]
Current ratio	0.58 (0.23) [0.012]	0.58 (0.23) [0.011]	0.58 (0.23) [0.011]	0.58 (0.23) [0.011]	0.58 (0.23) [0.013]	0.56 (0.24) [0.020]	0.61 (0.23) [0.007]
Firm age	0.00 (0.00) [0.520]	0.00 (0.00) [0.454]	0.00 (0.00) [0.450]	0.00 (0.00) [0.454]	0.00 (0.00) [0.472]	0.00 (0.00) [0.524]	0.00 (0.00) [0.518]
Firm size	0.89 (0.22) [0.000]	0.83 (0.21) [0.000]	0.82 (0.21) [0.000]	0.82 (0.21) [0.000]	0.83 (0.21) [0.000]	0.86 (0.23) [0.000]	0.83 (0.22) [0.000]
Time in China	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]
IPR protection	0.05 (0.02) [0.006]	0.04 (0.02) [0.036]	0.04 (0.02) [0.046]	0.04 (0.02) [0.040]	0.04 (0.02) [0.038]	0.05 (0.02) [0.011]	0.04 (0.02) [0.035]
GDP growth	−0.07 (0.05) [0.206]	−0.06 (0.05) [0.210]	−0.07 (0.05) [0.262]	−0.06 (0.05) [0.226]	−0.06 (0.05) [0.252]	−0.05 (0.05) [0.329]	−0.05 (0.05) [0.326]
Openness	0.02 (0.01) [0.055]	0.02 (0.01) [0.070]	0.02 (0.01) [0.079]	0.02 (0.01) [0.076]	0.02 (0.01) [0.063]	0.02 (0.01) [0.100]	0.02 (0.01) [0.059]
Number of competitors	0.10 (0.08) [0.196]	0.08 (0.07) [0.325]	0.09 (0.08) [0.271]	0.09 (0.08) [0.250]	0.10 (0.08) [0.198]	0.11 (0.08) [0.157]	0.08 (0.08) [0.293]
Year and industry dummies	Included	Included	Included	Included	Included	Included	Included
Wald's chi-squared	8084.06	8265.62	5984.11	8201.62	8370.65	8094.99	7644.15
Log pseudo-likelihood	−4658.57	−4650.66	−4650.86	−4651.54	−4655.49	−4653.11	−4656.02

$N = 10{,}158$. Two-tailed tests. Standard errors are reported in parentheses. p values are reported in brackets.

tension period. Instead of using 1 as the threshold, 0.5 and 1.5 were tested. *Political tension* remained a positive and significant predictor in both models ($p = 0.003$, $p = 0.001$). Model 5 tested the political relations score of the current year minus the score in the previous year as a measure of political tension. It was reverse-coded by multiplying it by – 1, so that a positive value means an increase in political tension. Model 5 shows that *political tension* was still a positive and significant ($p = 0.034$) predictor. In model 6, the political relations score was a percentage, rather than the value. That too was reverse-coded. *Political tension* remained a positive and significant ($p = 0.000$) predictor. Finally, instead of using the score change to quantify political tension, political tension was considered to exist when the bilateral foreign relationship score between two countries was below zero. In that case the score was used, otherwise it was 0. The results are summarized in Model 7. *Political tension* measured this way was not a significant predictor, showing that signaling through local innovation may not act as an effective response to political tension that lasts for a

long time. MNEs may only intend to signal in the first year when bilateral relations deteriorate.

Table 3 summarizes the results testing for moderating effects. Model 1 includes a term representing an interaction between *political tension* and *home country's dependence advantage*. Its coefficient is negative and significant ($p = 0.000$). That means that the impact of political tension on the number of local patent applications is weaker when the home country is less dependent on China. The interaction term remained negative and significant in the full model (Model 5). Therefore, H2a is supported.

Model 2 includes a term representing an interaction between *political tension* and *China's dependence advantage*. Its coefficient is positive and significant ($p = 0.042$). This means that the impact of political tension on the number of local patent applications is stronger when China's dependence advantage over the home country is greater. The interaction term remained positive and significant in the full model (model 5). Therefore, H2b is supported.

Model 3 includes a term interacting *political tension* with *R&D intensity*. Its coefficient is negative and significant ($p = 0.034$). This means that the relationship between

Table 3 Coefficients of zero-inflated negative binomial regressions predicting patent applications (moderating effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Political tension	0.51 (0.10) [0.000]	0.21 (0.09) [0.017]	0.46 (0.14) [0.001]	0.53 (0.16) [0.001]	0.23 (0.11) [0.044]
Political relations × home country's dependence advantage	−4.49 (1.13) [0.000]				−4.25 (1.14) [0.000]
Political relations × China's dependence advantage		6.90 (3.39) [0.042]			8.49 (3.10) [0.006]
Political relations × R&D intensity			−0.05 (0.02) [0.034]		−0.01 (0.00) [0.048]
Political relations × host-country subsidiary				0.17 (0.09) [0.046]	0.14 (0.04) [0.000]
Control variables					
Home country's dependence advantage	−2.97 (5.64) [0.599]	−2.98 (5.50) [0.587]	−3.06 (5.53) [0.580]	−2.87 (5.45) [0.599]	−3.92 (5.74) [0.494]
China's dependence advantage	10.63 (4.90) [0.030]	10.59 (4.97) [0.033]	10.18 (4.91) [0.038]	10.47 (4.94) [0.034]	8.51 (4.96) [0.086]
R&D intensity	0.03 (0.01) [0.019]	0.03 (0.02) [0.042]	0.03 (0.02) [0.033]	0.03 (0.02) [0.041]	0.03 (0.01) [0.020]
Host-country subsidiary	0.06 (0.04) [0.111]	0.06 (0.04) [0.107]	0.06 (0.04) [0.109]	0.06 (0.04) [0.109]	0.06 (0.04) [0.113]
ROA	0.01 (0.01) [0.049]	0.01 (0.01) [0.010]	0.01 (0.01) [0.009]	0.01 (0.01) [0.009]	0.01 (0.01) [0.056]
Current ratio	0.58 (0.22) [0.009]	0.58 (0.23) [0.011]	0.59 (0.22) [0.009]	0.54 (0.22) [0.015]	0.58 (0.22) [0.008]
Firm age	0.00 (0.00) [0.466]	0.00 (0.00) [0.459]	0.00 (0.00) [0.489]	0.00 (0.00) [0.450]	0.00 (0.00) [0.466]
Firm size	0.85 (0.21) [0.000]	0.83 (0.21) [0.000]	0.84 (0.21) [0.000]	0.83 (0.21) [0.000]	0.86 (0.21) [0.000]
Time in China	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]	0.07 (0.02) [0.000]
IPR protection	0.04 (0.02) [0.024]	0.04 (0.02) [0.041]	0.04 (0.02) [0.036]	0.04 (0.02) [0.039]	0.04 (0.02) [0.032]
GDP growth	−0.08 (0.05) [0.128]	−0.06 (0.05) [0.217]	−0.06 (0.05) [0.221]	−0.06 (0.05) [0.210]	−0.06 (0.05) [0.206]
Openness	0.02 (0.01) [0.061]	0.02 (0.01) [0.073]	0.02 (0.01) [0.073]	0.02 (0.01) [0.069]	0.02 (0.01) [0.074]
Number of competitors	0.08 (0.08) [0.322]	0.07 (0.08) [0.396]	0.08 (0.08) [0.322]	0.08 (0.08) [0.335]	0.07 (0.08) [0.389]
Year and industry dummies	Included	Included	Included	Included	Included
Wald's chi-squared	7637.32	7358.04	7518.07	7560.69	6591.52
Log pseudo-likelihood	−4643.25	−4649.58	−4647.65	−4649.83	−4638.06

$N = 10{,}158$. Two-tailed tests. Standard errors are in the parentheses. p values are in the brackets.

political tension and the number of applications is weaker when an MNE is doing more R&D. The interaction term remains negative and significant in the full model (model 5). Therefore, H3 is supported.

Model 4 includes a term interacting *political tension* with *host-country subsidiary*. Its coefficient is positive and significant ($p = 0.046$). So the relationship between political tension and patenting is stronger when an MNE has more of a stake in China. The interaction term remains positive and significant in the full model (model 5). Therefore, H4 is also supported. All previous results hold in the full model.

The magnitudes of the marginal effects of the moderating variables were assessed using the approach proposed by Busenbark, Graffin, Campbell and Lee (2022). The marginal effect of a predictor on the dependent variable was plotted over different levels of the moderating variable. Figures 1, 2, 3, and 4 are based on the coefficients of models 1 to 4 of Table 3. The *x*-axis is the level of the moderator, and

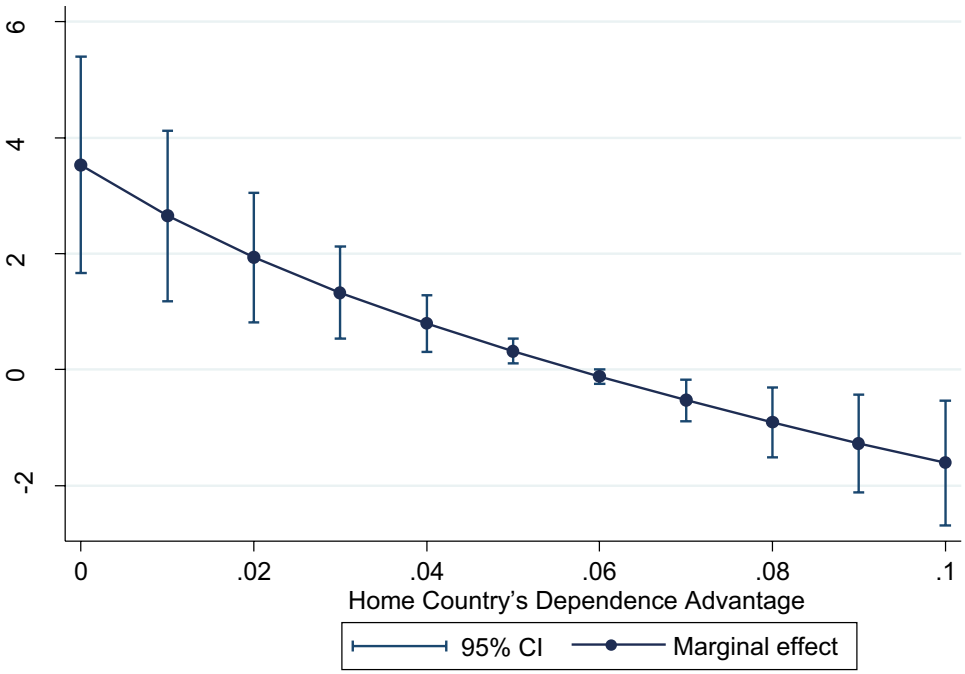

Fig. 1 Marginal effect of political tension on the number of local patent applications at different levels of *home country's dependence advantage*

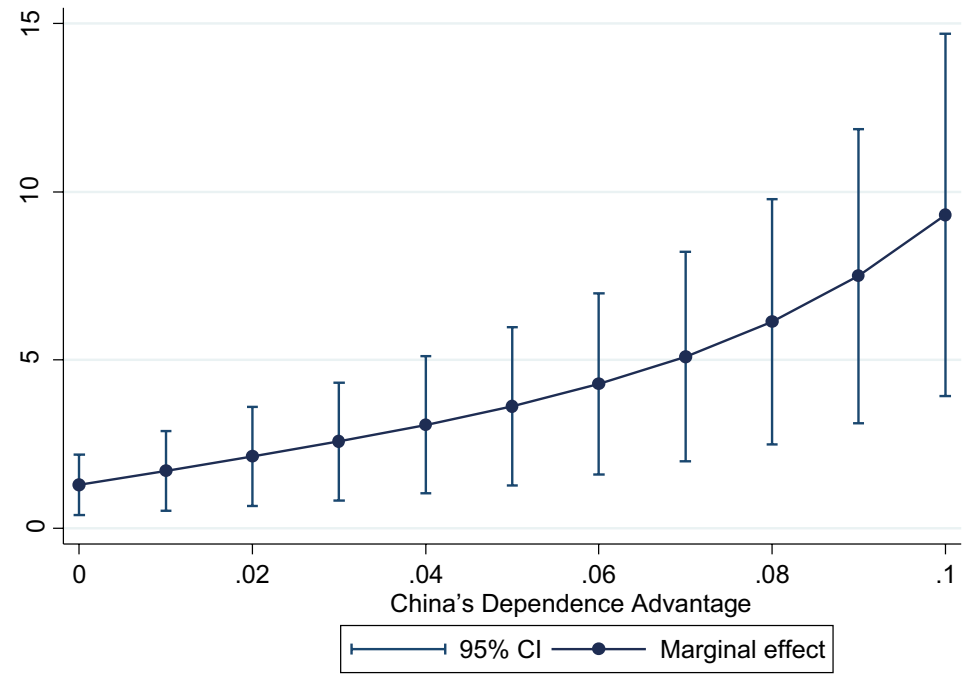

Fig. 2 Marginal effect of political tension on the number of local patent applications at different levels of *China's dependence advantage*

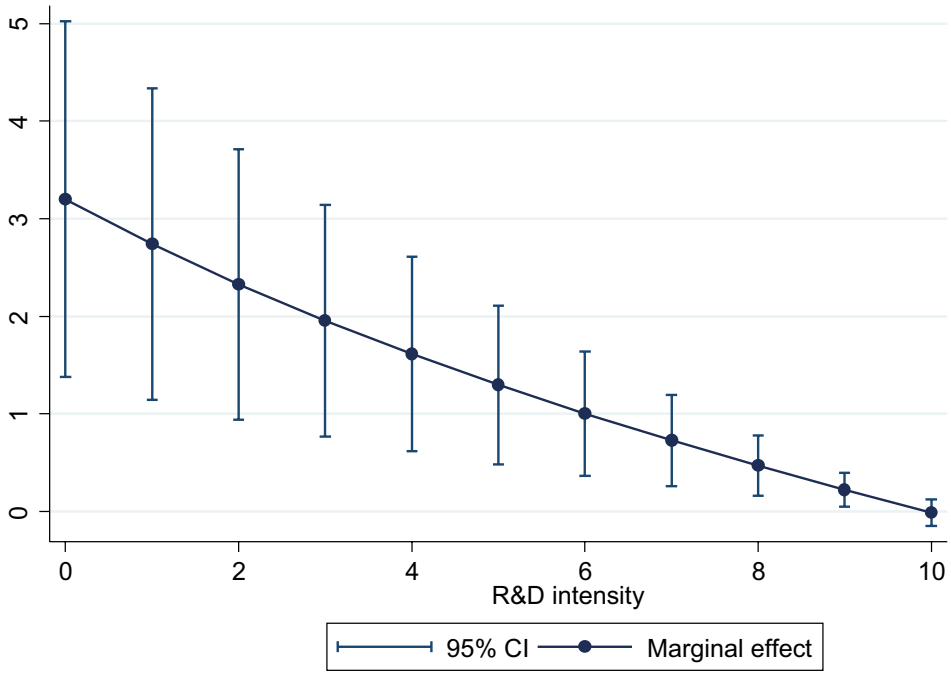

Fig. 3 Marginal effect of political tension on the number of local patent applications at different levels of *R&D intensity*

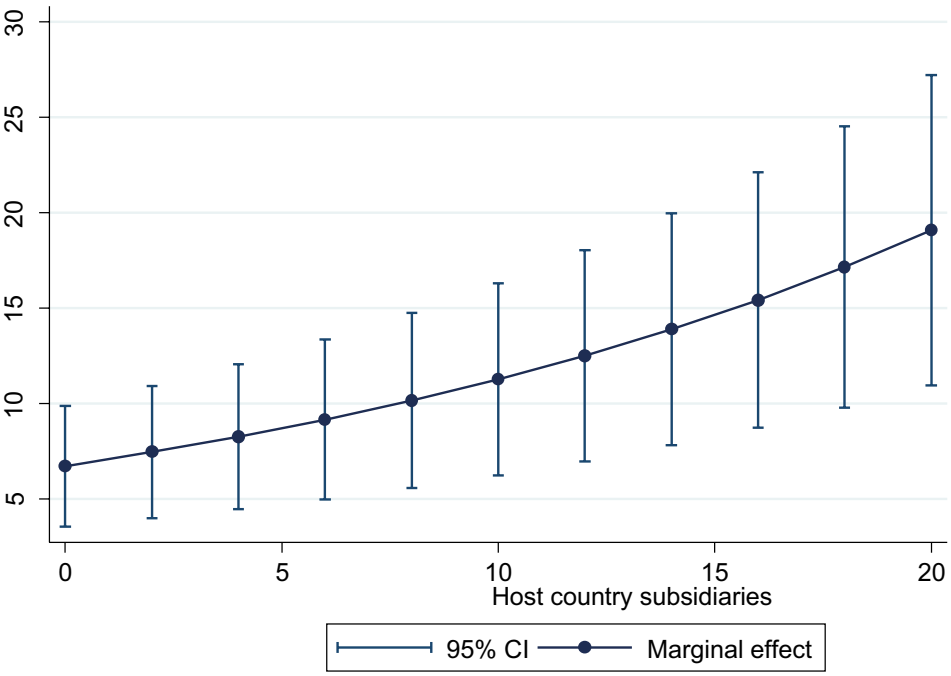

Fig. 4 Marginal effect of political tension on the number of local patent applications at different levels of *host-country subsidiaries*

the *y*-axis is the marginal effect with its 95% confidence interval. In all four figures, the marginal effects at lower levels of the moderator are significantly different from those at higher levels, supporting significant moderating effects. The marginal effects are also significantly different from 0, supporting the main effect. In Fig. 1, as the value of *home country's dependence advantage* increases, the marginal effects gradually change from positive to negative. The patterns shown in Fig. 2 are consistent with H2a. In Fig. 2, as the value of *China's dependence advantage* increases, the marginal effects remain positive and continues to increase. The patterns shown in Fig. 3 are consistent with H2b. Figures 3 and 4 follow similar patterns to Figs. 2 and 3 and are consistent with H3 and H4.

Table A2.1 in Appendix 2 presents the results of some robustness checks using an alternative dependent variable, alternative model formulations, and lagged independent variables.

Post hoc analysis

These findings were further tested in interviews with 48 senior managers of 20 MNE subsidiaries in China. Appendix 3 describes the details of the interview process and the sample. Its country and industry distribution corresponded with the sample of the secondary data analyses. Table A3.2 presents some quotes from the interviews.

The interviews confirmed that foreign subsidiaries patent in China for reasons other than protection (see Table A3.3). Twelve of the interviewees stated that their firms filed patent applications for other reasons. Many mentioned that patenting could serve as a signal to enhance the firm's reputation. As one of the managers said, "The government was also pleased to witness such a large patent output…We then could get a lot of help in bidding and applying for certain policy certifications."

Table A3.4 summarizes some quotes from the interviews dealing with foreign subsidiaries filing for patents as a response to bilateral political tension. As one of the managers said, "In fact, patent application transmitted a signal to the government. You will then get more policy [support] and financing, which are quite important to your operation in the Chinese market. Especially since in recent years our Japan headquarters is not so confident about doing business in China. So, after you initially send a signal to the government, the government may in turn give certain support for your operations there. This is critical for you to deal with risks and shocks."

Discussion

The recent de-globalization trend has further highlighted the importance of political considerations for MNEs. This study tested the idea that bilateral political tension between the host and home countries influences MNEs' patenting. The findings extend scholarly understanding of the impact of the political environment on MNE strategy. The data show that patenting of local innovation can serve as a signal of an MNE's usefulness to a host-country government (at least in China). The findings clarify how political tension influences MNEs' operations, and also incorporate signaling theory into the study of political influences on firm strategy.

Persistent political tension could become a new normal which MNEs must adapt to and deal with. Continuing to operate in the face of bilateral political tension calls for paying close attention to the bilateral political situation. While previous studies have identified other ways to respond to political risk or other crises, such as CSR (Zhou & Wang, 2020), the findings here expand the toolbox for MNE managers that decide to stay despite deteriorating bilateral relations. Patenting local innovations enhances their legitimacy. This study thus not only enriches understanding of MNEs' responses to changes in the political environment, but also extends understanding of the motives underlying patenting.

As previously mentioned, this study's focus on China may have compromised the generalizability of the findings. Although MNEs located anywhere might have to deal with bilateral political tensions, political considerations can be particularly important in China because China's bilateral relationships with many nations have been deteriorating in recent years. Also, exit from China may be a rather extreme response due to the large size of the Chinese market for most goods. Patenting rather than divesting may be a response particularly relevant to China. Future studies should examine other host countries to test the generalizability of this study's findings.

Note too that the sample here was restricted to very large, listed firms. Their responses may to some extent be unrepresentative of those of smaller firms. Smaller MNEs may be more flexible in their strategies and more inclined to exit. Future research might usefully exploit data on a broader set of MNEs to examine the generalizability of these results.

Signaling through local innovation has been shown to serve as a response to deteriorating bilateral relations, but its benefits may weaken over time. Future studies could explore MNEs' responses when political tension persists over an extended period.

In any such follow-up research, the measure of bilateral political tension might be improved by using a greater variety of data sources. The Tsinghua University dataset has its advantages, but it only considers relations between China and certain important countries. Some potentially important bilateral tensions may thus have been overlooked. Future studies should seek to correct that.

Conclusions

When bilateral political tension arises between an MNE's home and host countries, patenting local innovations in the host country can serve as a signal of the firm's usefulness to local stakeholders to enhance its legitimacy. The usefulness of patenting depends on the relative dependence of the home country and the firm on the host country, just as resource dependence theory predicts. We found support for our arguments in a sample of foreign subsidiaries operating in China. The findings of this study thus enrich scholarly understanding of the impact of political factors on MNEs, and of the signaling role of patenting as a non-market strategy, both of which deserve further investigation.

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Nan Zhou is Professor at School of Economics and Management, Tongji University in China. She received a Ph.D. degree from Wharton School, University of Pennsylvania. Her research addresses questions that intersect the fields of corporate strategy and international business, focusing primarily on understanding how strategic decisions of MNEs are influenced by firm resources and institutional environments in the context of emerging markets.

Jiatao Li is Chair Professor of Management and Lee Quo Wei Professor of Business, and Director of the Center for Business Strategy and Innovation, Hong Kong University of Science and Technology. He is a Fellow of the AIB and an editor of the Journal of International Business Studies. His current research interests are in the areas of organizational learning, strategic alliances, corporate governance, innovation, and entrepreneurship, with a focus on issues related to global firms and those from emerging economies.

Jue Wang is Professor and Dean of School of Business Administration, Southwestern University of Finance and Economics. He received a PhD degree from Birkbeck College, University of London, UK. His research interests include organizational learning, knowledge spillover, talent management, cross-border mergers and acquisitions, and corporate social responsibility of emerging economy multinational enterprises.