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ABSTRACT

Research that links boards in general and interlocks in particular with internationalization activities of emerging market multinationals (EMNEs) has recently garnered significant attention. However, a focused examination of the impact of the interlocks of different types of directors on the nature of EMNE internationalization strategy is missing. To address this gap, we use an integrated agency–resource dependence perspective to distinguish board interlocks provided by inside directors from those provided by independent directors to demonstrate their impact on exploratory and exploitative internationalization. We test our hypotheses on 1996 observations of Indian firms between 2011 and 2017. Our results show that while inside director interlocks promote exploitative strategies over exploratory internationalization strategies, independent director interlocks deter exploitative internationalization. Furthermore, these preferences are contingent upon the R&D intensity of the firm.

Keywords: Board of directors, Director interlocks, Exploratory internationalization, Exploitative internationalization; Insider director interlocks, Independent director interlocks, Emerging market multinationals

1. Introduction

In recent years, the internationalization of firms from emerging economies has received significant attention from both business scholars and practitioners (Tan et al., 2020). While the growing number of multinational enterprises from emerging economies (EMNE) has drawn attention, it is the context in which the EMNEs originate that has most intrigued scholars (Deng & Zhang, 2018; Hernandez & Guillén, 2018). Unlike multinationals from the developed countries, EMNEs originate from countries that have inadequate resources, inefficient technologies, and underdeveloped institutions (Buckley & Tian, 2017; Madhok & Keyhani, 2012; Nair et al., 2015) and yet, despite these challenges, there is a surge of EMNEs competing in the international markets. This influx has prompted scholars to examine the rationales and enablers of these firms' international growth and expansion strategies, and the locations of their expansion (Cui et al., 2014; Luo & Bu, 2018).

Extant research on EMNE internationalization identifies two complementary, focused strategies for internationalization: asset-exploitation, where EMNEs expand to countries where they can exploit their existing assets and capabilities, and asset-exploration, where EMNEs expand to acquire new strategic assets (Makino et al., 2002) EMNEs typically adopt the asset exploitation strategy when they internationalize to other emerging economies, whereas asset exploration is the strategic choice when they internationalize to the more technologically advanced developed countries (Cui et al., 2014; Yiu et al., 2007). In other words, exploitative internationalization uses the existing technological and management knowhow, whereas exploratory internationalization is aimed at acquiring new technological and management knowhow. Occasionally, firms implement ambidextrous strategies, which is when asset exploration and asset exploitation are simultaneously adopted (Choi et al., 2019; Hsu et al., 2013).

The current understanding of the factors that determine the firms' choice of an exploration or exploitation strategy for internationalization relates predominantly to their capabilities, knowledge, and institutional characteristics (Cuervo-Cazurra et al., 2015; Prange & Verdier, 2011). At the same time, given the complexities of internationalization and the subsequent demand for information processing, the role of board capital, defined as the ability of the board to provide resources to the firm (Hillman & Dalziel, 2003), has also emerged as the focus of a growing body of research on internationalization (Maitland & Sammartino, 2015; Strange et al., 2009). We advance both these streams of research by exploring how a specific aspect of board capital, viz., board social capital (measured by board interlocks) influences EMNE internationalization. Further, in the examination of board social capital, the need to separate independent (outside) from non-independent (inside) directors is highlighted in the extant literature (Ferris et al., 2003; Hillman & Dalziel, 2003). We follow this line of argument by separately assessing the impact of the board social capital offered by insider vs. independent directors on the type (exploration vs. exploitation) of EMNE internationalization strategy.

We posit that understanding the influence of board social capital on the type of internationalization strategy will significantly advance our knowledge about the impact of the board of directors on EMNE internationalization. This is because, unlike firms in the developed economies, EMNEs operate in environments characterized by resource scarcity, where interlocks ease the way to accessing resources (Singh & Delios, 2017), thereby increasing the board's resource-provision capability. However, board interlocks have the potential to impair firm performance by promoting managerial opportunism and expropriation (Fich & White, 2005; Perry & Peyer, 2005), which highlights the need for strengthening the board's monitoring functions. This reflects the necessity to acknowledge and understand the interface between monitoring and resource provisioning within the board.

Further, we also factor in the role played by research and development (R&D) activities in the relationship between board interlocks and the type of internationalization. Investments in R&D helps EMNEs develop capabilities that offer significant value in the process of internationalization (Ahsan et al., 2020; Chebbi et al., 2017; Chittoor et al., 2009; Chittoor & Ray, 2007). The inherently risky nature of this investment can also result in a divergence of interest between directors and managers (Honoré et al., 2015). Thus, R&D is related to both director interlocks (Dalziel et al., 2011) and EMNE internationalization (Thakur-Wernz et al., 2019; Thakur-Wernz & Samant, 2017) and could potentially influence the relationship between the two. This possibility is also examined in our study.

Research on the role of the board in internationalization predominantly employs one of two theoretical lenses: agency (Filatotchev et al., 2011; Tihanyi et al., 2003) or resource dependence (Rivas, 2012; Shin et al., 2016). The agency perspective assumes that directors primarily perform monitoring functions (Boivie et al., 2016; Jensen & Meckling, 1976). In contrast, the resource dependence view (Hillman et al., 2009; Pfeffer & Salancik, 1978) propounds the resource provisioning role of the board of directors. This either/or approach has been criticized for creating a silo-style examination of director functions (Hillman & Dalziel, 2003; Zona et al., 2018). To address this dichotomy, management research (particularly international business research) has attempted to integrate the two theoretical perspectives (Chen et al., 2016; Lai et al., 2019). In line with these attempts, and consequent to our identification of an overlap between the monitoring and resource-provisioning functions of boards in EMNEs, we integrate the resource dependence and agency perspectives to study the impact of board interlocks on the mode of internationalization. Moreover, in emerging economy firms, goal incongruence between board and managers (i.e., the traditional principal-agency problem) co-exists with the concentrated ownership (family or business groups) of such firms (principal-principal conflicts) (Bhaumik et al., 2019; Singh

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& Delios, 2017). In the current paper, while we acknowledge the existence of principal-principal conflicts, our primary focus is on the principal-agency conflict in these firms, for which the monitoring function of the board is an alleviating mechanism.

We empirically test these relationships on a seven-year panel data with 1996 observations of 643 listed Indian firms between 2011 to 2017. India offers an appropriate context to test our hypotheses for three broad reasons. First, Indian data is extensively used to study EMNE internationalization (Chittoor et al., 2009; Gaur et al., 2014). The outward foreign direct investment flows from India rose from US$ 2,985 million in 2004-05 to US$ 11,037 million in 2017-18 (UNCTAD, 2018). Second, since India's economy has been classified as emergent (Jain, 2006), it offers contextual support to generate insights, contrasting with the current scholarship predominantly based on Western economies (Javalgi & Grossman, 2016; Thite et al., 2016). Third, extant research also demonstrates that EMNEs based in India prescribe to a combination of exploration and exploitation-based internationalization strategies in their product and market dimensions (Ahsan et al., 2020; Chebbi et al., 2017; Chittoor & Ray, 2007). In 2017, for instance, of the total outward foreign direct investment flows from India, 61% was to developed countries, whereas developing countries accounted for the remaining 39%[1]. Therefore, choosing the Indian context ensures that both these forms of internationalization can be understood and compared.

Our study seeks to throw light on how and under what conditions the interlocks by different types of director affect the nature of EMNE internationalization. In doing so, we heed the calls to integrate the agency and resource dependence perspectives to understand the impact of boards of directors on firm outcomes (Hillman & Dalziel, 2003). In contrast to existing research that predominantly examines the outside director's social capital in isolation (Chen et al., 2016; Lai et al., 2019), our approach distinguishes between the social capital

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[1] This detail was manually computed by the researchers based on the reports from the Reserve Bank of India

offered by outside directors and inside directors, thereby emphasizing the role of board independence in EMNE internationalization. Second, we advance understanding of the antecedents that determine the type of internationalization strategy used by EMNEs. While existing studies have emphasized the EMNEs' drive to make different choices between exploration and exploitation strategy for internationalization, the firm-level factors that determine this choice of strategy is less understood (Choi et al., 2019). Our findings address this gap by explaining the role of board interlocks by different types of directors in determining the type of internationalization strategy by EMNEs. Third, though R&D and board social capital have been previously identified as antecedents of internationalization, their role in influencing the type of internationalization strategy in EMNEs is less explored. By studying firm R&D as a contingency factor that influences the relationship between different types of director social capital and choices of international expansion, we provide nuanced understanding of the role of "capability development" in the choice of EMNE internationalization strategy (Purkayastha et al., 2018).

2. Theory and hypotheses

2.1 EMNE internationalization strategies

Extant research demonstrates significant interest in understanding how firms use their existing assets or acquire new assets through internationalization (Makino et al., 2002). In the context of developed-country multinationals, international business scholars have traditionally viewed internationalization as the process of firms exploiting their competitive advantages in markets abroad (Hymer, 1976; Zahra, 2005). However, with the increase in EMNE internationalization, arguments advocating exploratory internationalization is also evident (Child & Rodrigues, 2005; Cui et al., 2014). Research on EMNEs highlights that internationalization strategies that individually focus on exploitation or exploration, and the ambidextrous strategy that combines exploration and exploitation, have their own benefits

and challenges. Choosing a focused strategy that exploits a firm's existing capabilities (exploitative internationalization) can, in environments similar to the home country, provide it with quick returns. However, if this mode of expansion does not expose EMNEs to new learning environments, it can result in the firm missing out on new opportunities for developing capabilities that might be exploited in the future (Gaur et al., 2014; Niosi & Tschang, 2009; Yilmaz et al., 2015). Alternatively, choosing a focused strategy that explores new capabilities (exploratory internationalization) provides EMNEs with access to an environment that offers novel knowledge. However, the nature of this strategy requires the firm to have significant learning capacity and the financial strength to survive in a new, uncertain environment (Luo & Rui, 2009; Luo & Tung, 2007).

Recent theoretical debates and empirical evidence evince that choosing an ambidextrous strategy to internationalize provides EMNEs with opportunities for capitalizing on the expected complementarity between exploitation and exploration. However, the challenge of integrating the two strategies presents the firm with significant costs (Bandeira-de-Mello et al., 2016; Prange & Verdier, 2011; Raisch et al., 2009). Thus, despite the benefits of an ambidextrous strategy, EMNEs often make the strategic choice to opt for individual focused strategies viz., exploration or exploitation. It is therefore imperative to understand the factors that can lead firms to adopt one of these over the other (Choi et al., 2019).

2.2 Board interlocks and EMNE internationalization

The role played by board interlocks in strategic decisions (such as internationalization) has attracted attention in recent years (Chen et al., 2009; Peng et al., 2001). However, this growing body of research is developing along dichotomous lines. There are two contrasting streams of argument that represent two broad theoretical perspectives—agency theory and the resource dependence view. Agency theory assumes that the interests of the manager are divergent from those of the owner, leading to potential principal–agent (PA) conflicts that

underline the importance of the director's monitoring function (Eisenhardt, 1989; Jensen & Meckling, 1976). In emerging economies, these traditional agency problems are augmented by the prevalence of the concentrated ownership model, which results in agency conflicts between the controlling and minority shareholders (Armitage et al., 2017; Young et al., 2008). This kind of conflict, widely termed the principal–principal (PP) problem, is often witnessed in firms where ownership is concentrated within a family or business group. While some scholars consider that emerging economy firms are more likely to face the PP problem than the traditional PA problem, it is important to note that both types of agency conflicts are tangible in emerging economy firms (Bhaumik et al., 2019; Oehmichen, 2018; D. Singh & Delios, 2017). The severity of PP conflicts in EMNE firms can be attributed to the level of ownership concentration, while the weak corporate governance systems that generally characterize the emerging economies enable managers to engage in activities that minimize shareholder wealth, resulting in potential PA conflicts (Young et al., 2008). Hence, the role of PA conflicts in emerging economy firms and the influence these have on, inter alia, their internationalization strategies warrant further examination. We therefore primarily focus on PA conflicts by incorporating an acknowledgement of (the types of) ownership concentration in our research design.

Agency theorists advocate board independence and claim that independent directors play a significant role in board monitoring, which is key to containing managerial self-interest (Baysinger & Butler, 1985; Daily & Dalton, 1994). In contrast, supporters of the resource dependence view posit that the primary role of the board of directors is to assist managers to realize their firm-performance goals via resource provisioning in the form of advice (Gales & Kesner, 1994; Hillman et al., 2000). Research on director interlocks often reveals that the influence of interlocks on firm outcomes such as internationalization is ambivalent (Chen et al., 2016; Lai et al., 2019). One plausible explanation for this

inconsistency is the preference of researchers for one director-function over other in their theorizing on the relationship between interlocks and firm performance. To overcome this, there have been calls to integrate the basic tenets of agency theory with those of the resource dependence view (Hillman & Dalziel, 2003).

We heed this call by integrating agency and resource dependence logic into our theoretical model and argue that the directors' position on the board (insider vs independent) and directors' social capital (determined by interlocks) signify their potential and resources and can be employed to assess their influence on the type of EMNE internationalization strategy. Recognizing the position of directors on the board is crucial to the examination of the board capital offered by director interlocks in relation to EMNE internationalization for the following reasons. First, the functional role of the director (independent vs. insider) determines their power, status, and primary responsibility on the board (monitoring vs. resource provisioning), and it can also influence the relationship between the director's capital and resource provisioning activities, such as advice to managers (Hillman & Dalziel, 2003). Since complex strategic decisions, such as internationalization, require boards to enhance managerial capabilities to ensure successful outcomes (Kim et al., 2009), the position of the director on the board becomes decisive.

Second, the directors' impact on organizational learning, which is key to internationalization, is dependent on both their predominant function and board social capital (such as may be gained through interlocks) (Anand et al., 2002; Barden & Mitchell, 2007; Zhao et al., 2005). In this regard, the position of a director on the board determines the director's access to firm-specific knowledge and the trust placed in the executives in the interlocked firm (Adams & Ferreira, 2007; Holmlstrom, 2004). Since interlocks act as channels to exchange strategic knowledge "which may impinge on or affect the focal organization" (Pfeffer & Salancik, 1978), the knowledge transferred depends on the

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director's position on the board. Hence, the learning capability of EMNEs that operate in a resource-deficient environment is closely linked to the knowledge that the strategic leaders, e.g., directors, provide to the firm (Singh & Delios, 2017). Even in the context of emerging markets such as India where business groups are prevalent, this dichotomy is relevant. This is because the high level of interlocking among firms affiliated to business groups affects neither the level of independence of the independent directors on these boards nor the interlocks between such directors (Aggarwal et al., 2019).

In the upcoming sections, we build our hypotheses to demonstrate how our integrated agency–resource dependence perspective relates to both inside and independent directors and various aspects of board social capital provided by interlocks, subsequently influencing the choice of exploratory and exploitative internationalization.

2.3 Director interlocks and exploitative internationalization

Exploitation comprises the refinement and extension of current capabilities, technologies, and knowledge (March, 1991), and primarily involves using the existing knowledge owned by the firm (Niosi & Tschang, 2009). It Scholarship on EMNE internationalization highlights that EMNEs often have a competitive advantage when internationalizing in other developing countries, where they can exploit their locally developed knowledge and combine this with other capabilities such as low-cost manufacturing, labor management, and availability of cost-effective manpower (Makino et al., 2002). Exploitation as a means of internationalization is advantageous for EMNEs for two reasons. First, exploitation requires limited additional learning. Given that EMNEs generally originate from resource-deficient environments, exploitation is thus a cost-effective means of reaching markets abroad (Makino et al., 2002). Second, generation of rents from exploitation is less risky and more certain (Prange & Verdier, 2011).

However, a strategy that focuses only on exploiting the firm's existing capabilities in international markets has its shortcomings. While isolated exploitation may provide quick returns, these can, in the long-run, be sub-optimal (March, 1991). This is because exploitative strategies provide firms with limited opportunities for experimenting with novel ideas and developing new capabilities that might hold the potential for superior firm performance in the future. Moreover, the capabilities of EMNEs can be exploited in only a limited number of geographical regions that have institutional arrangements similar to those of the home country because the location-based strategic resources gained from the unique home country institutional environments are region-specific and geographically less transferable (Hashai & Buckley, 2014).

In the case of EMNEs that operate in resource-deficient environments (Singh & Delios, 2017) in which strategic leaders, such as directors, are an important source of firm knowledge (Vera & Crossan, 2004), board capital plays an important role in determining the exploitation strategy to internationalize. We integrate the agency and resource dependence perspectives to argue that the status of the board director will affect both their ability and motivation to provide resource advantages (Makino et al., 2002), possibly derived from interlocks, with consequent implications for the firm's specific internationalization strategy.

We argue that inside directors would be more inclined to use the knowledge transferred through interlocks to execute an exploitative internationalization strategy. This can be attributed to the fact that returns from exploitation are quicker, and the process of generating returns is strategically less risky. This is highly supported by agency theory arguments that suggest that managers will be keen to allocate more attention to expanding their extant strategic resources than to investing in new resources that will divert the firm's attention from its existing goals (Shleifer & Vishny, 1989). Managers are also motivated by the shorter returns (Jensen & Meckling, 1976) provided by exploitation compared to the

long-term returns offered by exploration. Since inside directors are weak monitors of managerial action, they are inclined to support the managers in their strategic decisions (Fama & Jensen, 1983; Hermalin and Weisbach, 1998). Building on this, we argue that inside directors, who often hold executive roles or work closely with executives and the CEO, will be keen to exploit the current knowledge and resources in the international market rather than to explore new knowledge. Further, inside directors have access to their firm's specific knowledge and they are in a position to exploit the firm's existing knowledge and capabilities with relative ease (Masulis & Mobbs, 2011). Hence, we argue that the interlocks provided by inside directors will be positively related to the EMNE adopting an exploitative internationalization strategy.

In contrast, we posit that interlocks from independent directors will be negatively related to the exploitative internationalization strategy for the following reasons. First, from an agency perspective, independent directors involved in monitoring will be less trusted by managers, which will limit knowledge sharing between managers and independent directors (Faleye et al., 2011). Hence, independent directors have insufficient access to the focal firm's firm-specific knowledge. Such directors will therefore find it challenging to effectively exploit the existing knowledge in their internationalization process. Second, their functional role predisposes independent directors to monitor the actions of executives who incline toward exploitative internationalization. There is evidence that interlocked independent directors tend to monitor and regulate the proposals of executives in strategic decisions, such as those related to R&D investment (Hillman & Dalziel, 2003). With the knowledge gained from interlocks with other internationalizing firms, independent directors will be able to advise and regulate managers, and avoid focusing on an exploitation strategy that does not foster the new organizational learning that would be beneficial in the long run. Combining these arguments, we hypothesize the following:

Hypothesis 1a*. Inside director interlocks are positively related to exploitative*
internationalization.

Hypothesis 1b*. Independent director interlocks are negatively related to exploitative*
internationalization.

2.4 Director interlocks and exploratory internationalization

In exploratory internationalization strategies, firms internationalize to expand their assets and
increase organization learning by deploying their existing resources to build long-term
competencies (Makino et al., 2002). Consequently, exploration as a strategy for
internationalization involves components such as searching for knowledge, experimenting
with design, and discovering new knowledge (March, 1991). Extant literature highlights
exploration as one of the key EMNE internationalization strategies (Chittoor & Ray, 2007;
Cui et al., 2014) for several reasons. First, EMNEs, irrespective of the country of origin,
operate in environments that are resource deficient (Singh & Delios, 2017); these firms are
motivated to venture abroad in search of knowledge and technological skillsets that will
enable them to capture the international market in host countries (Deng, 2009; Rui & Yip,
2008). Second, the labor and capital markets in emerging countries are less mature than those
of the developed countries (Hoskisson et al., 2000; Khanna & Palepu, 1999). Thus,
internationalization to these destinations can facilitate resources and capital acquisition.
Third, exploration as an internationalization strategy is essential for EMNEs if they are to
acquire the technology and assets that will enable them to mitigate the increasing competition
in their home country presented by incoming foreign competitors (Cui et al., 2014; Jing Li et
al., 2012). Exploratory internationalization strategies are not unique to EMNEs. However, the
magnitude of asset-seeking internationalization by EMNEs and the disruption that this has
caused for MNEs from the developed countries can be attributed to EMNE motivation to

offset their late-comer status and catch up with their MNE counterparts (Chittoor et al., 2009; Luo & Bu, 2018).

Although the exploration strategy offers firms an opportunity to gain organizational learning in international markets, the returns are both long-term and uncertain, affecting the relationship between exploration efforts and their outcomes. These considerations of uncertainty and risk are highly cogent to an EMNE's internationalization strategy because such firms are often resource-constrained and find it difficult to maintain a long-term outlook (Luo & Rui, 2009; Luo & Tung, 2007). The learning capabilities of EMNEs are similarly pertinent to the success of exploratory internationalization because exploration provides firms with access to unique knowledge in new international markets (Thakur-Wernz & Samant, 2017).

We argue that interlocks formed by inside directors will be negatively associated with the exploratory internationalization strategy for the following reasons. First, as already argued, inside directors are more inclined to implement strategies that will generate quick returns. Since the exploratory internationalization strategy requires firms to first invest in learning so they can build the capabilities that help them gain a competitive advantage in the long-term (Gupta et al., 2006), an increase in inside director interlocks will result in a decrease in exploration. Second, internationalizing through exploration is a highly complex process and the returns are very uncertain (Hsu et al., 2013). Again, this uncertainty will be negatively viewed by inside directors, and the relationship between inside director interlocks and exploration will be therefore also be negative. Third, compared to independent directors, inside directors are mostly interlocked to firms that are fairly similar to the focal firm. This generates an imitation of strategies rather than an exploration of diverse or novel ones (Han et al., 2015). Moreover, compared to independent directors, inside directors are, on average, connected to a smaller number of external firms (Mizruchi, 1996). Thus, the knowledge

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transferred through inside director interlocks is not sufficiently novel to enable EMNEs to develop capabilities that help with exploratory internationalization exploration in complex environments.

We also argue that independent directors can negatively affect exploratory internationalization by firms, for two reasons. First, the exploration strategy for internationalization requires external knowledge transferred via interlocks to be integrated with the existing internal knowledge (Savino et al., 2017; Xie & Li, 2018). Independent directors have restricted access to the firm's internal knowledge and capabilities, making this integration an uphill task. Second, in a typical firm, independent directors are keen to use their knowledge gained from other firms through interlocks to monitor the proposals of the executives who design the firm's strategy (Baysinger & Hoskisson, 1990). Since the strategic involvement of independent directors is limited compared to that of inside directors (who, as already noted, favor and support exploitative internationalization strategies) the opportunities for independent directors to receive and use the knowledge transferred through interlocks to develop exploration proposals are similarly bounded. Thus, combining the arguments, we hypothesize the following:

> ***Hypothesis 2a***. *Inside director interlocks are negatively related to exploratory internationalization.*
>
> ***Hypothesis 2b***. *Independent director interlocks are negatively related to exploratory internationalization.*
>
> *2.5 Moderating effect of R&D intensity*

The role of R&D in EMNE internationalization has gained significant attention in recent years (Bonaglia, Goldstein, & Mathews, 2007; Purkayastha et al., 2018; Zahra, Filatotchev, & Wright, 2009). Emerging research that links R&D and EMNE internationalization has identified two broad ways in which R&D is related to EMNE internationalization. First,

EMNEs often internationalize to developed countries that have business environments that support innovation and generate positive returns for their R&D investments (Cuervo-Cazurra, 2012; Witt & Lewin, 2007). Second, an alternative stream of research suggests that EMNEs import technology and learn from market spillovers to build capabilities that can be utilized to attain competitive advantage in international markets (Chittoor et al., 2009; Chittoor & Ray, 2007; Jiatao Li & Kozhikode, 2009).

Research on corporate governance has highlighted that board characteristics (Chung et al., 2003; Honoré et al., 2015) and particularly, the characteristics of director interlocks can also determine a firm's R&D investments (Chung et al., 2003; Helmers et al., 2017; Li, 2019). Extant literature also demonstrates that the effect of director interlocks on R&D investments is dependent on the type of director (insider vs. independent). For example, (Dalziel et al., 2011) identify that inside and independent directors utilize the knowledge gained through interlocks differently, which affects R&D investments. Given that R&D investments are related to both director interlocks and EMNE internationalization, R&D investments could also potentially influence the relationship between director interlocks and internationalization. For instance, Chittoor et al. (2009) establish how the import of technological resources can enable firms to develop the internal resources and capabilities that play a significant role in EMNE performance in the international markets. Therefore, we anticipate that the level of a firm's R&D investments can influence how inside and independent directors utilize the knowledge transferred through interlocks to make decisions on the type of internationalization strategy.

We begin by hypothesizing the comparative influence of inside director interlocks on exploitation vs. exploration strategy in the presence of R&D investments. We anticipate that at higher levels of R&D investment, inside director interlocks will be related more positively to exploration than to exploitation for the following reasons. First, an increase in R&D

investment enables firms to improve their capabilities; these can be leveraged to manage the uncertainties that arise during the process of internationalization (Singh & Gaur, 2013; Yi et al., 2013). When firms develop capabilities through R&D, they are keen to protect their investments via the developed countries' institutional support of intellectual property rights. This gives managers confidence that exploration to the developed economies can provide better returns and generate superior competitive advantages for the firm. Alignment with managerial decisions favoring R&D will thus result in inside directors preferring exploration over exploitation. Second, since R&D investments are predominantly driven by managerial interests (Alessandri & Pattit, 2014; Kor, 2006; Nam et al., 2003), managers will, from an empire-building perspective, be keen to allocate more resources to such projects (Xuan, 2009), which can lead to proposals for R&D-driven internationalization searching out unique resources and strategic assets. Since inside directors lack independence (Fama & Jensen, 1983; Hillman & Dalziel, 2003), their scrutiny of such proposals will be somewhat cursory and biased in management's favor. Moreover, inside directors with executive connections perform higher resource provisioning compared to independent directors (Hillman & Dalziel, 2003), and consequently, they effectively combine the external knowledge gained through interlocks with the internal knowledge developed through R&D investments. Hence, we hypothesize the following:

> **Hypothesis 3:** *R&D intensity will moderate the relationship between inside director interlocks and internationalization strategies in such a way that when R&D intensity is higher, inside director interlocks impact exploratory internationalization more positively than exploitative internationalization.*

In contrast, for firms that make R&D investments, independent director interlocks could have a more positive impact on exploitative internationalization over exploratory internationalization for the following reasons. First, given that highly interlocked directors

are more aware of technological developments and internationalization strategies, interlocked directors are better equipped to analyze the proposals that connect R&D capabilities with internationalization. Previous research has identified R&D as a critical capability that drives EMNE internationalization. In EMNEs with high R&D, internationalization involves attempts to catch up with industry leaders and to generate rent at a global scale. Given that EMNEs are late comers to globalization, firms that employ this risky strategy to explore in the global market by using R&D as a platform face unsurmountable challenges. Independent directors can potentially utilize the knowledge gained through interlocks to scrutinize risky proposals presented by managers who want to carry out R&D-driven exploration in international markets. This is in alignment with evidence that suggests that independent director interlocks are negatively related to firms' risky R&D spending (Dalziel et al., 2011). Second, independent directors could possibly be convinced that the internal capabilities developed by the firm's R&D investments will give the firm the potential to exploit those capabilities in the international markets. Since interlocked independent directors are keen to improve the efficiency of the firm's R&D investments, they will be willing to exploit the existing capabilities generated by the firm's R&D in international markets. Combining the arguments that interlocked independent directors will minutely scrutinize proposals for ambitious exploration into international markets while being eager to use financial measures to improve the cost-efficiency of existing R&D investments, we hypothesize that,

> **Hypothesis 4:** *R&D intensity will moderate the relationship between independent director interlocks and internationalization strategies in such a way that when R&D intensity is higher, independent director interlocks impact exploitative internationalization more positively than exploratory internationalization.*

3 Methodology

3.1 Data and context of study

We test our hypotheses in the context of India, which is classified as an emerging or developing economy (Jain, 2006; Javalgi & Grossman, 2016; Thite et al., 2016). We extract and combine data from two databases. First, we collect firm-level financial and corporate governance data from the Prowess database published by the Centre for Monitoring Indian Economy (CMIE). The CMIE Prowess database integrates information on all the firms listed on the major Indian stock exchanges. The listed firms together make up to 75% of the total corporate taxes collected in India (Kumar et al., 2020). Next, we collect the data on outgoing Foreign Direct Investment (OFDI) from reports published by the Reserve Bank of India (RBI), which is India's central bank. RBI is the principal authority for the approval of foreign direct investment in the country, and data from this database has often been used in similar studies (Feinberg & Majumdar, 2001; Hattari & Rajan, 2010; Majumdar & Bhattacharjee, 2014). Since the OFDI data availability from RBI is from 2011 onwards, we use that as the starting time-period of our analysis. RBI provides annual details of the destination countries of all OFDI from Indian firms, which we use to compute the exploitation and exploration constructs. Since firms belonging to finance, insurance, and real estate are subject to a different set of corporate governance regulations, we follow prior studies and drop them from our sample (Beckman et al., 2004; Kim et al., 2016), which contains firms representing 6 primary industries as per the National Industry Classification (NIC), namely manufacturing, services, construction, mining, agriculture, and transportation. Our final sample is an unbalanced panel of 1996 firm years, consisting of 643 unique firms over the time-period 2011 to 2017.

3.2 Variables

3.2.1   Dependent variables

The dependent variables in our study are exploitative and exploratory internationalization. We follow Bandeira-de-Mello et al., (2016) in classifying exploitative internationalization as

an emerging market firm transferring their existing capabilities to other emerging markets that are institutionally similar to the home country. On the other hand, exploratory internationalization will involve a firm from an emerging market entering advanced and developed markets that are institutionally distant from the home country. Thus, we categorize the internationalization activity of our sample firms as exploratory or exploitative based on the destination country. Further, to classify the OFDI host country as developed or emerging, we employ the classification provided by the United Nations' report on the World Economic Situation and Prospects (WESP, 2018). The classifications are mutually exclusive and reflect the basic economic conditions of a country; they have frequently been used in similar studies to distinguish emerging and developed markets (Cassia & Magno, 2015; Harmancioglu & Tellis, 2018).

After applying this classification to our dataset, we compute the count of exploitative and explorative FDIs as our dependent variables. Our sample consists of 4,111 exploratory FDIs (encompassing 1,110 firm-year combinations) and 3,493 exploitative FDIs (encompassing 886 firm-year combinations) by Indian firms. We find that there are only 20 instances in our sample where the same firm has both exploratory and exploitative FDIs in the same year.

3.2.2   Independent variables

The *interlocks* provided by the independent and inside directors are the key independent variables in this study. Based on the classifications provided in the Prowess database, we first identify the independent and inside directors in our sample. We capture interlocks as the total number of firms that the focal firm has interlocks with through the board of directors (Freeman, 1978; Koka & Prescott, 2002). Thereafter, following extant literature, the measure of interlocks is finalized as the proportion of total interlocks provided by the directors against the total number of directors (Filatotchev et al., 2018; Ortiz-de-Mandojana et al., 2012) for

each firm-year. This computation is done separately for independent and inside directors to find the distinct interlock variables for independent and inside directors. For our moderating relationship, we compute *R&D intensity* as the ratio of annual R&D expenditure to total sales (Cohen et al., 1987; D. A. Singh & Gaur, 2013).

3.2.3 Control variables

We control for several other variables that can potentially impact our dependent variables. First, we control for board characteristics such as *board size, board independence, number of board meetings,* and *CEO-chairperson duality* (Panicker et al., 2019; Singh & Delios, 2017; Zona et al., 2018). Next, we control for the proportion of shareholdings by different types of controlling and non-controlling owners, including *family shareholding, foreign institutional shareholding,* and *domestic institutional shareholding* (Panicker et al., 2019; Ray et al., 2018; Singh & Gaur, 2013). Further, firm characteristics such as *firm size* (measured as log of total assets), *profitability* (measured as return on assets), *exports* (measured as exports as percentage of total sales), and *debt to equity ratio* are also found to influence the internationalization of a firm (Gaur & Kumar, 2009; Singh & Jun, 1999; Tihanyi et al., 2003), and are thus controlled in our study. Finally, our model controls for *business group affiliation*, and the firm's *industry* and *age* (Boter & Holmquist, 1996; Carr et al., 2010; Chittoor et al., 2009; Gaur & Kumar, 2009).Table 1 presents the list, source, and computation of all the variables used in this study.

Insert Table 1 about here

3.3 Analytical procedure

We employed a panel data negative binomial estimation technique for our analysis. Our dependent variables are count variables; the two appropriate estimation techniques in such situations are negative binomial and Poisson estimation (Hausman et al., 1984). Our

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preliminary analysis with STATA command OVERDISP (Fávero & Belfiore, 2018) showed

evidence of overdispersion in our data. We therefore employed negative binomial estimation,

a special case of Poisson estimation, which corrects for overdispersion. Next, the outcomes of

Hausman test (Hausman, 1978) showed that our model does not violate any assumptions of

random-effects estimation (p-value = 0.2699). Additionally, random-effects estimation also

provides benefits such as retention of more observations, accommodation of both within and

across firm variations (Belkhouja & Yoon, 2018), and inclusion of time-invariant

independent variables in estimation. All independent variables are lagged by one year,

consistent with the argument that a one-year lag best represents a typical planning cycle

(Geringer et al., 2000; Wan & Hoskisson, 2003). Moreover, we incorporated year dummies

as a standard practice (Zhao, 2006). To enhance the interpretation of the moderating effect,

we mean centered the independent variables for all models with interaction terms (Aiken et

al., 1991).

The overall statistical model of our analysis is presented below.

$$
\begin{aligned}
\textit{Expected count of exploratory or exploitative internationalization}_{i,t} \\
= \beta_0 + \beta_1 \textit{Inside director interlocks}_{i,t-1} \\
+ \beta_2 \textit{Independent director interlocks}_{i,t-1} \\
+ \beta_3 (\textit{Inside director interlocks}_{i,t-1} * \textit{R\&D intensity}_{i,t-1}) \\
+ \beta_4 (\textit{Independent director interlocks}_{i,t-1} * \textit{R\&D intensity}_{i,t-1}) \\
+ \beta_5 \textit{Board independence}_{i,t-1} + \beta_6 \textit{Board size}_{i,t-1} \\
+ \beta_7 \textit{Board meeting}_{i,t-1} + \beta_8 \textit{CEOChairperson}_{i,t-1} \\
+ \beta_9 \textit{Family shareholding}_{i,t-1} + \beta_{10} \textit{FII shareholding}_{i,t-1} \\
+ \beta_{11} \textit{DII shareholding}_{i,t-1} + \beta_{12} \textit{BG affiliation}_{i,t-1} + \beta_{13} \textit{Firm size}_{i,t-1} \\
+ \beta_{14} \textit{Profitability}_{i,t-1} + \beta_{15} \textit{R\&D intensity}_{i,t-1} \\
+ \beta_{16} \textit{Debt to Equity ratio}_{i,t-1} + \beta_{17} \textit{Export ratio}_{i,t-1} + \beta_{18} \textit{Firm age}_{i,t-1} \\
+ \beta_{19} \textit{Industry}_{i,t} + \beta_{20} \textit{Year}_{i,t} + \epsilon_{i,j}
\end{aligned}
$$

4 Results

Tables 2 and 3 present the descriptive statistics and correlation matrix, respectively. To

ensure that our model did not suffer from any multicollinearity issues, we calculated the

Variance Inflation Factor (VIF) of all the variables. We found that the highest VIF was 1.58 and the average VIF was 1.38, placing the risk of multicollinearity well below even a conservative threshold of 4 (O'brien, 2007).

In Table 5, we present the outcomes of estimation of the impact of board interlocks on exploratory internationalization. From Table 5 Model 1, we note a negative relation between inside director interlocks and exploratory internationalization (β=-0.015, p=0.008), thus supporting hypothesis H2a. However, from Model 2 of Table 5, we find that the association between independent director interlocks and exploratory internationalization is not statistically significant. Hence hypothesis H2b is not supported.

Insert Table 5 about here

Table 6 present the outcomes of the moderating effect of R&D intensity on the relation between inside director interlocks and internationalization, while Table 7 demonstrates the moderating effect of R&D intensity on the relation between independent director interlocks and internationalization. The Table 6 results show that when R&D intensity is higher, inside director interlocks impact exploratory internationalization (β=0.005, p=0.000) more positively than they impact exploitative internationalization (β=-0.003, p=0.295). Thus hypothesis 3 is supported. Table 7 demonstrates that when R&D intensity is higher, independent director interlocks impact exploitative internationalization (β=0.008, p=0.029) more positively than they impact exploratory internationalization (β=-0.021, p=0.000). Thus, hypothesis 4 is strongly supported.

Insert Tables 6 and 7 about here

Figure 1 demonstrates the moderating effect of R&D intensity on the relation between inside director interlocks and exploratory internationalization. Figures 2 and 3 graphically

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represent the moderating effect of R&D intensity on the relation between independent director interlocks and exploitative and exploratory internationalization, respectively.

Insert Figures 1, 2, and 3 about here

Since extant literature points to a possible curvilinearity in the relationship between board interlocks and the strategic outcomes of firms (Lang & Lockhart, 1990; Wu, 2008), we ran additional analysis with the square of all interlock terms. While we do not find evidence of a curvilinear relationship on the effect of either kind of interlock on exploratory internationalization, our results in Table 8 reveal that inside director interlocks have an inverted u-shaped relation with exploitative internationalization. Further u-testing revealed that the inflection-point at which the relation starts to diminish is 20.33.

Insert Table 8 about here

Finally, we examined the economic significance of our findings. We find that for each one-unit increase on insider director interlocks, the expected count of exploitative internationalization increases by 1.06, whereas the expected count of exploratory internationalization decreases by 0.94. On the other hand, for each one-unit increase in independent director interlocks, the expected count of the exploitative internationalization decreases by 0.98, whereas a change in independent director interlocks does not influence exploratory internationalization.

Table 9 summarizes the overall outcomes of our study, in comparison with the hypothesized relationships.

Insert Table 9 about here

4.1 Robustness tests

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To test the robustness of our results, we performed several additional estimations using alternative model specifications, alternate time-periods to examine the effect of regulatory changes (Saeed et al., 2016) and tests of endogeneity. The details and outcomes of these tests as supplementary materials in Appendix, owing to space constraints. Qualitatively, the outcomes of the robustness tests are aligned with our main results. Table 10 summarizes the outcomes of all additional robustness tests performed in this study and their descriptive outcomes.

Insert Table 10 about here
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5. Discussion

Despite significant interest about the antecedents of EMNE internationalization, our understanding of the role of director interlocks in driving EMNE internationalization is limited. Much of the nascent literature on EMNE internationalization and boards of directors overlooks the functional roles of directors and differences in the modes of internationalization. To the best of our knowledge, ours is the first study to theoretically and empirically examine the relationship between the variations in the impact of interlocks by independent and inside directors on the exploratory and exploitative internationalization strategies of firms. Our results support the theoretical predictions that the effect of interlocks on internationalization is contingent upon both the functional status of directors—insider vs. independent —and the nature of the EMNE's internationalization strategy—exploratory vs. exploitative. Our results show that inside director interlocks are positively related to exploitative internationalization, whereas independent director interlocks are negatively related to it. In contrast, inside director interlocks are negatively related to exploratory internationalization, and independent director interlocks have no impact on the exploratory internationalization strategy of EMNEs. Further, our results also suggest that the relationship

between the interlocks of different types of directors and the nature of internationalization is contingent upon the R&D intensity of the firm.

Our findings make three important contributions to the advancement of theory in the research on corporate governance and internationalization. The first of these builds on the emerging approach that integrates agency theory and the resource dependence perspective to examine the effect of board capital on internationalization decisions. This integration allows us to examine the director's board capital in juxtaposition with board independence. Recent efforts to use this approach to understand the effect of board interlocks on internationalization have been limited to looking at independent directors only, and presented equivocal outcomes. We advance this line of research and attempt to reconcile the disparate findings of board interlocks on internationalization by taking a decomposed view of the relationship between board interlocks and internationalization at two levels. First, we distinguish between board directors by their functionality (insider vs. independent) and second, we incorporate a distinction between the types of internationalization strategy (exploration vs. exploitation) of EMNEs. Our results generate insights into which type of directors promote or deter a particular EMNE internationalization strategy and highlight that the functional role of directors determines the extent to which they leverage their resources to influence internationalization strategies. Given that directors yield significant power and influence in a firm's strategy, the differential impact of outside and inside director board capital on the internationalization strategy implies that a director's board capital can, depending on their position on the board, wield competing effects on the type of internationalization strategy. Thus, it is critical for EMNEs to evaluate the capital and position of their board directors to ensure they are a good fit with the EMNE's intended internationalization strategy.

Second, our results help advance the research on the antecedents of EMNEs' internationalization strategy. We take a micro-foundations approach to study the antecedent

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role played by specific types of director interlocks in the firm's decision to follow asset exploitation or asset exploration during the internationalization process (Chittoor et al., 2019). The ability of directors to affect the internationalization process partly stems from the knowledge acquired through interlocks and partly from their ability to access the firm's internal knowledge, which is determined by their position on board. Although there are a few studies that examine the role of interlocks on internationalization, there is, to the best of our knowledge, little or no research demonstrating that the type of director interlock is an antecedent to internationalization strategy type. Moreover, much of the research on director interlocks and internationalization has been undertaken in the context of developed countries (Singh & Gaur, 2013) and this study advances the understanding of EMNE internationalization, where the board of directors is considered to be an essential source of external knowledge.

Third, we contribute to emerging research that highlights the role of capabilities in EMNE internationalization. This stream of research emphasizes the role of R&D in determining the nature of internationalization—i.e., whether it is motivated by asset exploitation or asset exploration—in EMNEs (Purkayastha et al., 2018). Extant research argues that an EMNE's investment in R&D affects how it evaluate its assets and capabilities, which are both transferable and exploitable in international markets. Our findings suggest this approach may be incomplete and posit that R&D intensity also is also instrumental to explaining the relationship between director interlocks and choice of internationalization strategy. Since directors play a significant role in evaluating and approving proposals for both R&D investment (Dalziel et al., 2011) and internationalization, our findings on the interaction effects of director interlocks and R&D intensity help us make significant strides in understanding the contingent effect of R&D capabilities on the role of board interlocks and, in turn, on EMNE internationalization.

6. Summary and Conclusion

6.1 Limitations and future research directions

Our study, however, is not without limitations. First, research on strategic leaders such as the board of directors is criticized for the inability to observe board functions directly (Neely Jr et al., 2020). Second, individual characteristics of directors can also vary and these variations can affect the relationships we tested. Third, we categorize countries into emerging and developed economies, but countries within these categories can vary in various institutional and cultural parameters (Meyer & Peng, 2016; Wright et al., 2005). Future researchers should address these limitations in their research designs.

Besides these avenues of future research, our theorizing and findings offer other promising opportunities. First, future researchers could include contingency factors such as connected firm's relative resources, industry relatedness, and organization structure, (Howard et al., 2017; Kang, 2008; Stuart & Yim, 2010; Zona et al., 2018) to understand their effects on the interlocks-internationalization relationship. Second, specific to EMNE internationalization, future researchers might also test the role played by specific ownership structures, such as business groups, family business and concentrated ownership (Chittoor et al., 2009), in the relationship between the type of director interlock and the nature of internationalization. Further attention can also be paid to non-linear relationships between interlocks and internationalization.

6.2 Managerial implications

Our findings have significant implications for managers. First, we show that firms can benefit from directors' knowledge and board capital in the context of internationalization strategies by strategizing their director appointments to suit their potential internationalization strategies. It is imperative that firms recruit directors to align their social capital with the planned internationalization strategy. Our findings establish that firms can

best determine how they could access external knowledge through board interlocks to implement internationalization strategies and the implications that board structure can have on strategic decision making at a firm level. Our findings indicate the type of directors (insider vs independent) who would facilitate a particular type of internationalization strategy, thereby empowering the firms to assess the value a busy director would offer to firm decisions such as internationalization. We find that EMNEs, while recruiting directors, cannot univocally assume that all directors will be motivated to endorse a particular type of internationalization strategy. Instead, the directors' proclivity to promote a particular type of internationalization strategy is dependent on both their social capital and board position. Second, the role played by R&D intensity in the relationship between interlocks and internationalization helps managers in determining how director capital can be most optimally utilized to execute internationalization strategy. Third, specific to emerging economy firms, which are highly dependent on directors for external knowledge, our findings inform firms how to make strategic choices in director appointments to enhance the firm's internationalization strategy.

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Table 1
Variable list, source, and computation

Variable name	Type of variable	Variable definition and computation	Source of data
Exploitative internationalization	Dependent variable	OFDI from home country to an emerging market	OFDI reports from Reserve Bank of India
Exploratory internationalization	Dependent variable	OFDI from home country to a developed market	OFDI reports from Reserve Bank of India
Inside director interlocks	Independent variable	Ratio of total interlocks provided by inside directors to the total number of inside directors	CMIE Prowess database
Independent director interlocks	Independent variable	Ratio of total interlocks provided by independent directors to the total number of independent directors	CMIE Prowess database
R&D intensity	Moderating variable	Annual R&D expenditure as a ratio of total sales	CMIE Prowess database
Board independence	Control variable	Ratio of independent directors to total size of the board	CMIE Prowess database
Board size	Control variable	Total number of directors on the board	CMIE Prowess database
Board meetings	Control variable	Total number of board meetings per year	CMIE Prowess database
CEO chairperson	Control variable	Dummy variable taking value 1 if CEO is also the Chairperson, 0 otherwise	CMIE Prowess database
Family shareholding	Control variable	Percentage of shares held by family	CMIE Prowess database
FII shareholding	Control variable	Percentage of shares held by foreign institutional investors	CMIE Prowess database
DII shareholding	Control variable	Percentage of shares held by domestic institutional investors	CMIE Prowess database
Business group affiliation	Control variable	Dummy variable which takes value 1 if a firm belongs to a business group, 0 otherwise	CMIE Prowess database
Firm size	Control variable	Total assets of the firm	CMIE Prowess database
Profitability	Control variable	Return on assets, which is the ratio of net income to total assets	CMIE Prowess database
Debt to equity ratio	Control variable	Ratio of total debts to total equity of the firm	CMIE Prowess database
Export ratio	Control variable	Ratio of export income to total sales	CMIE Prowess database
Firm age	Control variable	Number of years since the founding of the firm	CMIE Prowess database
Industry code	Control variable	Two-digit code signifying the primary industry of operation of the firm	CMIE Prowess database
Year of FDI	Control variable	Year in which the OFDI occurred	CMIE Prowess database

Table 2
Summary statistics

	Mean	Std Dev
Exploratory internationalization	3.704	3.941
Exploitative internationalization	3.947	5.123
Inside director interlocks	4.539	5.084
Independent director interlocks	3.807	2.776
Board independence	0.454	0.120
Board size	10.717	3.220
Board meetings	8.919	2.882
CEO chairperson	0.296	0.457
Family shareholding	53.842	16.902
FII shareholding	9.908	11.229
DII shareholding	6.283	7.894
Business group affiliated	3.352	0.671
Firm size	1495.017	5732.647
Profitability	3.888	34.212
R&D intensity	0.868	5.224
Debt to equity ratio	1.023	2.973
Export ratio	2.306	1.750
Firm age	33.071	20.934

Table 3
Correlation matrix[&]

	1	2	3	4	5	6	7	8	9	10	11
1.Exploratory internationalization	1										
2.Exploitative internationalization	0.45*	1									
3.Independent director interlocks	0.01	0.036	1								
4.Inside director interlocks	-0.07	0.1*	0.33*	1							
5.Board independence	-0.07*	0.08*	0.20*	0.21*	1						
6.Board size	0.03	0.12*	0.24*	0.08*	-0.02	1					
7.Board meetings	0.05	0.06	0.15*	0.05*	0.07*	0.19*	1				
8.CEO chairperson	0.01	0.07*	-0.03	0.02	0.18*	-0.03	0.05*	1			
9.Family shareholding	-0.03	-0.03	-0.08*	-0.07*	-0.09*	-0.02	-0.09*	0.01	1		
10.FII shareholding	0.14*	0.26*	0.28*	0.18*	0.15*	0.31*	0.17*	-0.01	-0.31*	1	
11.DII shareholding	0.16*	0.06	0.19*	0.09*	0.04	0.31*	0.19*	-0.02	-0.31*	0.26*	1
12.Business group affiliated	-0.01	-0.07*	-0.17*	-0.07*	0.02	-0.23*	-0.13*	0.03	-0.03	-0.19*	-0.19*
13.Firm size	0.22*	0.21*	0.3*	0.22*	0.04	0.54*	0.34*	0.03	-0.08*	0.53*	0.46*
14.Profitability	0.09*	0.13*	0.09*	0.01	0.04	0.15*	0.08*	0.01	0.07*	0.22*	0.06*
15.R&D intensity	0.03	0.07*	0.02	0.09*	0.08*	0.03	-0.002	0.04	0.01	0.04	0.03
16.Debt to equity ratio	-0.02	-0.01	-0.02	-0.01	0.003	-0.05	0.04	0.05*	-0.03	-0.07*	-0.01
17.Export ratio	0.01	-0.01	0.01	0.01	0.003	-0.002	-0.02	-0.01	0.04	-0.03	-0.02
18.Firm age	0.12*	0.08*	0.13*	0.05*	0.07*	0.23*	0.05*	0.06*	-0.12*	0.08*	0.36*

* Correlation is significant at the 0.05 level (2-tailed)
& Continued on next page

Table 3, Continued

	12	13	14	15	16	17	18
12.Business group affiliated	1						
13.Firm size	-0.31*	1					
14.Profitability	-0.12*	0.1*	1				
15.R&D intensity	-0.02	0.07*	0.15*	1			
16.Debt to equity ratio	0.05*	0.04	-0.22*	-0.01	1		
17.Export ratio	-0.01	-0.03	0.03	-0.01	0.01	1	
18.Firm age	-0.26*	0.26*	-0.02	-0.02	-0.01	-0.01	1

Table 4

Random effects negative binomial estimation of the impact of board interlocks on exploitative internationalization

	Model 1			Model 2			Model 3		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.026	0.011	0.020				0.044	0.012	0.000
Independent director interlocks				-0.058	0.016	0.000	-0.077	0.016	0.000
Board independence	-0.631	0.399	0.114	-0.539	0.396	0.173	-0.615	0.389	0.114
Board size	0.001	0.015	0.932	0.003	0.015	0.834	0.002	0.015	0.890
Board meetings	0.005	0.014	0.713	0.003	0.014	0.835	0.002	0.014	0.866
CEO chairperson	0.193	0.080	0.016	0.142	0.078	0.070	0.185	0.078	0.017
Family shareholding	-0.005	0.003	0.088	-0.004	0.003	0.189	-0.004	0.003	0.100
FII shareholding	0.024	0.005	0.000	0.028	0.005	0.000	0.030	0.005	0.000
DII shareholding	-0.009	0.006	0.191	-0.008	0.006	0.193	-0.007	0.006	0.242
Business group affiliated	0.178	0.085	0.037	0.286	0.086	0.001	0.257	0.085	0.002
Firm size	0.030	0.035	0.395	0.048	0.035	0.169	0.034	0.034	0.327
Profitability	0.000	0.001	0.937	0.000	0.001	0.706	0.000	0.001	0.798
R&D intensity	0.043	0.012	0.001	0.040	0.013	0.002	0.042	0.012	0.001
Debt to equity ratio	-0.012	0.011	0.274	-0.010	0.011	0.352	-0.011	0.011	0.290
Export ratio	0.000	0.027	0.986	-0.006	0.027	0.820	0.004	0.027	0.868
Firm age	0.000	0.002	0.931	0.001	0.002	0.564	0.000	0.002	0.961
Wald Chi-squared	245.05			264.61			371.54		
Log Likelihood	-1507.67			-1504.10			-1497.26		
N	886			886			886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table 5

Random effects negative binomial estimation of the Impact of board interlocks on exploratory internationalization

	Model 1			Model 2			Model 3		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	-0.015	0.006	0.008				-0.015	0.006	0.014
Independent director interlocks				-0.014	0.012	0.271	-0.006	0.013	0.620
Board independence	-0.133	0.292	0.648	-0.242	0.289	0.403	-0.127	0.292	0.664
Board size	-0.010	0.012	0.430	-0.007	0.013	0.572	-0.009	0.013	0.493
Board meetings	0.005	0.013	0.709	0.008	0.013	0.521	0.005	0.013	0.664
CEO chairperson	0.023	0.067	0.736	0.021	0.068	0.761	0.022	0.067	0.745
Family shareholding	-0.004	0.002	0.096	-0.003	0.002	0.137	-0.004	0.002	0.090
FII shareholding	0.002	0.004	0.676	0.001	0.004	0.710	0.002	0.004	0.690
DII shareholding	0.012	0.005	0.019	0.014	0.005	0.007	0.012	0.005	0.018
Business group affiliated	-0.004	0.079	0.961	-0.039	0.078	0.621	-0.003	0.079	0.969
Firm size	0.101	0.029	0.000	0.098	0.029	0.001	0.102	0.029	0.000
Profitability	0.003	0.001	0.015	0.003	0.001	0.017	0.003	0.001	0.015
R&D intensity	-0.011	0.025	0.668	-0.029	0.024	0.234	-0.011	0.025	0.666
Debt to equity ratio	-0.003	0.020	0.866	0.000	0.020	0.992	-0.003	0.020	0.875
Export ratio	0.005	0.021	0.814	0.003	0.022	0.882	0.006	0.021	0.795
Firm age	-0.005	0.002	0.021	-0.004	0.002	0.050	-0.004	0.002	0.024
Wald Chi-squared	280.90			272.89			281.50		
Log Likelihood	-1573.52			-1576.51			-1573.40		
N	1110			1110			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table 6
Random effects negative binomial estimation of the moderating effect of R&D intensity on insider board interlocks - internationalization

	Exploitative internationalization			Exploratory internationalization		
	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.041	0.012	0.001	-0.002	0.007	0.729
Independent director interlocks	-0.078	0.016	0.000	-0.013	0.013	0.287
Board independence	-0.640	0.390	0.101	-0.059	0.291	0.839
Board size	0.004	0.015	0.801	-0.010	0.012	0.432
Board meetings	0.002	0.014	0.872	0.007	0.013	0.573
CEO chairperson	0.179	0.078	0.022	0.045	0.067	0.499
Family shareholding	-0.005	0.003	0.085	-0.005	0.002	0.042
FII shareholding	0.029	0.005	0.000	0.001	0.004	0.719
DII shareholding	-0.008	0.006	0.200	0.013	0.005	0.012
Business group affiliated	0.261	0.085	0.002	0.005	0.078	0.950
Firm size	0.034	0.034	0.315	0.101	0.029	0.000
Profitability	0.000	0.001	0.766	0.004	0.001	0.010
R&D intensity	0.047	0.013	0.000	0.023	0.026	0.379
Debt to equity ratio	-0.011	0.011	0.308	-0.007	0.020	0.714
Export ratio	0.001	0.027	0.978	0.009	0.021	0.672
Firm age	0.000	0.002	0.879	-0.004	0.002	0.031
Inside director interlock * R&D intensity	-0.003	0.003	0.295	0.005	0.001	0.000
Wald Chi-squared	372.75			296.100		
Log Likelihood	-1496.68			-1566.32		
N	886			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table 7

Random effects negative binomial estimation of the moderating effect of R&D intensity on independent board interlocks - internationalization

	Exploitative internationalization			Exploratory internationalization		
	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.032	0.011	0.005	-0.012	0.006	0.043
Independent director interlocks	-0.056	0.016	0.000	-0.006	0.013	0.652
Board independence	-0.620	0.395	0.116	-0.056	0.291	0.848
Board size	0.012	0.014	0.397	-0.013	0.012	0.287
Board meetings	-0.007	0.014	0.601	0.005	0.013	0.712
CEO chairperson	0.128	0.076	0.093	0.052	0.067	0.436
Family shareholding	-0.001	0.003	0.732	-0.004	0.002	0.090
FII shareholding	0.028	0.005	0.000	0.002	0.004	0.602
DII shareholding	-0.006	0.006	0.288	0.013	0.005	0.012
Business group affiliated	0.253	0.082	0.002	-0.019	0.078	0.812
Firm size	0.033	0.029	0.249	0.106	0.029	0.000
Profitability	0.000	0.001	0.887	0.004	0.001	0.009
R&D intensity	0.035	0.011	0.001	0.003	0.024	0.912
Debt to equity ratio	-0.007	0.011	0.495	-0.017	0.020	0.412
Export ratio	0.037	0.024	0.126	0.006	0.021	0.787
Firm age	0.003	0.002	0.191	-0.004	0.002	0.025
Independent director interlock * R&D intensity	0.008	0.004	0.029	-0.021	0.006	0.000
Wald Chi-squared	351.82			296.82		
Log Likelihood	-1545.06			-1566.91		
N	886			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table 8

Random effects negative binomial estimation of the curvilinear effects of insider interlocks on exploitative internationalization

	B-Value	Std. Dev	p-value
Inside director interlocks	0.093	0.018	0.000
Inside director interlocks squared	-0.002	0.001	0.000
Independent director interlocks	-0.088	0.016	0.000
Board independence	-0.576	0.385	0.135
Board size	0.003	0.015	0.820
Board meetings	0.002	0.013	0.871
CEO chairperson	0.216	0.077	0.005
Family shareholding	-0.005	0.003	0.056
FII shareholding	0.030	0.005	0.000
DII shareholding	-0.007	0.006	0.237
Business group affiliated	0.207	0.085	0.015
Firm size	0.027	0.034	0.431
Profitability	0.000	0.001	0.976
R&D intensity	0.044	0.012	0.000
Debt to equity ratio	-0.013	0.010	0.228
Export ratio	0.009	0.026	0.731
Firm age	0.000	0.002	0.935
Wald Chi-squared	393.84***		
Log Likelihood	-1491.1085		
N	886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table 9

Summary of predicted and final outcomes of the study

Hypothesis	Summary	Predicted relationship	Actual relationship
Hypothesis 1a	Impact of insider interlocks on exploitative internationalization	Positive	Curvilinear
Hypothesis 1b	Impact of independent interlocks on exploitative internationalization	Negative	Negative
Hypothesis 2a	Impact of insider interlocks on exploratory internationalization	Negative	Negative
Hypothesis 2b	Impact of independent interlocks on exploratory internationalization	Negative	Insignificant
Hypothesis 3	Moderating effect of R&D on insider interlocks and internationalization	Effect of moderation on exploratory internationalization is more positive than on exploitative internationalization	Effect of moderation on exploratory internationalization is more positive than on exploitative internationalization
Hypothesis 4	Moderating effect of R&D on independent interlocks and internationalization	Effect on moderation on exploitative internationalization is more positive than on exploratory internationalization	Effect on moderation on exploitative internationalization is more positive than on exploratory internationalization

Table 10
Summary and outcome of robustness tests performed on the sample

Purpose of the test	Test method	Outcomes
Alternate model specification	Poisson estimation	Results do not vary
	Multilevel mixed effects negative binomial regression	Results do not vary
	Zero-truncated negative binomial regression	Results do not vary
Alternate time-periods	2011-2013 (Before Companies act 2013)	Results do not vary
	2013-2017 (After Companies act 2013)	Results do not vary
Endogeneity tests	Omitted variable bias using fixed effects model	Results do not vary
	Selection bias using Heckman two stage analysis	Results do not vary

Figure 1
Moderating effect of R&D intensity on insider director interlocks and exploratory internationalization
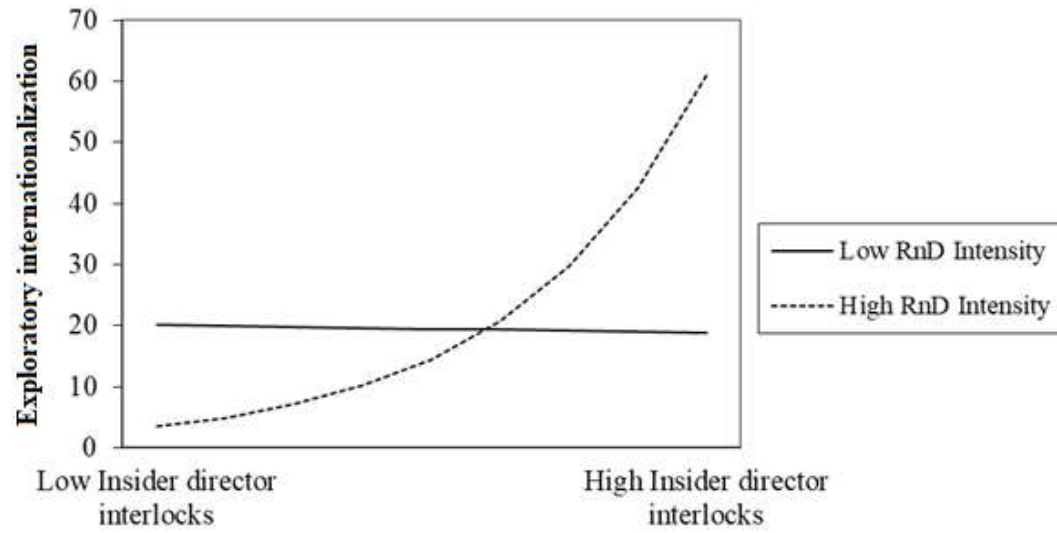
Figure 2
Moderating effect of R&D intensity on independent director interlocks and exploitative internationalization
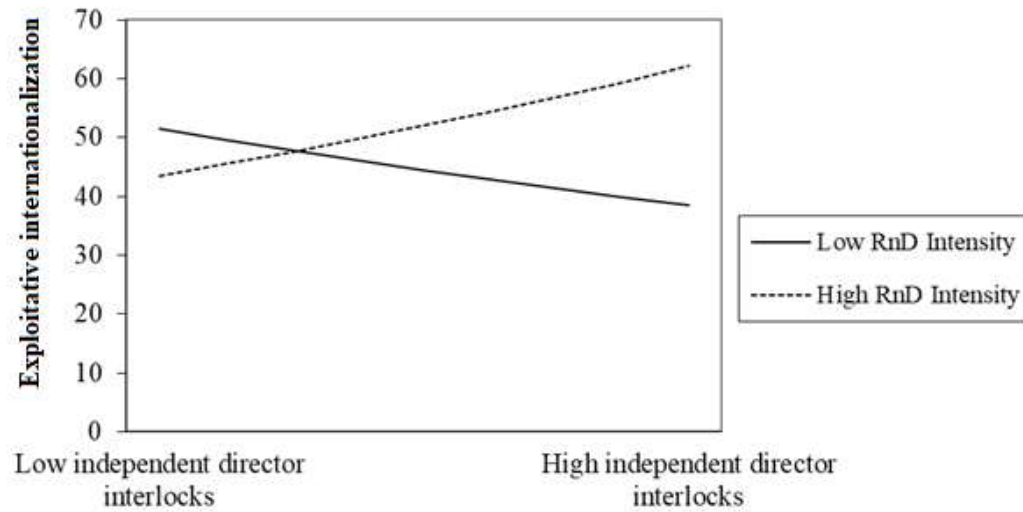
Figure 3
Moderating effect of R&D intensity on independent director interlocks and exploratory internationalization
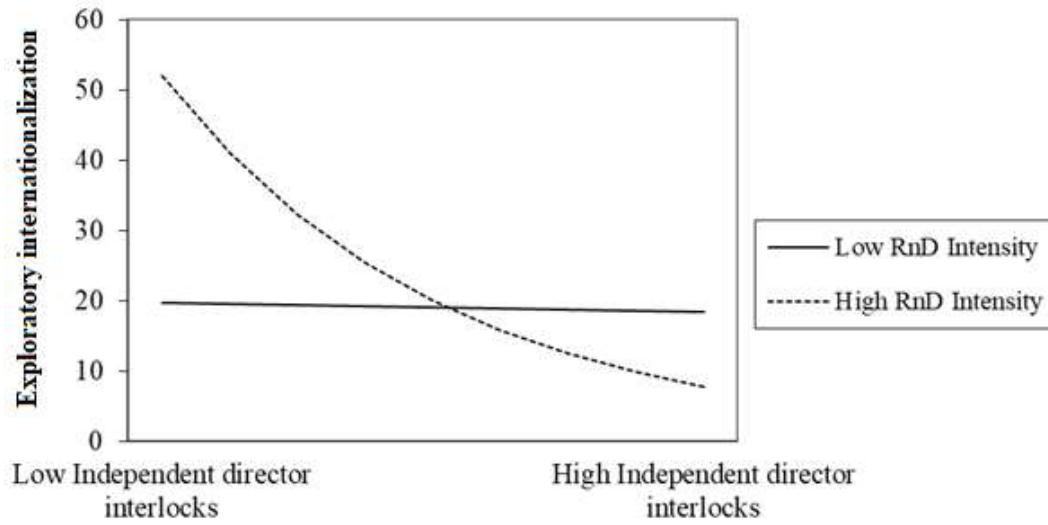
Appendix A: Robustness tests

To ensure the robustness of our outcomes, we perform several sets of robustness tests on our sample. These include introducing alternate models, alternate time-periods and tests of endogeneity.

As a test of alternate model specifications, we analyzed our model using two additional estimation techniques commonly employed for count data, namely Poisson regression and multi-level mixed effects negative binomial regression. The results of these estimations are presented in Tables TA.1 to TA.4, are consistent with our initial results.

Table TA.1. Poisson regression estimation results on the relation between board interlocks, R&D intensity and exploitative internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.044	0.012	0.000	0.046	0.012	0.000
Independent director interlocks	-0.077	0.016	0.000	-0.075	0.016	0.000
Board independence	-0.615	0.389	0.114	-0.848	0.414	0.041
Board size	0.002	0.015	0.890	0.000	0.015	0.984
Board meetings	0.002	0.014	0.866	0.003	0.014	0.803
CEO chairperson	0.185	0.078	0.017	0.207	0.079	0.008
Family shareholding	-0.004	0.003	0.100	-0.005	0.003	0.083
FII shareholding	0.030	0.005	0.000	0.028	0.005	0.000
DII shareholding	-0.007	0.006	0.242	-0.006	0.006	0.351
Business group affiliated	0.257	0.085	0.002	0.265	0.085	0.002
Firm size	0.034	0.034	0.326	0.029	0.034	0.390
Profitability	0.000	0.001	0.798	0.000	0.001	0.655
R&D intensity	0.042	0.012	0.001	-0.003	0.050	0.956
Debt to equity ratio	-0.011	0.011	0.290	-0.011	0.011	0.280
Export ratio	0.004	0.027	0.868	-0.006	0.027	0.839
Firm age	0.000	0.002	0.961	-0.001	0.002	0.675

Inside director interlock * R&D intensity				-0.004	0.009	0.660
Independent director interlock * R&D intensity				0.013	0.007	0.070
Wald Chi-squared	372.870			375.050		
Log Likelihood	-1497.260			-1495.560		
N	886			886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA.2. Poisson regression estimation results on the relation between board interlocks, R&D intensity and exploratory internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	-0.017	0.006	0.005	-0.006	0.006	0.376
Independent director interlocks	-0.004	0.013	0.723	-0.009	0.012	0.477
Board independence	-0.094	0.291	0.746	0.258	0.301	0.392
Board size	-0.009	0.012	0.443	-0.028	0.013	0.030
Board meetings	0.006	0.013	0.658	0.007	0.012	0.558
CEO chairperson	0.041	0.066	0.532	0.049	0.065	0.451
Family shareholding	-0.004	0.002	0.079	-0.005	0.002	0.026
FII shareholding	0.000	0.004	0.920	-0.001	0.004	0.706
DII shareholding	0.012	0.005	0.017	0.012	0.005	0.016
Business group affiliated	0.022	0.078	0.778	-0.014	0.077	0.859
Firm size	0.106	0.029	0.000	0.120	0.028	0.000
Profitability	0.004	0.001	0.008	0.004	0.001	0.008
R&D intensity	0.000	0.024	1.000	-0.332	0.087	0.000
Debt to equity ratio	-0.007	0.020	0.715	-0.007	0.020	0.704
Export ratio	0.003	0.021	0.886	0.009	0.021	0.647
Firm age	-0.005	0.002	0.017	-0.004	0.002	0.023
Inside director interlock * R&D intensity				0.061	0.011	0.000
Independent director interlock * R&D intensity				-0.001	0.010	0.975
Wald Chi-squared	301.600			347.090		
Log Likelihood	-1576.700			-1560.030		
N	1110			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA.3. Multilevel mixed effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploitative internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.044	0.012	0.000	0.046	0.012	0.000
Independent director interlocks	-0.077	0.016	0.000	-0.075	0.016	0.000
Board independence	-0.615	0.389	0.114	-0.848	0.414	0.041
Board size	0.002	0.015	0.890	0.000	0.015	0.984
Board meetings	0.002	0.014	0.866	0.003	0.014	0.803
CEO chairperson	0.185	0.078	0.017	0.207	0.079	0.008
Family shareholding	-0.004	0.003	0.100	-0.005	0.003	0.083
FII shareholding	0.030	0.005	0.000	0.028	0.005	0.000
DII shareholding	-0.007	0.006	0.242	-0.006	0.006	0.351
Business group affiliated	0.257	0.085	0.002	0.265	0.085	0.002
Firm size	0.034	0.034	0.326	0.029	0.034	0.390
Profitability	0.000	0.001	0.798	0.000	0.001	0.655
R&D intensity	0.042	0.012	0.001	-0.003	0.050	0.956
Debt to equity ratio	-0.011	0.011	0.290	-0.011	0.011	0.280
Export ratio	0.004	0.027	0.868	-0.006	0.027	0.839
Firm age	0.000	0.002	0.961	-0.001	0.002	0.675
Inside director interlock * R&D intensity				-0.004	0.009	0.660
Independent director interlock * R&D intensity				0.013	0.007	0.070
Wald Chi-squared	372.870			375.070		
Log Likelihood	-1497.258			-1495.560		
N	886			886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA.4. Multilevel mixed effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploratory internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	-0.017	0.006	0.005	-0.006	0.006	0.376
Independent director interlocks	-0.004	0.013	0.723	-0.009	0.012	0.477
Board independence	-0.094	0.291	0.746	0.258	0.301	0.392
Board size	-0.009	0.012	0.443	-0.028	0.013	0.030
Board meetings	0.006	0.013	0.658	0.007	0.012	0.558
CEO chairperson	0.041	0.066	0.532	0.049	0.065	0.451
Family shareholding	-0.004	0.002	0.079	-0.005	0.002	0.026
FII shareholding	0.000	0.004	0.920	-0.001	0.004	0.706
DII shareholding	0.012	0.005	0.017	0.012	0.005	0.016
Business group affiliated	0.022	0.078	0.778	-0.014	0.077	0.859
Firm size	0.106	0.029	0.000	0.120	0.028	0.000
Profitability	0.004	0.001	0.008	0.004	0.001	0.008
R&D intensity	0.000	0.024	1.000	-0.332	0.087	0.000
Debt to equity ratio	-0.007	0.020	0.715	-0.007	0.020	0.704
Export ratio	0.003	0.021	0.886	0.009	0.021	0.647
Firm age	-0.005	0.002	0.017	-0.004	0.002	0.023
Inside director interlock * R&D intensity				0.061	0.011	0.000
Independent director interlock * R&D intensity				-0.002	0.010	0.975
Wald Chi-squared		301.600			347.090	
Log Likelihood		-1576.701			-1560.031	
N		1110			1110	

All independent variables are lagged by one year. Industry and year dummies are included in the models

Second, the data in our study are concerned with those firms that have undertaken FDI; hence, our dependent variables do not take the value 0. However, the negative binomial regression model assumes the presence of zeroes in the data. To ensure that this assumption has not affected our outcomes, we employed a zero-truncated negative binomial regression, which is a technique to model count data where the value zero cannot occur (Hilbe, 2007). On applying this technique to our sample, we find that the results are consistent with our initial analysis (TA.5 and TA.6 in Appendix).

Table TA.5. Zero truncated negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploitative internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.072	0.021	0.001	0.072	0.021	0.001
Independent director interlocks	-0.091	0.027	0.001	-0.096	0.028	0.001
Board independence	-1.690	0.674	0.012	-1.672	0.674	0.013
Board size	-0.019	0.025	0.460	-0.017	0.025	0.514
Board meetings	-0.010	0.025	0.691	-0.011	0.025	0.665
CEO chairperson	0.219	0.125	0.080	0.212	0.125	0.090
Family shareholding	-0.002	0.004	0.610	-0.002	0.004	0.581
FII shareholding	0.045	0.008	0.000	0.045	0.008	0.000
DII shareholding	-0.006	0.008	0.489	-0.007	0.008	0.431
Business group affiliated	0.284	0.132	0.031	0.291	0.132	0.028
Firm size	0.086	0.049	0.080	0.087	0.049	0.076
Profitability	0.001	0.001	0.604	0.001	0.001	0.580
R&D intensity	0.047	0.022	0.036	0.056	0.024	0.021
Debt to equity ratio	-0.019	0.016	0.235	-0.018	0.016	0.250
Export ratio	0.087	0.045	0.052	0.081	0.044	0.068
Firm age	0.006	0.003	0.062	0.007	0.003	0.050

Inside director interlock * R&D intensity				-0.009	0.009	0.035
Independent director interlock * R&D intensity				0.016	0.007	0.026
Wald Chi-squared	186.49***			189.92***		
Log Likelihood	-1385.092			-1384.187		
N	886			886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA.6. Zero truncated negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploratory internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	-0.025	0.010	0.009	-0.008	0.009	0.408
Independent director interlocks	-0.001	0.020	0.954	-0.009	0.019	0.624
Board independence	-0.461	0.429	0.283	-0.369	0.420	0.381
Board size	-0.067	0.021	0.001	-0.074	0.021	0.001
Board meetings	0.009	0.018	0.613	0.011	0.018	0.530
CEO chairperson	0.060	0.096	0.536	0.090	0.096	0.351
Family shareholding	0.002	0.003	0.453	0.002	0.003	0.621
FII shareholding	0.006	0.005	0.309	0.006	0.005	0.248
DII shareholding	0.017	0.007	0.014	0.017	0.007	0.014
Business group affiliated	-0.290	0.116	0.012	-0.321	0.114	0.005
Firm size	0.248	0.041	0.000	0.254	0.041	0.000
Profitability	0.006	0.002	0.001	0.007	0.002	0.001
R&D intensity	0.045	0.041	0.273	0.074	0.042	0.075
Debt to equity ratio	-0.006	0.031	0.836	-0.006	0.031	0.854
Export ratio	-0.018	0.028	0.519	-0.012	0.028	0.660
Firm age	0.003	0.003	0.363	0.003	0.003	0.257
Inside director interlock * R&D intensity				0.009	0.003	0.001
Independent director interlock * R&D intensity				-0.040	0.012	0.001
Wald Chi-squared	125.2***			131.92***		
Log Likelihood	-1509.077			-1501.495		
N	1110			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Third, to account for within-firm variation in the data and to address some of endogenity emerging out of potential omitted variable bias, we also performed fixed effects negative binomial regression on our sample. Results, presented in TA.7 and TA.8 align with the main results.

Table TA.7. Fixed effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploitative internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.004	0.016	0.008	0.003	0.011	0.185
Independent director interlocks	-0.011	0.023	0.016	-0.022	0.016	0.017
Board independence	-0.399	0.464	0.390	-0.041	0.263	0.876
Board size	0.005	0.020	0.819	-0.038	0.013	0.003
Board meetings	0.028	0.017	0.110	0.001	0.013	0.913
CEO chairperson	-0.008	0.124	0.951	-0.040	0.117	0.733
Family shareholding	0.001	0.006	0.849	0.000	0.006	0.943
FII shareholding	0.018	0.008	0.033	0.002	0.006	0.758
DII shareholding	0.006	0.008	0.480	-0.001	0.005	0.791
Firm size	-0.075	0.074	0.312	0.299	0.107	0.005
Profitability	0.000	0.001	0.741	0.005	0.001	0.000
R&D intensity	-0.048	0.016	0.002	0.040	0.038	0.297
Debt to equity ratio	-0.018	0.019	0.337	-0.011	0.025	0.657
Export ratio	0.011	0.045	0.810	0.072	0.027	0.007
Firm age	-0.006	0.008	0.425	0.030	0.015	0.038
Inside director interlock * R&D intensity				-0.005	0.006	0.408
Independent director interlock * R&D intensity				0.010	0.003	0.000
Wald Chi-squared	61.55***			85.91***		
Log Likelihood	-849.865			-969.987		
N	886			886		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA.8. Fixed effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and exploratory internationalization

	Model 1			Model 2		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	-0.004	0.016	0.008	-0.008	0.012	0.049
Independent director interlocks	-0.011	0.023	0.016	-0.028	0.019	0.141
Board independence	-0.399	0.464	0.390	0.220	0.346	0.525
Board size	0.005	0.020	0.819	-0.031	0.016	0.055
Board meetings	0.028	0.017	0.110	0.007	0.016	0.674
CEO chairperson	-0.008	0.124	0.951	-0.040	0.136	0.772
Family shareholding	0.001	0.006	0.849	0.001	0.006	0.859
FII shareholding	0.018	0.008	0.033	0.008	0.007	0.301
DII shareholding	0.006	0.008	0.480	-0.001	0.006	0.905
Firm size	-0.075	0.074	0.312	0.006	0.096	0.951
Profitability	0.000	0.001	0.741	0.003	0.001	0.057
R&D intensity	-0.048	0.016	0.002	0.016	0.041	0.704
Debt to equity ratio	-0.018	0.019	0.337	0.003	0.031	0.915
Export ratio	0.011	0.045	0.810	0.069	0.035	0.048
Firm age	-0.006	0.008	0.425	-0.013	0.008	0.136
Inside director interlock * R&D intensity				0.008	0.002	0.000
Independent director interlock * R&D intensity				0.002	0.007	0.330
Wald Chi-squared	40.95***			41.8***		
Log Likelihood	-910.413			-962.121		
N	1110			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Fourth, we acknowledge the influence that the Companies Act, 2013 might have on the corporate governance practices of Indian firms. To verify the potential impact of this legislation on the interlocking in the boards of Indian firms, we split our sample into two time periods, one from 2011-2013 and the other from 2014-2017. We ran random effects negative binomial regressions separately on the two samples and find that the results of both sets of analysis align with our initial results (tables TA.9 and TA.10), demonstrating that the Companies Act 2013 did not have a major influence on our hypothesized relationships.

Table TA. 9 Random effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and internationalization, 2011-2013

	Model 1: Exploitation			Model 2: Exploration			Model 3: Exploitation with moderations			Model 4: Exploration with moderations		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.027	0.013	0.046	-0.017	0.007	0.021	0.038	0.015	0.013	-0.012	0.009	0.166
Independent director interlocks	-0.099	0.024	0.000	0.001	0.016	0.983	-0.100	0.024	0.000	-0.002	0.016	0.898
Board independence	-1.825	0.660	0.006	0.058	0.407	0.887	-1.741	0.660	0.008	0.074	0.408	0.856
Board size	0.017	0.021	0.430	-0.023	0.019	0.211	0.017	0.021	0.421	-0.024	0.019	0.208
Board meetings	0.000	0.024	0.996	-0.007	0.017	0.702	0.000	0.024	0.990	-0.006	0.017	0.713
CEO chairperson	-0.022	0.120	0.858	-0.010	0.095	0.912	-0.005	0.120	0.964	0.005	0.096	0.959
Family shareholding	0.001	0.004	0.825	-0.002	0.003	0.536	0.000	0.004	0.918	-0.002	0.003	0.503
FII shareholding	0.025	0.007	0.000	-0.009	0.005	0.071	0.025	0.007	0.000	-0.009	0.005	0.086
DII shareholding	0.006	0.014	0.675	0.007	0.008	0.403	0.006	0.014	0.655	0.007	0.008	0.382
Business group affiliated	0.236	0.124	0.057	-0.078	0.104	0.454	0.216	0.124	0.081	-0.086	0.104	0.408
Firm size	0.030	0.047	0.519	0.211	0.042	0.000	0.028	0.047	0.549	0.208	0.042	0.000
Profitability	0.003	0.003	0.227	0.001	0.002	0.594	0.003	0.003	0.218	0.001	0.002	0.561

R&D intensity	0.002	0.012	0.854	0.003	0.026	0.923	-0.004	0.013	0.749	0.012	0.027	0.662
Debt to equity ratio	-0.002	0.011	0.869	0.002	0.020	0.910	-0.002	0.011	0.830	0.002	0.021	0.917
Export ratio	0.031	0.040	0.449	0.008	0.026	0.765	0.038	0.041	0.352	0.009	0.026	0.722
Firm age	0.002	0.003	0.479	0.000	0.003	0.924	0.002	0.003	0.640	0.000	0.003	0.937
Inside director interlock * R&D intensity							-0.003	0.002	0.163	0.002	0.002	0.027
Independent director interlock * R&D intensity							0.001	0.004	0.037	-0.020	0.009	0.019
Wald Chi-squared	63.68***			54.59***			67.16***			55.32***		
Log Likelihood	-671.025			-722.858			-670.066			-722.206		
N	284			322			284			322		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Table TA. 10 Random effects negative binomial regression estimation results on the relation between board interlocks, R&D intensity and internationalization, 2013-2017

	Model 1: Exploitation			Model 2: Exploration			Model 3: Exploitation with moderations			Model 4: Exploration with moderations		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.046	0.017	0.007	-0.009	0.010	0.038	0.040	0.017	0.017	0.002	0.011	0.843
Independent director interlocks	-0.033	0.022	0.028	-0.012	0.019	0.523	-0.039	0.022	0.070	-0.018	0.019	0.334
Board independence	-0.043	0.492	0.931	-0.976	0.445	0.028	-0.105	0.480	0.827	-0.922	0.444	0.038
Board size	0.007	0.018	0.684	-0.052	0.018	0.003	0.012	0.018	0.497	-0.056	0.018	0.002
Board meetings	-0.015	0.017	0.382	0.024	0.017	0.162	-0.018	0.017	0.311	0.024	0.017	0.175
CEO chairperson	0.227	0.095	0.016	0.048	0.092	0.602	0.229	0.093	0.014	0.050	0.091	0.583
Family shareholding	-0.004	0.003	0.238	0.001	0.003	0.760	-0.004	0.003	0.199	0.001	0.003	0.788
FII shareholding	0.024	0.006	0.000	0.011	0.005	0.017	0.025	0.006	0.000	0.012	0.005	0.012
DII shareholding	-0.009	0.007	0.164	0.017	0.006	0.007	-0.010	0.007	0.130	0.017	0.006	0.006
Business group affiliated	0.222	0.109	0.042	-0.299	0.101	0.003	0.235	0.107	0.029	-0.304	0.100	0.002
Firm size	0.065	0.037	0.081	0.113	0.038	0.003	0.066	0.037	0.075	0.115	0.038	0.003
Profitability	-0.001	0.001	0.283	0.004	0.002	0.052	-0.001	0.001	0.372	0.004	0.002	0.050
R&D intensity	0.066	0.016	0.000	-0.002	0.027	0.939	0.080	0.015	0.000	0.027	0.030	0.356
Debt to equity ratio	-0.095	0.050	0.056	-0.016	0.034	0.636	-0.091	0.048	0.059	-0.015	0.034	0.647
Export ratio	0.040	0.030	0.179	-0.023	0.026	0.391	0.029	0.029	0.327	-0.021	0.026	0.430
Firm age	0.002	0.002	0.425	0.003	0.002	0.218	0.002	0.002	0.281	0.003	0.002	0.198
Inside director interlock * R&D intensity							-0.016	0.005	0.000	0.004	0.002	0.030
Independent director interlock * R&D intensity							0.019	0.006	0.001	-0.022	0.010	0.029
Wald Chi-squared	141.99***			70.04***			155.7***			74.5***		
Log Likelihood	-857.38			-906.65844			-851.608			-904.084		
N	602			788			602			788		

All independent variables are lagged by one year. Industry and year dummies are included in the models

Finally, we performed a Heckman 2-stage selection estimation to mitigate any potential sample selection bias arising in our model from selecting firms with a higher probability of having directors with interlocks. In the first step of the two-stage analysis, we used a probit model to estimate whether a firm will have interlocked directors. A survey of the literature shows that certain characteristics of the appointing firm, such as lagged stock return, sales growth, lagged return on assets, firm size measured as total assets, age of the firm, board size and proportion of independent directors on board, and fixed industry and year effects determine the presence of interlocks among directors (Baccouche et al., 2014; Ferris et al., 2018; Fich & Shivdasani, 2007). The non-selection hazard (i.e., the inverse Mills ratio) generated by the first-stage selection model was then included in the second-stage regressions to address potential sample selection biases. The second stage of analysis, where the lambda from stage 1 is included as a control variable, also shows a high level of consistency with the initial results, effectively alleviating our concerns about our sample's selection bias (TA.11 and TA.12).

Table TA.11 Heckman stage 1, DV: Presence of board interlocks

	β-value	Std. dev	p-value
Stock returns	-0.069	0.075	0.058
Sales growth	0.000	0.002	0.006
Board independence	3.219	0.816	0.000
Board size	0.042	0.040	0.295
Board meetings	0.072	0.038	0.057
CEO chairperson	-0.631	0.207	0.002
Family shareholding	-0.017	0.008	0.034

FII shareholding	-0.017	0.013	0.183
DII shareholding	-0.014	0.022	0.530
Business group affiliated	-0.513	0.244	0.035
Firm size	0.259	0.098	0.009
Profitability	0.002	0.002	0.434
R&D intensity	-0.068	0.024	0.005
Debt to equity ratio	0.239	0.117	0.041
Export ratio	0.118	0.068	0.083
Firm age	0.019	0.011	0.078
Wald Chi-squared	140.020		
N	1996		

Table TA.12. Heckman stage 2: The relation between board interlocks, R&D intensity and internationalization

	Exploitative internationalization			Exploitative internationalization with moderations			Exploratory internationalization			Exploratory internationalization with moderations		
	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value	B-Value	Std. Dev	p-value
Inside director interlocks	0.067	0.015	0.000	0.082	0.015	0.000	-0.021	0.007	0.002	-0.010	0.008	0.185
Independent director interlocks	-0.095	0.021	0.000	-0.102	0.020	0.000	-0.004	0.014	0.785	-0.004	0.014	0.767
Board independence	-1.155	0.580	0.046	-1.155	0.556	0.038	-0.333	0.421	0.430	-0.151	0.418	0.718
Board size	-0.019	0.020	0.347	-0.008	0.020	0.687	0.004	0.015	0.810	-0.002	0.015	0.871
Board meetings	-0.026	0.019	0.157	-0.026	0.018	0.158	-0.003	0.016	0.845	-0.003	0.016	0.860
CEO chairperson	0.191	0.107	0.074	0.197	0.104	0.057	0.053	0.087	0.544	0.101	0.086	0.241
Family shareholding	-0.003	0.004	0.498	-0.004	0.004	0.238	-0.004	0.003	0.110	-0.005	0.003	0.080
FII shareholding	0.042	0.006	0.000	0.044	0.006	0.000	0.001	0.005	0.856	0.001	0.005	0.860
DII shareholding	0.008	0.007	0.303	0.007	0.007	0.335	-0.004	0.007	0.568	-0.002	0.007	0.758
Business group affiliated	-0.282	0.111	0.012	-0.342	0.108	0.002	0.051	0.096	0.591	0.058	0.095	0.538
Firm size	0.029	0.053	0.584	-0.010	0.052	0.841	0.137	0.037	0.000	0.141	0.036	0.000
Profitability	0.000	0.001	0.782	0.001	0.001	0.646	0.004	0.002	0.024	0.004	0.002	0.008
R&D intensity	0.020	0.016	0.217	0.042	0.017	0.017	-0.007	0.027	0.802	0.020	0.026	0.450
Debt to equity ratio	-0.002	0.011	0.862	-0.001	0.010	0.916	-0.003	0.026	0.913	-0.021	0.026	0.416
Export ratio	0.047	0.041	0.244	0.060	0.039	0.126	0.029	0.030	0.349	0.029	0.030	0.342
Firm age	-0.003	0.003	0.291	-0.002	0.003	0.358	-0.001	0.002	0.768	-0.001	0.002	0.759
Lambda	0.301	0.303	0.321	0.525	0.295	0.075	-0.397	0.392	0.310	-0.360	0.391	0.358
Inside director interlock * R&D intensity				-0.012	0.003	0.067				0.003	0.002	0.007
Independent director interlock * R&D intensity				0.029	0.005	0.000				-0.019	0.007	0.004
Wald Chi-squared	225.53			266.72			96.08			115.67		
Log Likelihood	-897.66			-884.64			-990.1			-981.31		
N	886			886			1110			1110		

All independent variables are lagged by one year. Industry and year dummies are included in the models