Behavioral antecedents a firm's alliance portfolio configuration: managerial human capital

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Abstract
The resource-based view, relational view and related literature on the role of alliances and networks on innovation suggests the importance of relational resources for innovation (Srivastava and Gnyawali, 2011) and argues that as the resource richness of an alliance portfolio increases, so does the scope for their synergistic combinations, implying greater value creation potential available to a focal firm (Hoehn-Wiets, Karim and Lee, 2017). All these elements of capability-based perspective suggest that collaboration with resource-rich partners provide a focal firm with access to knowledge that can be combined with its internal resources and such combinations might result in breakthrough innovations. However, some studies do not rule out the possibility that potential challenges might arise from increase in portfolio diversity due to high coordination costs (Goerzen and Beamish, 2005). If there exists an optimal diversity for firms’ alliance portfolio to benefit maximum increase in innovation performance, why do firms keep expanding the variety of resources in their alliance portfolios and eventually experience decrease in innovation performance? It might be that firms are irrational about their portfolio decisions, meaning although they are aware of detrimental consequences of very diverse alliance portfolio on their final performance, there are still some unexplored factors which force them to maintain diversity of their alliance portfolio too high or low. It implies that capability-based perspectives fail to fully explain firms’ irrational alliance portfolio decisions, therefore it is imperative to add a new theoretical perspective to alliance portfolio configuration literature and explore what is happening in alliance portfolios in order to better understand why majority of firms maintain their alliance portfolios diverse, while some firms possess less diversified alliance portfolios. In this study, we examine factors which directly influence a firm’s alliance portfolio configuration and in a result a firm makes an irrational decision knowing that the decision might lead to decrease in innovation performance. Given the idea that strategic decisions are the outcome of behavioral factors rather than economic optimization (Cyert and March, 1963), we argue that firms’ portfolio decisions are driven by their managerial human capital. In other words, firms do not increase or decrease alliance portfolio diversity to maximize the performance which would be rational decisions. Instead, such portfolio related decisions are made based on the skills and knowledge repertoire of their boundedly rational top managers. According to Castanias and Helfat (2001), top managers’ education and experience shape their skills
and knowledge which play a key role in shaping managers’ dominant logic for a firm (Kor and Mesko, 2013). Managers interact with their dominant logic and make decisions based on their interpretation and evaluation of a particular business environment. Managers embed their understanding of business processes into a firm’s routines, therefore their skills and knowledge shaped by education and experience becomes a determinant of a firm’s organization-wide innovation search (Kor and Mesko, 2013).

Our novel contribution lies in adding a new theoretical perspective to alliance literature which better explains firms’ alliance portfolio configuration. By conceptualizing top managers as boundedly rational decision makers, we theorize that they are guided by their education and knowledge, thus providing novel insights into the antecedents of observed alliance portfolio configurations. This study focuses on three dimensions of managerial human capital: generic (education), industry specific (industry tenure) and firm specific knowledge (firm tenure). Prior studies argue that these dimensions of managerial human capital allow managers to identify new opportunities, absorb knowledge, apply new research techniques, and new inventions and products (e.g. Castanias & Helfat, 2001; Cohen & Levinthal, 1990).

Previous studies have argued that education tend to change students’ pre-existing values (e.g. Rynes & Trank, 1999). High level of education is associated with high capacity for information processing and greater degree of tolerance for ambiguity, therefore greater degree of openness (Dollinger, 1984). Therefore, we argue that well-educated managers are more open to absorbing new technological knowledge, therefore they are more likely to keep firms’ alliance portfolios diversified in order to magnitude the scope of search for new knowledge and resources. Our notion of alliance portfolio partner diversity refers to the degree of variance in partners’ resources, capabilities, knowledge and technological base (Jiang, Tao, Santoro, 2010).

Managers with a long tenure are generally more knowledgeable about the firm’s prospects (Kor, 2006), and more likely to be risk-averse because they are psychologically and tangibly invested in the firm (Simsek, 2007; Li, 2007). Experienced top management team might specifically resort to established rules, regulations and procedures and commit themselves to status-quo (Hambick and Fukutomi, 1991). Therefore, we argue that tenured top management team will lead to less diversified alliance portfolio, since long tenured managers are less likely to deviate from traditional quest for innovation. In other words, they are less open to absorbing new technological knowledge, and thus keeping a firm’s alliance portfolio homogenous.

Resource-based theory stresses that a firm’s competitive advantage is highly dependent on its valuable, inimitable and nonsubstitutable resources (Barney, 1991). TMTs background, general experience and network relationships represent a firm’s competitive advantage creating resources. Following Li (2017), we argue that TMTs general experience and network enable them to recognize market opportunities. Long industry tenured TMTs tend to be aware of market trends, thus try to benefit technological development by expanding alliance portfolio diversity. We, therefore, argue that TMTs with long industry tenure are more likely to form a firm alliance portfolio from heterogeneous partners.

We constructed a unique firm-level patent database that included data on firm’s senior management, alliance activity and partners’ patent activity. The initial sample was drawn from pharmaceutical firms that were among the sector’s hundred largest employers in Compustat at any time during the period of 1999-2014. Then sample firms’ executives and their backgrounds were identified using BoardEX, Execucomp and Thomson Reuters databases. We used SDC Platinium to collect data on sample firms’ alliance activity (all types of alliances) for the period of 1995 - 2010 in order to construct focal firms alliance portfolios based a rolling 4-year window. We identified partners’ patents using The National Bureau of Economic Research (NBER) paper’s public database (Kogan, Papanikolaou, Seru and Stoffman, 2017). After removing firms whose partners didn’t have any patent during the observation period, we eventually ended up with a unique database which consisted of 87 pharmaceutical firms for the period of 1999 - 2010.
Antecedents a firm’s alliance portfolio configuration: The role of top management team

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Abstract

Research on alliance portfolios has considerably advanced our understanding of performance implications of firms’ alliance portfolios. Previous studies have examined the effect of alliance portfolio on patent output (McGill & Santoro, 2009), innovation performance (Degener, Maurer, & Bort, 2018), operating performance (Cobeña, Gallego, & Casanueva, 2017), breakthrough innovations (Srivastava & Gnyawali, 2011), financial performance (Jiang, Tao, & Santoro, 2010). However, no attempt was made to explain how firms configure these alliance portfolios and why the level of alliance portfolio diversity varies across firms. Since the decision about alliance portfolio is an part of a firm’s innovation strategy, this study focuses on the role top management team to explain why firms differ in the levels of their alliance portfolio diversity. This study examines the antecedents of firms’ alliance portfolio decisions by examining their top management team’s characteristics which are believed to influence their quest for technological knowledge.
Introduction

The literature on the role of alliances suggests the importance of relational resources of an alliance portfolio for innovation (Srivastava & Gnyawali, 2011). On the one hand, the resource richness of an alliance portfolio which refers to the degree of variance in terms of resources, capabilities, knowledge, cultural and technological bases (Goerzen & Beamish, 2005) increases, so does the scope for their synergistic combinations. This provides a focal firm with greater value creation potential (Hoehn-Weiss, Karim, & Lee, 2017). The rationale behind this view is that a focal firm with a rich alliance portfolio is more likely to access desired knowledge that can be combined with its internal resources. On the other hand, interdependencies in an alliance portfolio might also result in conflicts that arise from excessive diversity of portfolio resources (Wassmer, 2010). Moreover, Goerzen and Beamish (2005) argue that potential challenges might arise from increase in portfolio diversity due to high coordination costs. This suggests that the effect of an alliance portfolio diversity of a firm performance is only positive up to a certain point (Duysters & Lokshin, 2011). However, evidently some firms keep expanding the variety of resources in their alliance portfolios that might result in overshooting the optimum at some point and eventually experiencing decrease in performance. Whereas, other firms undershoot the optimum by keeping their alliance portfolio level too low. This justifies a close look at the factors determining the diversity of an alliance portfolio.

In this study, building upon upper echelon theory, we examine the role of top management team on an alliance portfolio diversity. Traditionally upper echelon theory has argued that top managers are boundedly rational and look at business challenges through their highly individualized lenses
(Hambrick & Mason, 1984). Therefore, organizational outcomes reflect their characteristics to a certain extent. Top managers’ education and experience shape their skills and knowledge which play a key role in shaping managers’ dominant logic for a firm (Yasemin Y Kor & Mesko, 2013), because they embed their understanding of business processes into a firm’s routines over time.

Studies on the role of top management team have argued that top managers’ characteristics affect organizational outcomes through their dynamic managerial capabilities such as managerial cognition (Buyl, Boone, & Matthyssens, 2011), managerial social capital that is social relations (Adner & Helfat, 2003) and managerial human capital (Helfat & Martin, 2015). For example, top managers with short firm tenure will be less likely to consider information from external sources in strategy making process (Patzelt, Zu Knyphausen-Aufseß, & Nikol, 2008). Moreover, well-educated top managers are more likely to solve more complex business problems (Wally & Baum, 1994) and identify new opportunities, absorb knowledge, apply new research techniques, and new inventions and products (Castanias & Helfat, 2001; Cohen & Levinthal, 1990).

Top management team’s characteristics are antecedents of, rather than a proxy for dynamic capabilities (Buyl et al., 2011). Therefore, in this study we argue that top management team’s characteristics affect different capacities (i.e. sensing, seizing and reconfiguring) of managerial dynamic capabilities. Changes in the level of different capacities lead to increase/decrease in resource diversity of an alliance portfolio. In other words, we argue that managerial dynamic capabilities mediate the relationship between top management team’s characteristics and strategic outcomes.
Our novel contribution lies in adding a theoretical perspective to alliance literature which explains firms’ alliance portfolio diversity. By conceptualizing top managers as boundedly rational decision makers, we theorize that they are guided by their characteristics, thus providing novel insights into the antecedents of observed alliance portfolio configurations.

**Theory development**

In the literature of inter-organizational networks an alliance portfolio is defined as a focal firm egocentric network (Castro, Casanueva, & Galán, 2014). This network evolves over time through formation of new alliances and termination of existing strategic alliances (Gautam Ahuja, 2000). The evolution of a focal firm’s egocentric network occurs through two mechanisms: nodal change and ego structural change (Gautam Ahuja, Soda, & Zaheer, 2012). These dynamic processes in the network are driven by the endogenous micro dynamics embedded in the network (Gulati & Gargiulo, 1999).

Alliance portfolio diversity concept places the focus on network resources and compares a focal firm’s partners with each other (Cobeña et al., 2017). Alliance portfolio partner diversity refers to the degree of variance in partners’ resources, capabilities, knowledge and technological base (Goerzen & Beamish, 2005; Jiang et al., 2010). The literature on inter organizational alliances and networks suggests the importance of relational resources in an alliance portfolio (Srivastava and Gnyawali, 2011) and argues that as the resource richness of an alliance portfolio increases, so does the scope for their synergistic combinations. As a result, greater value creation potential becomes available to a focal firm (Hoehn-Wiess, Karim and Lee, 2017). Baum, Calabrese, and Silverman
(2000) argue that an alliance portfolio has an optimal configuration when a focal firm can access varied complimentary resources that it desires (heterophily).

However, other scholars support homophily and argue that excessive diversity or lack of similarity in the portfolio might lead to conflicts (Lavie & Miller, 2008; Wassmer, 2010). They argue that high similarity between partners in the portfolio increases the probability that they will create synergies between each other that will benefit the focal firm. The rationale behind this is that partners with similar backgrounds, experiences, knowledge and technological bases have higher absorption capacity (Cohen & Levinthal, 1990), therefore they are more likely to establish synergetic relations between each other.

According to Gautam Ahuja et al. (2012), both heterophily and homophily are micro dynamics that can jointly affect the evolution of an alliance portfolio. Although we have an understanding of evolution of alliance portfolios through micro dynamics, the question of how a focal firm prefers more (heterophyllic behavior) or less different partners (homophylic behavior) in its alliance portfolio has been understudied (Castro et al., 2014).

Alliance portfolio studies have argued that a high level of portfolio diversity will increase a focal firm’s survival and foster its performance (Cobeña et al., 2017). However, the increase in performance will continue only up to a certain point, then it might start decreasing due to costs and complexity of managing very diverse technological knowledge in the portfolio (Duysters & Lokshin, 2011). In reality some firms keep expanding the variety of resources in their alliance portfolios even though the effect of diversity is negative, while others keep the level of alliance portfolio diversity too low even though there is still room to foster performance. This implies that
alliance portfolio literature needs a new perspective to explain the antecedents of alliance portfolios and why firms’ alliance portfolios differ in the level of diversity. The main question here is that what causes changes in an alliance portfolio by affecting its micro dynamics such as heterophily and homophily (Gautam Ahuja et al., 2012).

In this study, building upon upper echelon theory, we examine the role of top management team in alliance portfolio decisions. Upper echelon scholars argue that organizational outcomes are the function of top managers’ willful actions. The rationale behind this premise is that top managers’ repertoire of skills and knowledge affect their interpretation of business problems, thus it is believed that final organizational outcomes reflect their psychological preferences and beliefs (e.g. values and personality traits) to some extent (Wowak, Gomez-Mejia, & Steinbach, 2017). Top managers’ education and experience form a repertoire of skills and knowledge (Castanias & Helfat, 2001) that plays a key role in shaping managers’ dominant logic for a firm (Yasemin Y Kor & Mesko, 2013). This dominant logic expands and becomes embedded in a firm’s routines (Krogh & Roos, 1996), therefore influences a firm’s organization-wide knowledge and resource search (Yasemin Y Kor & Mesko, 2013).

David J Teece, Pisano, and Shuen (1997) argue that top managers have dynamic capabilities that can be seen as an aid to their endeavoring to gain competitive advantage in fast changing business environments. Dynamic managerial capabilities are “the capabilities with which managers build, integrate, and reconfigure organizational resources and competences” (Adner & Helfat, 2003, p. 1012). Helfat and Martin (2015) conclude in their review of assessment of managerial impact on strategic change that the central component of dynamic managerial capabilities is “asset orchestration” that can create value in the search of resources and capabilities.
is top managers’ trying to find a fit between search/selection and configuration/deployment of resources (Sirmon & Hitt, 2009). The fit is a primary function of effective management and enhances a firm’s ability to adapt to changing conditions. Sirmon, Hitt, and Ireland (2007) argue that synchronizing investment, bundling and deployment decisions might have strong performance effects.

David J. Teece (2007) disaggregates dynamic managerial capabilities into the capacity (1) to sense opportunities and threats, (2) to seize opportunities, and (3) to transform and reconfigure organizations’ recourses. Building upon upper echelon studies, Buyl et al. (2011) argue that top managers characteristics cause changes in the level of these three capacities that in turn might increase/decrease an organization’s ability to stay competitive over time and adapt to changing conditions.

The literature distinguishes three underlying factors of dynamic managerial capabilities: managerial social capital, managerial human capital and managerial cognition (Adner & Helfat, 2003). Traditional upper echelon studies have mostly focused on managerial cognition underpinning of dynamic managerial capabilities and argued that top managers’ cognitive processes is an important factor to explain why top managers’ characteristics matter for an organization’s strategic behavior (e.g. Buyl et al., 2011). Managerial human capital refers top managers’ skills and knowledge that develop through their prior experience, training and education (Helfat & Martin, 2015). According to Adner and Helfat (2003), managerial social capital refers to top managers’ formal and informal relationships that can be used in an organization’s search for resources. All three underlying factors of dynamic managerial capabilities interact with each other and top managers’ characteristics such as education (level and type) and prior
experience (firm and industry) are believed to affect these factors simultaneously. Top managers can draw on their relations (managerial social capital), knowledge and expertise (managerial human capital) and attention, perception, interpretation and reasoning (managerial cognition) to sense opportunities and threats, seize opportunities and reconfigure resources and capabilities (Helfat & Martin, 2015). These arguments in the literature of dynamic managerial capabilities suggest that top managers’ characteristics are associated with an organization’s strategic outcomes (in our case decisions about alliance portfolio diversity) by affecting micro foundations (sensing, seizing and reconfiguring) of managers’ dynamic capabilities. Following Buyl et al. (2011), we treat top management team characteristics as antecedents, rather than proxies for dynamic managerial capabilities.

Various studies have argued that executives’ high educational background affect their managerial cognition (Buyl et al., 2011; Ou, Waldman, & Peterson, 2018; Patzelt et al., 2008). Top executives’ educational background shapes the nature of the strategies they choose to pursue (Ou et al., 2018; Patzelt et al., 2008). Previous studies have argued that education tend to change students’ pre-existing values (Rynes & Trank, 1999) and “affects the cognitive models developed and thereby the strategic choices made” (Hitt & Tyler, 1991, p. 333). Jensen and Zajac (2004) argue that top management team members’ educational background is positively associated with a firm’s subsequent diversification strategies, because top executives with a solid educational background “perceive a firm as a collection of return-generating assets that need not be associated with a single line of business” (p. 509). Moreover, high level of education is associated with high capacity for information processing and greater degree of tolerance for ambiguity, therefore greater degree of openness (Dollinger, 1984). Some scholars argue that higher education reflects an individual’s
high level of intelligence (e.g. Khanna, Jones, & Boivie, 2014). Higher education also signals to the capital market that a firm top executives possess required cognitive abilities and knowledge to manage investments (Patzelt et al., 2008). Therefore, formally educated top managers attract are more likely to attract other capital market players, as they have strategic flexibility and are capable of managing diverse businesses.

Alongside with managerial cognition, some scholar have argued that top executives educational background is associated with their managerial human capital (Geletkanycz & Boyd, 2011; Khanna et al., 2014). Higher levels of formal education is more valuable to the board because, it indicates greater specific skills and knowledge about business problems (Khanna et al., 2014).

Since higher levels of formal education is positively associated with greater levels of cognitive processes, and specific skills and knowledge, we argue that top managers with a solid educational background become more likely to sense potential opportunities and threats in the market due to their openness. Moreover, top managers with a solid educational background are more likely to take potential opportunities eagerly and decisively, as they are believed to have higher ability to understand new and diverse knowledge (seizing). Lastly, such top managers are more likely to establish relationships with other organizations that have new and diverse knowledge compared to a firm’s portfolio resources, as their cognitive abilities, and skills and knowledge allow them to manage diverse recourses (reconfiguring). Hence, we argue that net effect of higher levels of formal education on resource diversity of a firm’s alliance portfolio will be positive.

H1: The higher the aggregate level of formal education of top management team, the more diversified a firm’s alliance portfolio.
Various studies have argued that executives’ industry affect their managerial cognition (Buyl et al., 2011; Khanna et al., 2014). Industry-specific experience “involves knowledge of the opportunities, competitive conditions, and regulations specific to an industry” (Yasemin Y Kor, 2003, p. 710). According to Castanias and Helfat (2001), industry-specific experience helps top managers to identify new technological trends, come up with proper strategies and position new product and services strategically. One of the primary tasks of top management team is to maintain the balance between exploitation and exploration in order to increase an organization’s adaptability to changing environment. Buyl et al. (2011) argue that an organization’s fitness to current environment and adaptability to changing environment is highly dependent on top managers’ cognition. Top managers’ industry experience might affect their capacity to tackle the contrary issues arising from exploitative and explorative behaviors (Smith & Tushman, 2005).

Another advantage of industry specific experience is social contact (managerial social capital). Top managers connect to different individuals, thus different firms during their journey before getting appointed to the focal firm. Top management team members with more social capital have strategic options at their disposal, and they can easily turn their contacts into customer relations and enter a strategic alliance (Patzelt et al., 2008).

Since higher levels of industry experience is positively associated with greater levels of cognitive abilities to understand the industry, and higher numbers of social contacts in the industry, we argue that top managers with a long industry tenure become more likely to better identify new market trends (Li, 2007). Top managers with more industry experience have cognitive ability to better interpret customer and competitor information in the process of new technology development (seize) (Yasemin Y Kor, 2003). Top management team’s higher cognitive ability and broad network
relations might enhance their attention to explorative issues (reconfiguring) (Cao, Simsek, & Zhang, 2010). Hence, we argue that long industry tenured top managers will be more likely to benefit different technology development experiences, meaning they might prefer to keep a firm’s alliance portfolio diversified.

**H2: The higher the aggregate level of industry experience of top management team, the more diversified a firm’s alliance portfolio.**

The literature on managerial cognition posits that top managers with long firm specific experience are generally more committed to a situation of status-quo (Buyl et al., 2011). Managers with long firm tenure are generally more knowledgeable about the firm’s prospects (Yasemin Y Kor, 2006), and more likely to be risk-averse because they are psychologically and tangibly invested in the firm (Simsek, 2007). Experienced top management team might specifically resort to established rules, regulations and procedures and commit themselves to status-quo (Hambrick & Fukutomi, 1991).

Several studies have argued that top managers firm experience is associated with managerial human capital (Harris & Helfat, 1997). A firm benefits top management team’s tacit knowledge of the firm’s material, human and intangible resources (Yasemin Y Kor, 2003). Top managers with tacit knowledge are better able to transform existing internal resources and capabilities into competitive advantage and adjust the level of financial and time resources allocated to different projects (Patzelt et al., 2008).

Consequently, firm experience affects micro foundations (sensing, seizing and reconfiguring) of managerial cognition and managerial human capital. For example, increase in risk awareness and firm specific skills and knowledge might have a negative effect on sense non-traditional
opportunities. This might lead top managers to seize opportunities that are not so different from a firm’s traditional activities and ignore other new market trends. Lastly, top managers with long firm-specific experience are less likely to deviate from traditional quest for innovation. In other words, they are less open to absorbing new technological knowledge. Therefore, they are more likely to deploy less diverse external resources in order to reduce risk of technology development (reconfiguring). Considering the negative effects of long firm tenure on micro dynamics of dynamic managerial capabilities in terms of openness to non-traditional activities, we argue that net effect of firm tenure on an alliance portfolio diversity will be negative.

H3: The higher the aggregate level of firm experience of top management team, the less diversified a firm’s alliance portfolio.

Methods

Data and sample

I tested the hypotheses on a sample that consisted of publicly listed U.S. pharmaceutical firms and covered the period of 1999-2010. We chose the pharmaceutical industry to test our hypotheses, because this industry is characterized by its high degree of managerial discretion (Gerstner, König, Enders, & Hambrick, 2013) and availability of detailed alliance activity and patent data.

We constructed a unique firm-level patent database that included data on firm’s senior management, alliance activity and partners’ patent activity. The initial sample was drawn from pharmaceutical firms that were among the sector’s hundred largest employers in Compustat at
any time during the period of 1999-2014. Then sample firms’ executives and their backgrounds were identified using BoardEX, Execucomp and Thomson Reuters databases. We used SDC Platinium to collect data on sample firms’ alliance activity (all types of alliances) for the period of 1995 - 2010 in order to construct focal firms alliance portfolios based a rolling 5-year window. We identified partners’ patents using The National Bureau of Economic Research (NBER) paper’s public database (Kogan, Papanikolaou, Seru, & Stoffman, 2017), in which the authors used extensive name-matching tools to assign USPTO patents to focal firms. However, these firms were classified by a “permno” identifier. Thus, we employed a CRSP/Compustat merged database (linking table) to obtain global firm-level identifiers (i.e. gvkey and cusip) for each patent record. After removing firms whose partners didn’t have any patent during the observation period, we eventually ended up with a unique database which consisted of 87 pharmaceutical firms for the period of 1999 - 2010.

**Dependent variable**

We measured alliance portfolio diversity at three steps. Firstly, we identified a focal firm’s partners for each year of the observation period. In our final database, 87 focal firms had 185 partners over the period of 1999 – 2010. Secondly, we identified those partners’ granted patents to construct a portfolio for each focal firm. We pooled partners’ all granted patents starting from year t – 4, meaning that partners’ patents granted from year t-4 to year t, (i.e. the firm’s “existing alliance portfolio”) comprised a focal firm’s alliance portfolio. Partners had around 33.000 patents across 322 patent classes during the observation period. Thirdly, we used Herfindahl – Hirshman index to
calculate the diversity of a focal firm’s alliance portfolio in terms of patent classes of partners’ patents:

$$\text{HHI} = \sum_{k=1}^{N} S^2$$  \hspace{1cm} (1)

Where $S$ is patent class’s weight and $N$ is the number of distinct patents in an alliance portfolio. The higher the index was, the less diversified the portfolio was. In other words, higher values of the index implied that partners’ knowledge and resources were homogenous in a focal firm’s portfolio.

**Independent variables**

Following Hitt, Bierman, Uhlenbruck, and Shimizu (2006), we used three components of managerial human capital: TMT’s education, TMT’s firm experience and TMT’s industry experience. Prior work on TMTs, has often used averages to aggregate these measures. However, recent studies have viewed top management’s characteristics as the stock of resources, and used sums or totals to aggregate these measures (Khanna et al., 2014).

TMT’s educational level was measured by summing top executives’ highest formal educational qualification prior to his/her appointment. We coded degrees as follows: 1 = Bachelor, 2 = Master, 3 = Master of Business Administration and 4 = doctorate (Talke, Salomo, & Rost, 2010). We distinguished master of business administration and regular master degrees (master of arts and
master of science). Then we summed these values to measure the aggregate level of highest formal education of TMT. Graph 1 shows the proportion of educational qualifications of top managers.

Graph 1. The proportion of educational qualifications of top managers

TMT’s firm-specific experience was measured by summing top executives’ firm tenure. Top executives firm-specific tenure consisted of their firm experience before joining TMTs and their firm experience as members of TMTs. Graph 2 shows that TMTs in our database have on average 5 years of firm-specific experience.

TMT’s industry-specific experience was measured by summing top executives’ tenure in the pharmaceutical industry before joining TMTs of focal firms. Graph 3 shows that TMTs in our database have on average 12-13 years of industry-specific experience.
Graph 1. The distribution of top managers firm and industry experiences.

Control variables

In this study, we controlled for R&D (R&D expenditure divided by sales), firm age (difference between IPO and observation years), firm size (log transformed total assets), industry (4 digit sic code), number of patents in a focal firm’s alliance portfolio. At TMT level we accounted for TMT size, TMT average age, TMT gender composition, TMT outsider ratio.

Next steps

We are currently working on analysis. At this point in time, we are discussing possible econometric models to test our predictions. Once we decide which econometric model to deploy, we will be able to run final regressions.
References


