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Cross-border mergers and acquisitions: A double-edged sword for Chinese firms' innovation performance

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Abstract: This study examines the impact of the incompatibility between Chinese firms' learning ability and knowledge-seeking opportunities on their innovation performance following cross-border mergers and acquisitions. Using a sample of 239 firms from 2014 to 2018, a quasi-Poisson model is employed to analyze the direct and indirect relationships among study variables. The findings indicate that firms that aggressively pursue cross-border mergers and acquisitions experience a decline in innovation performance. In contrast, innovation performance is strengthened when the host countries' legal frameworks are strict. The study suggests that firms seeking to enter the global market must strike a balance between their learning abilities and knowledge-seeking opportunities. The study also infers that managers should consider not only firm-level factors but also industry-level and country-level factors that could affect the relationship between cross-border mergers and acquisitions and innovation outcomes.

Subjects: Political Economy; Business, Management and Accounting; Industry & Industrial Studies

Keywords: innovation; cross-border mergers and acquisitions; Chinese firms

1. Introduction

Cross-border mergers & acquisition (CBM&A) by multinational enterprises (MNEs) from emerging economies, especially those from China, draw significant attention from both scholars, policy-makers and practitioners. It has been argued that CBM&As help Chinese MNEs to build competitive advantages to catch up with their peers from industrially advanced economies (Lebedev et al., 2015; Liu et al., 2021). China has experienced a transformation of industrial upgrading over the past decades. As one of the main drivers of firms' growth today in the knowledge-intensive economy, innovation ability is arguably the most important stimulus to firms' future development

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(Christofi et al., 2019). Despite the immense practical importance of CBM&As in promoting innovation activities, our understanding of the relationship between firms' CBM&A engagement and innovation outputs in emerging economies is nascent (Cho & Chung, 2022). Consequently, Chinese MNEs have increasingly become aware of the importance of technology and innovation capability (Li, 2022). However, characterized by a lack of the necessary knowledge and resources to innovate, Chinese MNEs often acquire external knowledge through CBM&As to move up within the international value chain towards higher value-added segments. The predominant focus of existing research has been on the performance effects of CBM&As in terms of human resource restructure, managers'behaviour or financial improvement while neglecting the knowledge transfer and integration process (Ahammad et al., 2016; Gu, 2023; Tang et al., 2022). Yet, little is known about the extent to which the possession of acquired knowledge could result in enlarging the acquiring firm's knowledge base and under what conditions Chinese MNEs would enhance their innovation outputs through CBM&As. Chinese MNEs face challenges in technological development due to various factors, such as the country's rapid economic growth, insufficient investment in R&D, and weak intellectual property protection (Li, 2022). Because they are still at a disadvantage in terms of technological skills, Chinese MNEs have increasingly relied on CBM&As as a means of accessing external knowledge and resources, which can help them catch up with their international counterparts and enhance their global competitiveness (Liu et al., 2021). Given that Chinese MNEs routinely engage in several CBM&As to carry out their knowledge-seeking strategy, this phenomenon merits further study. On the other hand, for acquiring firms, CBM&As involve a learning process requiring a significant learning capability to understand and codify the acquired knowledge fully. The interaction between the acquired knowledge and the existing knowledge base of the MNEs will facilitate the technological competence of MNEs and influences the subsequent innovation outputs. However, a critical and largely underexplored issue is the challenge faced by Chinese MNEs in managing and deriving benefits from multiple CBM&As within a short timeframe. Since Chinese firms have limited resources, engaging in such transactions concurrently can place a strain on their resources and obstruct their capacity to effectively learn and absorb advanced technical knowledge, potentially hampering the transfer of strategic assets to innovation capabilities (Cheng & Yang, 2017; Colombo & Rabbiosi, 2014).

Therefore, this paper addresses this gap by examining the relationship between Chinese MNEs' learning ability and knowledge-seeking opportunities through CBM&As concerning their innovation outcomes. The gap between the knowledge learning process, which demands a significant commitment for knowledge codification, and MNEs' resource limitations when rapidly expanding to overseas markets is therefore identified in this research. We aim to answer the following research question: How does the engagement in CBM&As influence innovation outputs in Chinese MNEs, and under what conditions is this relationship more effective? To address this question, we develop a framework grounded in organizational learning and institutional perspectives, which explores the role of learning capability, defined as the ability to recombine the acquired knowledge and create synergies in the form of patent outputs.

This study makes several key contributions to the existing literature. First, it presents a novel framework that elucidates the relationship between knowledge-seeking opportunities and innovation performance within the context of CBM&As, thereby expanding our understanding of how such acquisitions can foster innovation in firms. Second, this research acknowledges the unique institutional environment in China that significantly influences the internationalization of Chinese MNEs. Although numerous studies have examined the impact of factors such as state ownership (Cui & Jiang, 2012), cultural distance (Ahammad et al., 2016), and specific dimensions of the institutional environment (Lv et al., 2022; Meyer et al., 2018) on Chinese firms' international expansion activities, they primarily focus on the direct effects of these factors on CBM&A completion rather than on innovation performance. In contrast, by examining the mediating role of learning capability, we shed light on the critical mechanisms through which firms can effectively integrate and leverage acquired knowledge to enhance their innovation performance. Lastly, by providing empirical evidence, this paper furthers the discussion on the relationship between

innovation performance and acquisition activity of Chinese MNEs, offering valuable insights for researchers, practitioners, and policymakers alike. This will provide a more nuanced understanding of the contingencies that shape the effectiveness of CBM&As as a strategy for boosting innovation in Chinese MNEs.

The rest of this paper is organized as follows: Section 2 presents the theoretical framework and develops the research hypotheses. Subsequently, section 3 outlines the data, variables, and methodology employed in this study. In section 4, the empirical results concerning CBM&As by Chinese MNEs are analyzed. Section 5 synthesizes the key findings and engages in a comprehensive discussion. Section 6 provides the conclusion, explores the implications for management practices, and acknowledges the limitations of the research.

2. Theoretical framework and hypotheses development

2.1. CBM&A on subsequent innovation performance

Technical know-how and problem-solving skills are essential for creating a variety of innovations because they transform environmental and organizational inputs into worthwhile new products and processes for market competitiveness (Coccia, 2018). Teece (1986) claims that merger and acquisition would benefit the acquirer with complementary resources, including more access to the capital for growth and other tangible and intangible assets. Numerous studies have argued that integration is expected to provide synergistic benefits to the acquirers (Tao et al., 2017; Zheng et al., 2016). As a coordination mechanism through which the acquirers learn from the acquired knowledge and improve their capabilities, post-acquisition integration enables the acquirer to use the existing capabilities more efficiently (Sarala et al., 2016; Zhang et al., 2015). CBM&As provide the acquiring firm with a more extensive and novel knowledge base, while firms face challenges in dealing with post-acquisition integration (Deng & Yang, 2015; Deng et al., 2020). Compared with other ways of internationalization, the CBM&A is characterized by the demand for immediate and quick returns. In other words, the acquirer is under pressure to make full use of acquisitions to indicate that the deal has been done successfully. Instead of accumulating their experience, the acquirers will seek the firms with desired knowledge and technologies (Liu & Zhang, 2014; Muehlfeld et al., 2012). However, previous literature demonstrate that there is a difference between the knowledge a firm acquires and the capabilities it upgrades (Ahammad et al., 2016). Coccia (2008) claims that the impact of information and technology transfer reduces with damped pulsations as the distance from the source of knowledgeto users grows. In the context of CBM&A, the knowledge could be converted to innovation performance only if the firm can disseminate or coordinate the external knowledge (Bartlett & Beamish, 2018). Once codifying the new knowledge in the stable patterns of behaviours, the organization could rely on the knowledge to guide the relevant future tasks (Nawaz & Tian, 2022). However, it is unlikely for firms to transfer or codify the tacit knowledge into their routines or norms in the short term.Chinese MNEs suffering from limited technologies and resources are desperately trying to acquire advanced knowledge to improve their competitive advantages (Christofi et al., 2019). However, they may find that experiential learning is crucial for the absorption and dissemination of tacit knowledge, a process that is characteristically gradual and time-intensive. Due to the existence of impediments related to post-acquisition integration, which are the barrier to successful deal completion, Chinese MNEs may fail to codify the necessary external knowledge to improve their innovative abilities (Bauer & Matzler, 2014). This is especially true when considering the complexity of incorporating explicit knowledge. Given the resource scarcity, Chinese MNEs need to make decisions about strategic priorities. The notion of how rapidly Chinese MNEs engage in internationalization is idiosyncratic since different firms have different knowledge, structures, skills and systems when performing CBM&As. While some Chinese MNEs may prefer to internationalize their business in a certain period, others may resist the temptation to expand rapidly by emphasizing fewer but successful attempts. Chinese MNEs aggressively engage in foreign expansion are more likely to reuse the established knowledge base to reduce uncertainty. In the context of innovation performance, although CBM&As will eventually enlarge the knowledge base of acquirers, this external knowledge could not

immediately be codified to enhance internal innovation ability. This phenomenon may be exacerbated when Chinese MNEs engage rapidly in foreign markets while not having sufficient resources to codify the external knowledge in the existing routines. More specifically, more CBM&A deals will force the firm to reallocate, combine and recombine the target firm's resources and assets at the expense of employee disruption, which may lead to the counter production of the firm's existing routines (Du & Zhang, 2018). The existing or ongoing innovation projects will likely be postponed since they need more time to become innovation outputs. Although the demand for incremental innovation quantity or quality improvement drives the firm to show a tendency to exploit the acquired knowledge or technologies, the incompatibility between learning ability and knowledge-seeking opportunities may harm the firm's subsequent innovation performance. The more a firm engages in the CBM&As, the less patient it becomes due to the necessity of dealing with the integration process and procedures (Ahammad et al., 2016). Thus, firms are unable to integrate the acquired unit smoothly and difficult to materialize the innovation benefits of CBM&As. Empirically, the incompatibility between two components will lead to low efficiency of the knowledge transfer, which will hamper the innovation potential of the acquisitions (Castellaneta & Zollo, 2014; Li et al., 2017). It is difficult to reap innovation benefits from CBM&As due to incompatibility between learning ability and knowledge-seeking opportunities. Innovation ability is a critical factor for those MNEs to achieve that goal. However, as latecomers, Chinese MNEs tend to favor advanced and acquired knowledge, which is more efficient and productive, over existing in-house innovation. Chinese MNEs seek every opportunity to enlarge their knowledge base to catch up with their Western peers. Such pressure of a rapid innovating output drives the Chinese MNEs to prioritize acquiring external knowledge, but they spend less time and resources dealing with post-merger integration. The above arguments lead to the following hypothesis:

Hypothesis 1: The incompatibility between learning ability and CBM&A opportunities is negatively related to innovation outcomes.

2.2. The moderating role of industry relatedness

When the state of the external business environment changes, the firm's post-acquisition performance are not consistent. MNEs have to conform to rules and belief systems in each host country to establish local legitimacy (Meyer & Peng, 2016). Essentially, the concept of host country institutions acting as sources of location advantages opens up the potential for institutional arbitrage to capitalize on differences between national economies and institutions. Consequently, firms may relocate their operations, either partially or wholly, to institutional environments that more effectively align with their strategic and operational needs, aligning with the perspectives of both the escape view and institutional arbitrage arguments (Deng et al., 2020). This paper follows previous literature (Erel et al., 2012; Xie et al., 2017) and defines external environment as a situation made up of micro, meso and macro levels factors. Specifically, significant factors of business environment in this study include the relatedness of industries, the ownership of the company and the regulatory quality and the quality of law of host country.

The relatedness of industries is generally conceived as whether or not the target firm is a strategic fit with the acquirer (Xie et al., 2017). Determined by the relatedness of two entities, the relationship between the degree of integration and firm performance has been well explored in the international business field (Bauer & Matzler, 2014). Integrating unrelated target firms can be a challenge for the acquirer since it is difficult to leverage the existing competencies to learn irrelevant knowledge or fundamentals of concepts. However, when two firms share similar knowledge bases, they can easily understand the technological resources of each other while enhancing the ability to exploit knowledge spillovers (Colombo & Rabbiosi, 2014). In addition, when the potential problem occurs in integration, the acquiring firm can rely on the existing disciplinary and firm-specific routines to solve it. CBM&A relatedness has several dimensions, including market, knowledge, and technology. This paper focuses on technology and knowledge relatedness, which refer to similarities in common skills, shared language and similar cognitive structures of both parties. According to Christofi et al. (2019), technological similarity enables the firm to reduce the

costs of synergies by transforming and assimilating the external knowledge into the shared knowledge base. Moreover, the knowledge similarity facilitates the innovation performance of the acquirer due to a better understanding of exchanging and combining the available information and knowledge. The relatedness of knowledge stock makes it easier for the acquirer to absorb and apply the new knowledge in the subsequent innovation process (Zhang et al., 2020).

Empirical research is mixed about the direct or indirect effect of industry relatedness of M&A on the post-acquisition innovation performance. Christofi et al. (2019) examine the impact of acquisitions on subsequent innovation performance of acquiring firms in the chemical industry. They found a nonlinear effect of knowledge relatedness on the innovation output. Both high levels of relatedness and unrelatedness will hurt the innovation output of acquirers. Since the highly overlapped knowledge base will impede the knowledge learning process while too little relatedness simply means that the motivation behind the deal is not innovation-driven (Chen et al., 2018). As for Chinese firms, Du and Boateng (2015) conducted a study analyzing how state ownership and institutions in both home and host countries impact the value of Chinese firms involved in CBM&As. Their findings suggest that a significant and positive correlation exists between firm relatedness and the acquiring firm's value within the Chinese context. In a more recent study, Zhang et al. (2020) proposed that when the acquiring and target firms operate within related industries, the risk associated with post-acquisition performance could be mitigated. This industry-related synergy could potentially amplify the gains resulting from the acquisition. In their empirical study examining CBM&A by Chinese acquirers within the European Union's 28 member countries during the period from 2008 to 2017, Liang et al. (2022) asserted that there exists a negative correlation between technological similarity and the innovation performance subsequent to the acquisition. Finally, Zhang and Yang (2022) have also identified an inverted U-shape between knowledge relatedness and post-acquisition of innovation productivity in the context of Chinese CBM&A.

While most previous studies consider the knowledge-relatedness of merging companies to be vital for post-acquisition integration, research on the moderating role of industry relatedness and how it influences the impact of frequency of CBM&As on acquirers' innovation outcome is limited. If two entities of the acquisitions are from similar industries, the acquirers are more familiar with the technological problems when adopting and appropriating the knowledge asset of acquired knowledge. In other words, asset-matching enables the acquirer to share analogous sets of "know-what" and "know-how," which play a critical role in resource integration (Cheng & Yang, 2017). Thus, when the deal numbers increase, the acquirer can more easily assimilate and explore a large amount of acquired knowledge and gain more innovation productivity in the post-acquisition integration of a relatedness knowledge base. On the other hand, an unrelated knowledge base means the acquired understanding is dissimilar and distanced from the acquirer's existing practices and knowledge utilization. Thus, it is challenging for MNEs to harness the knowledge, especially when the deal numbers proliferate. This led to the following hypothesis:

Hypothesis 2: The negative relationship between the incompatibility between learning ability and CBM&A opportunities and the acquirer's innovation output becomes weaker as the M&A relatedness increases.

2.3. The moderating role of ownership

In the context of CBM&As, the ownership of MNEs will equally influence their post-acquisition innovation performance in multiple ways. First, as suggested by Dikova et al. (2019), the larger state-owned enterprises (SOEs) usually have a better connection with overseas institutions, such as educational or scientific institutions, which enhances the legitimacy of innovative products of Chinese firms (Zhang et al., 2016). More specifically, the bridging ties allow the MNEs to understand the innovative products with the help of well-established firms and institutions that operate in the host countries. Those institutions from an external environment often enjoy excellent reputations in society, enabling outsiders to "piggyback" on them by building connections with them (Dikova

et al., 2019). In addition, the existence of trade agreements between local and Chinese governments is helping MNEs acquire knowledge through CBM&As. SOEs will benefit significantly from these trade agreements due to their political ties with the Chinese government. Compared with market orientation needs, political connections enable SOEs to face less obstruction or scrutiny during internationalization, which helps the firms close the deals more rapidly.

Furthermore, Coccia (2017) argues that optimizing the rates of R&D intensity and corporate tax profits can improve the competitive advantages of firms and contribute to the economic growth of a country. The Chinese government has emphasized the significance of technology improvements for its economic growth, aligning with its strategy of upgrading its position in the value chain to higher value-added segments. The SOEs that enter global markets have the potential to generate more tax revenue for the country and increase its R&D intensity. This, in turn, could optimize the labor productivity of the nation. Therefore, Chinese government will also provide SOEs with some political resources to accelerate the speed of integration. As a result, the integration process of M&A will become more efficient and time-saving for the SOEs and boost their innovation performance. The Chinese government has a relatively high degree of discretion and power in shaping foreign investment policies (Liu et al., 2020). Avioutskii and Tensaout (2022) argue that the use of ambidextrous CBM&A strategies is influenced by conglomerate affiliation, state ownership, and international business experience, whereas favorable effects of outward foreign direct investment (FDI) policies are only seen for specific firms or under conditions where the innovation environment in the host country is strong. Following this argument, the conventional wisdom is that, instead of solely embracing the market-oriented economy, the Chinese government will also intervene in the business decisions of MNEs to some extent during internationalization by imposing specific and relevant policies. Thus, a better connection with the Chinese government will enable SOEs to have better access to the changing policies and to understand the government's intention more immediately. Therefore, when the growth rate of CBM&A is higher, the need for speed and better integration is greater. Consequently, SOEs' connection with the Chinese government will become more critical. Based on the above argument, this study predicts:

Hypothesis 3: The negative relationship between the incompatibility between learning ability and CBM&A opportunities and the acquirer's innovation output becomes weaker as the state ownership of MNEs increases.

2.4. The moderating role of regulatory quality

Institutions have been defined as the "rules of the game," which decision-makers could not control while trying to maximize their utility within these rules (North, 1991). In the context of CBM&As, by providing certainty to MNEs, developed institutions improve the efficiency of markets to facilitate economic exchange and cooperation (North, 1991). Over the past decades, it has been argued that the institutional environment has played an essential role in internationalization and affects both the economic agents and markets in multiple ways (Banalieva, 2014; Bruton et al., 2015; Cui & Jiang, 2012; Meyer & Peng, 2016). This study follows Xie et al. (2017) and define institutional environment as a situation comprised of regulatory environments and rule of laws. For countries characterized by a low level of regulatory quality, it is difficult for Chinese MNEs to develop a strategy to deal with the local government, employees from the target firm, local communities and other interested parties. The obscure business environment leaves the MNEs no choice but to be swamped by unclear rules, acquisition regulations, or disclosure obligations. Prior research has identified those institutional settings such as regulatory quality will shape not only the entering strategies but also the post-acquisition innovation performance of MNEs (Cheng & Yang, 2017). On the other hand, specific regulation such as environmental regulation could drive MNEs to improve its green technology innovation ability (Zhang et al., 2022). A study (Wang, 2018) was carried out examining China's direct investment into ASEAN countries over the period from 2003 to 2015. The findings of the study indicated a positive relationship between the macro-system endowment of the host country and China's foreign investment. In other words, the greater the governance quality of the host nation, the more investment it tends to draw from China.

There is less empirical evidence on the indirect effect of the institutional environment on innovation performance in the context of CBM&As. For Chinese MNEs, those target firms from host countries with low-quality regulations become less attractive since additional costs associated with such institutional environments could increase the management burden (Dong et al., 2019). For instance, economic policy uncertainty in host county will significantly reduces the completion of CBM&A (Li et al., 2022). As outsiders, Chinese MNEs are more sensitive to the changing norms and rules of the host countries when entering global markets. Low-quality regulations will raise uncertainty and lower efficiency, which will decelerate the organizational learning ability of MNEs. Consequently, inefficiency leads to the limitation of learning ability in knowledge acquisition and will hurt the post-acquisition innovation performance of MNEs. Such adverse effects will be amplified when Chinese MNEs frequently engage in CBM&A. On the other hand, a robust regulatory quality environment will decrease the costs associated with the knowledge assimilation and integration process by providing a sound and transparent business environment. Therefore, the incompatibility between knowledge-seeking opportunities and learning ability may not substantially impact firms' subsequent innovation performance. Thus, this study predicts:

Hypothesis 4: The negative relation between the incompatibility between learning ability and CBM&A opportunities and the acquirer's innovation output becomes weaker as the regulatory quality increases.

2.5. The moderating role of quality of law

As argued above, as outsiders, Chinese MNEs are exposed to the risk and uncertainty embedded in the unfamiliar institutional environment of host countries. However, in countries with well-established institutions, such as a solid legal system, the danger of drastic changes in the business environment could be largely avoided. Since MNEs need to develop business strategies based on the host country's legal system, transparent and efficient legal systems will provide more completed and correct information regarding the M&A transaction, reducing the transaction costs for foreign investors. This protection is critical to the post-integration and simulation process, especially when firms actively engage in CBM&A. In addition, solid legal enforcement by the government of host countries will protect the interests of MNEs and reduce additional costs implied by any asymmetric information. For instance, MNEs are more likely to establish R&D centres or acquire innovative targets in countries with more advanced legal enforcement for property protection due to the credibility of the protection of intellectual property rights.

On the other hand, as outsiders, Chinese MNEs lack social networks in the host countries, which could generate the liability of foreignness. Therefore, more strict scrutiny will be imposed on those outsiders. Efficient legal regimes and law enforcement will create a favourable environment for CBM&A completion. Xie et al. (2017) argue that the rule of law and the rigor with which such laws are enforced in the host country are essential in attracting foreign investments in the form of CBM&As. In line with this expectation, the high quality of the legal system and the rule of law in host countries will reduce the transaction costs in the CBM&A. Therefore, the MNEs could allocate more resources to the post-acquisition knowledge integration process, which is critical to the subsequent innovation performance. Based on what was discussed above, this study proposes:

Hypothesis 5: The negative relationship between the incompatibility between learning ability and CBM&A opportunities and the acquirer's innovation output becomes weaker as the quality of law increases.

3. Data, variables, and methods

The dataset for the current study was created by combining data from several sources. The first source is the Zephyr database, which has been used due to its comprehensive database of deal information.[1] This study chose the Chinese listed firms that conducted CBM&As from 2014 to 2018 all over the world. The sample period chosen ensures that post-acquisition integration is either completed or withdrawn (Xie et al., 2017).The second source of data for dependent variable is the

CSMAR database, which provides financial statements and stock information of China's listed companies.[2] CSMAR is one of the earlier datasets to provide filed or granted patent information on China's listed firms. The patent numbers are obtained from the CSMAR database. The third source is the Worldwide Governance Indicators database, developed by Kaufmann et al. (2011) to measure the institutional environment of the host country,[3] which includes regulatory quality index and rules of laws index. After merging three databases and excluding unusable or unreliable observations, the paper has a final sample of 239 firms with complete information.

3.1. Dependent and independent variables

This study uses the natural logarithm of the patents granted to the specifically listed firm each year during the sample period. Although innovation performance is a multidimensional concept, the patent numbers could be a good indicator for several reasons. Compared with measurements such as surveys, patents are less subject to personal consideration and more definite (Ahammad et al., 2017; Griliches, 1998). In addition, the patents are examined by experts in terms of novelty and utility, which are linked directly to inventiveness (Peng & Deng, 2015). Even though firms may not choose to patent their innovation, either because the knowledge is difficult to patent or they only want to disclose their invention if the economic return reaches a certain minimum threshold. Thus, firms' propensity for patents may be influenced by multiple factors. Despite their weakness in measurement, patents were still widely used in previous studies. Patents are one of the most reliable proxies of innovation output at the firm level due to the relatedness of codified knowledge (Bronzini & Piselli, 2016).

Building on prior studies (Chetty et al., 2014), the incompatibility between learning ability and knowledge-seeking opportunities are captured by the growth rate of CBM&As in Chinese listed firms during the sample period (DEAL). More specifically, this study uses the growth rate of CBM&A deals a firm has conducted in a specific year compared with the previous year. Based on previous literature, if a firm becomes very active in CBM&A in a particular year, then such an aggressive strategy may impede the firm from integrating the eternal knowledge efficiently since the lack of enough learning ability. Therefore, this paper uses the growth rate of CBM&A deals of firms to test the hypothesis. This study uses R&D expenditure (R&D) to measure R&D intensity. Following previous literature (Berchicci, 2013), this variable is measured by R&D expenditure for a specific firm divided by the sales in a given year. The third variable is CBM&A relatedness (IND) between acquirer and targets. In a particular acquirer in a given year, a proportion variable has been generated to measure the proportion of deals both parties have from a related industry. If the specific acquirer hasn't done any deals this year, the value would be 0.

This study focuses on regulatory (RQ) and law system dimensions (RL) quality since they are crucial to post-acquisition integration. It uses institutional indices provided by the WGI database to measure the institutional environment. For each firm, one institutional value has been generated by weighted averaging the institutional index of its target country for the specific year. If the firm has not done any deals in a year, the value would be zero in that particular year. The model also includes the manufacture dummy to indicate whether the significant sectors of the acquirers are from the manufacturing industry or not. In addition, the ownership of MNEs is measured by the share percentage of the largest holder if the firm is an SOE (OWN). Otherwise, the value of the ownership percentage is zero.

3.2. Other variables

Prior research has identified several factors that contribute to the innovative performance of the MNE after the cross-border M&A. For instance, several studies have found a positive relationship between firm size and research productivity (Deng & Yang, 2015; Hughes et al., 2020). This study measures firm size (SIZE) by the natural logarithm of the firm's total assets in the given year. The relationship between firm size and innovation performance tends to be positive but not linear (Deng & Yang, 2015; Hughes et al., 2020). Firm age (AGE) is another characteristic that needs to be

controlled, captured by the firm's age since its establishment. Innovation is higher in young firms and decreases as firms age grow (Hughes et al., 2020).

3.3. Research methods

This study uses quasi-Poisson models to estimate the impact of frequency of CBM&As on the innovation performance of the acquirer to measure the count dependent variable of the panel data stably and consistently. The dependent variable is a count variable with a range of zero to a positive number. Consequently, standard multiple regression is inappropriate because it is a nonnegative number. When count data is available as a measurable statistic with a discrete response function, the econometric literature advises using a Poisson or negative binomial regression model, as these models are more effective than linear or discrete models (Greene, 2003). Contrary to the fundamental tenet of Poisson regression analysis, which states that the mean and variance should be equal, excessive dispersion is found. Therefore, quasi-Poisson and negative binomial regression analyses, estimators of GLM to allow over-dispersion (Ahmed et al., 2022; Naji et al., 2020), are used to fit our models to address the over-dispersion issue. This study runs the Pearson goodness of fit test to determine the best method for this model, which indicates that the quasi-Poisson model is preferred over negative binomial model (Dikova et al., 2019). Finally, a one-year lag is used for all the independent variables to avoid any potential endogeneity with the dependent variable. This yields the following models:

3.3.1. Direct effects

$$\mathrm{INO} = \beta 0 + \beta 1\ \mathrm{DEAL} + \beta 2\ \mathrm{R\&D} + \beta 3\ \mathrm{IND} + \beta 4\ \mathrm{OWN} + \beta 5\ \mathrm{RQ} + \beta 6\ \mathrm{RL} + \beta 7\ \mathrm{SIZE} + \beta 8\ \mathrm{AGE} + \varepsilon$$

3.3.2. Moderating effects

$$\mathrm{INO} = \beta_0 + \beta_1\ \mathrm{DEAL} + \beta_2\ \mathrm{R\&D} + \beta_3\ \mathrm{IND} + \beta_4\ \mathrm{OWN} + \beta_5\ \mathrm{RQ} + \beta_6\ \mathrm{RL} + \beta_7\ \mathrm{SIZE} + \beta_8\ \mathrm{AGE} + \mathrm{AL} * \mathrm{IND} + \mathrm{AL} * \mathrm{OWN} + \mathrm{AL} * \mathrm{RQ} + \mathrm{AL} * \mathrm{RL} + \varepsilon$$

4. Empirical results

Table 1 shows the description of the variables included in the model. Table 2 shows the information on the sample firms. Tables 3 shows the correlation matrices for all the variables used in the model. In bivariate relationships, the independent variables do not generally exhibit a meaningful association with one another.

Quasi-Poisson models with robust estimations have been adopted to test the impact of how rapidly MNEs conduct CBM&As on their innovation outcomes in the presence of several moderators. Previous research has shown that CBM&As will not immediately influence the innovation performance of the acquiring firm (Hughes et al., 2020). Thus, all the variables lagged for one year, except the patent variable. Using the lag of one year will enable the study to keep more data. Otherwise, the most recent years would be excluded. Model 1 shows the relationship between the control variables and innovation outputs. Model 2 adds the independent variables and Model 3 includes all the moderators. Table 4 presents the estimated coefficients. The results are based on the entire sample. The deal growth rate hurts the innovation outcomes in Model 2 and Model 3, although the contribution of the deal growth rate in Model 2 is not significant. Model 3, with all moderators, suggests that a 1% increase in deal growth rate will lead to an approximately 7% drop for the acquirer in terms of patents (β=-0.071, $p < 0.05$). This result is consistent with the hypothesis 1. The moderating effects of CBM&A relatedness, ownership advantages, regulatory quality and the rule of law are tested in Model 3. The results suggest that the existence of CBM&A relatedness weakens the negative effect of deal growth on innovation performance ($\beta = 0.001$, $p < 0.001$). However, the coefficient's magnitude is minimal, indicating that CBM&A relatedness has a relatively small impact on the main effects.

Table 1. Variable list and Description

Variable	Type	Description	Source
INO	Dependent	The natural logarithm of the patents granted to the specifically listed firm each year during the sample period	Zephyr
DEAL	Independent variables	The growth rate of CBM&A deals a firm has conducted in a specific year compared with the previous year	Zephyr
R&D	Independent variables	R&D expenditure for a specific firm divided by the sales in a given year	CSMAR
IND	Moderator	The proportion of deals both parties have from a related industry	Zephyr
OWN	Moderator	Dummy, 1 if the firm is an SOE	CSMAR
RQ	Moderator	Regulatory quality index	World Governance Indicators
RL	Moderator	Rules of law index	World Governance Indicators
SIZE	Control	The natural logarithm of the firm's total assets	CSMAR
AGE	Control	Firm's age	CSMAR

On the contrary, the positive but non-significant sign of ownership indicates that SOEs are more innovative after the transaction than non-SOEs. As for the regulatory quality, the positive and significant results ($\beta = 1.480$, $p < 0.001$) suggest that doing business in a host country with high regulatory quality will increase the post-acquisition innovation performance of MNEs. Many coefficients indicate that regulatory quality will largely influence the relationship between CMB&A engagement and subsequent innovation performance. The results are consistent with previous studies, which suggest that the host country matters in the relationship between CBM&As and innovation performance (Stiebale, 2016). However, the host country's law rules negatively moderate the deal growth rate's impact on innovation performance (β=-1.590, $p < 0.001$). The magnitude of the coefficient is also significant, suggesting that rules of law strongly impact the main effects. The effective results indicate that excessive rule of law of the host country may impede the MNEs' post-acquisition innovation performance.

This study conducts several additional tests to check the robustness of this study. First, this study tests the model using a negative binomial model. The results are presented in model 4 of Table 5. The coefficients for the results remain similar. Second, this study further performed sensitivity tests to check the robustness of the results. The correlation between variables is all below the threshold. Thus, there is no multicollinearity problem between different variables. A VIF analysis has also been run to check the possibility of collinearity among independent variables. The result is a maximum value of 26.34, which is lower than the accepted value of 30 (Du & Zhang, 2018). Regarding the measurements of business environment, this study replaces the regulatory quality and rules of laws with other measures of indicators such as government effectiveness (GE) and political stability (PS), as included in Kaufmann et al. (2011). The results are presented in Table 5, which remain consistent to those in the initial quasi-Poisson model. In

Table 2. Information on the sample firms

Variable	N	% of sample		N	% of sample
Acquirers' industry			**Target Country**		
Mining	25	10.5%	Europe	52	21.8%
Manufacturing	91	38.1%	Asia/Pacific	77	32.2%
Transportation and communications	36	15.1%	North America	36	15.1%
Wholesale and retails	12	5.0%	Africa	65	27.2%
Finance	35	14.6%	Others	9	3.8%
Service	40	16.7%	Total	239	
Total	239				
Ownership status of acquirers			**R&D intensity of target firms**		
State-owned	167	69.9%	High R&D intensity	128	53.6%
Private	72	30.1%	Low R&D intensity	111	46.4%
Total	239				

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Table 3. Correlations matrix for CBM&A by Chinese MNEs, 2014–2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
INO	1.00								
DEAL	−0.01**	1.00							
IND	0.07	0.53	1.00						
SOE	0.02	0.02***	0.01**	1.00					
R&D	0.09*	0.01	−0.02	−0.04	1.00				
RL	0.01	0.25	0.13**	−0.03	−0.02*	1.00			
RQ	0.05**	0.56	0.48	−0.01	0.04***	0.15	1.00		
SIZE	0.41	−0.06	0.10***	0.15	−0.21	0.04	0.00*	1.00	
AGE	0.08***	0.05***	0.05**	0.08*	0.09**	0.02**	0.02	0.17	1.00

summary, the robustness tests show that the results of this empirical paper are robust to different estimation methods.

5. Discussion

This study aims to advance the knowledge of a phenomenon inadequately examined in the IB literature: the impact of rapid engagement in CBM&As of Chinese MNEs on their innovation performance. It examines the post-acquisition innovation performance of Chinese MNEs through the lens of knowledge learning perspectives. By introducing the incompatibility between learning

Table 4. Results of quasi-Poisson analysis for CBM&A by Chinese MNEs, 2014–2018

VARIABLES	MODEL 1	MODEL2	MODEL3	MODEL4
	Controls Only			Negative binomial model
DEAL		−0.01 (0.04)	−0.07* (0.04)	−0.03* (0.02)
AGE	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
IND	0.04 (0.05)	0.03 (0.07)	−0.56*** (0.001)	−0.44** (0.005)
OWN	−0.001 (0.002)	−0.001 (0.002)	−0.001 (0.002)	−0.003 (0.002)
R&D	0.03*** (0.001)	0.03*** (0.0008)	0.03*** (0.001)	0.04** (0.0006)
SIZE	0.24*** (0.03)	0.24*** (0.0003)	0.23*** (0.0003)	0.23** (0.007)
RQ		0.41 (0.29)	−1.24** (0.06)	−0.99* (0.04)
RL		−0.38 (0.29)	1.42*** (0.0004)	−1.02*** (0.0008)
*DEAL * IND*			0.61*** (0.0005)	0.44*** (0.0006)
*DEAL * OWN*			0.0003 (0.002)	0.0001 (0.003)
*DEAL * RQ*			1.48*** (0.0004)	1.94** (0.006)
*DEAL * RL*			−1.59*** (0.0004)	−1.19*** (0.001)
R^2	0.23	0.31	0.25	0.28

*p<0.05, **p<0.01 and ***p<0.001 (standard errors in parenthesis).

Table 5. Robustness check for CBM&A by Chinese MNEs, 2014–2018

VARIABLES	MODEL 1	MODEL2	MODEL3
	Controls Only		
DEAL		−0.02* (0.03)	−0.04* (0.04)
AGE	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)
IND	0.06 (0.11)	0.05 (0.11)	−0.17* (0.02)
OWN	−0.002 (0.001)	−0.002 (0.001)	−0.003 (0.001)
R&D	0.04*** (0.0002)	0.04*** (0.0002)	0.04*** (0.0002)
SIZE	0.36** (0.009)	0.36** (0.009)	0.36** (0.009)
GE		0.31 (0.32)	−1.04** (0.002)
PS		−0.48 (0.31)	1.12** (0.005)
*DEAL * IND*			0.41** (0.005)
*DEAL * OWN*			0.001 (0.001)
*DEAL * GE*			1.33*** (0.0004)
*DEAL * PS*			−1.08*** (0.0008)
R^2	0.25	0.29	0.22

*p<0.05, **p<0.01 and ***p<0.001 (standard errors in parenthesis).

ability and knowledge-seeking opportunities, this paper deepens the understanding of the organization's learning process in the context of CBM&As. The empirical results indicate all of the significant key variables showed the expected signs. The variables of innovation performance was strongly significant and indicate a negative sign as expected, which shows that the incompatibility between the learning ability and the CBM&A opportunities may obstruct Chinese MNEs from increasing their post-acquisition innovation performance.

Although Chinese MNEs are motivated to expand globally to enhance their competitive advantages through CBM&As, Chinese MNEs may fail to transfer or codify the acquired knowledge to enlarge their knowledge base as upgrading their learning ability requires a great deal of time and resources (Li et al., 2019; Renneboog & Vansteenkiste, 2019; Xie et al., 2017). Consequently, innovation outputs will be affected due to the limited learning capability to assimilate the external knowledge. Alternatively, instead of focusing on the number of patents, Chinese MNEs are more focused on boosting the quality of their patents in the long run. Thus, instead of rapidly realizing potential patent growth, Chinese MNEs may not choose to go patents until they fully understand the acquired knowledge. This is consistent with their strategy of moving up within the value chain towards higher value-added segments. In line with this view, prior studies (Audretsch & Belitski, 2023; Brown et al., 2017) also contend that there are trade-offs between patented inventions and protecting them from imitation.

The results of the moderation effect of CBM&A relatedness, ownership and institutional environment are consistent with the predictions. The interaction between CBM&A relatedness and innovation is positive and significant. The results indicate that knowledge base similarity helps the

acquirer to minimize the risk of failure by reducing the difficulties or conflicts that could arise from post-acquisition integration. This is in line with previous research (Cheng & Yang, 2017; Xie et al., 2017). As for ownership advantages, the results suggest that the SOEs are more likely to become more innovative due to their connection with the government, which is consistent with the hypotheses. As an emerging country, China is characterized by active government interference in the internationalization process through regulations and policy (Du & Boateng, 2015). Thus, the relationship with the government is essential to the success of the CBM&As as the support from the Chinese government could strengthen SOEs' competitiveness during foreign expansion. Those political ties are believed to help them reduce uncertainty regarding understanding relevant policies or having access to specific resources (Deng & Yang, 2015; Deng et al., 2020). The interaction between regulatory quality is positive and significant and consistent to the results from the hypothesis 4. However, contrary to the hypothesis 5, the rules of law strengthen the negative impact of CBM&As on acquirers' innovation output significantly. The empirical results are consistent with earlier research. Ahmed et al. (2022) state that institutional context has a greater moderating effect on the link between investment motives and CBM&A. When expanding to foreign markets, Chinese MNEs are exposed to more stringent scrutiny due to the liability of foreignness (Dong et al., 2019). Although the rules of law help to facilitate transactions while resolving disputes, excessive review and scrutiny by the well-developed institutional environment would shift the attention and resources of MNEs from knowledge learning to dealing with massive regulations and government bureaucracy.

6. Conclusion

Drawing upon organizational innovation and CBM&A performance literature, this study proposed a theoretical framework that explores how the incompatibility between Chinese firms' learning ability and knowledge-seeking opportunities influences their innovation performance after CBM&As. The results support the initial hypotheses and suggest that innovation performance will drop if firms decide to engage in CBM&A aggressively. The CBM&A relatedness and the regulatory quality of host countries could weaken the impact of CBM&A on subsequent innovation performance. By contrast, the innovation performance will be strengthened if the rules of laws of the host countries are strict. This study contributes to the literature in several ways. First, by emphasizing the role of CBM&As in the innovation performance of acquiring firms through the lens of organizational learning perspectives, this paper fills a gap in the literature on the link between CBM&As and firm innovation performance by introducing the mechanism of incompatibility between learning perspectives and international opportunities. Second, this study fills a gap in the literature by highlighting the need for knowledge upgrading and adaptation during the CBM&As to improve post-acquisition innovation outcomes.

6.1. Limitations and future research directions

This study has a few limitations, which can serve as suggestions for future research directions. Firstly, this article does not distinguish between the various CBM&A incentives. In order to fully comprehend CBM&As, future studies should compare different justifications and detail the circumstances under which one method will prevail. The accessibility of the data is the second restriction on this paper. To evaluate the factors that affect long-term performance, future study may aim to gather data from samples with larger sample sizes.

6.2. Managerial implications

This paper provides some managerial implications for Chinese MNEs motivated to eventually increase their innovation abilities through CBM&As. First, although prior research noted that learning ability is essential to the success of CBM&As, a vital implication of this paper is that firms who actively enter the global market should learn to balance their learning abilities and knowledge-seeking opportunities. The findings indicate that the subsequent innovation performance may drop because it takes time for MNEs to integrate external knowledge into their knowledge base. This implies that subsequent innovation outputs after CBM&As are not the priority

of Chinese MNEs since they want to enlarge their knowledge base and increase innovation ability in the long run (Zhang et al., 2016).

Second, this research has demonstrated the interaction effect of CBM&A relatedness, ownership and institutional environment. The findings suggest that if two parties are from related industries, the negative influence of frequent engagement in CBM&As becomes weaker. This implies that managers should consider not only firm-level factors but also industry- and country-level factors which could influence the relationship between CBM&As and innovation outcomes (Datta & Roumani, 2015). This paper emphasizes that innovation is a significant dimension of post-acquisition performance that needs to be considered more thoroughly. As a result, managers can take use of ownership advantages, and industry-relatedness benefits in a way that strengthens their internal capabilities, hence improving the performance of following innovations.

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Notes
1. Zephyr data are available at: https://www.bvdinfo.com/en-gb/our-products/data/specialist/zephyr [Accessed 05 April 2021]
2. CSMAR data are available from: http://us.gtadata.com/ [Accessed 05 April 2021]
3. The WGI scores are available at: http://info.worldbank.org/governance/wgi/index.aspx#reports [Accessed 05 April 2021]

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