

Corporate Governance and R&D Strategic Decision Making

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ABSTRACT: This study seeks to develop understanding from the literature the important relationship between corporate governance mechanism especially board characteristics and R&D strategic decision making. Some board characteristics, such as board size and independence are positively associated with firm performance. Directors of different ethnic, cultural backgrounds and different nationalities stimulate a firm to improve or develop new products. Older directors are less risk-tolerant than younger ones and invest less in risky R&D investments. The effect of board size on performance is negative and significant, while it has a positive and significant impact on R&D investment. Therefore, board characteristics are the considerable factors in affecting the effective R&D strategic decision making.

Keywords: *Board characteristics, corporate governance, decision making, R&D investment*

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INTRODUCTION

Business R&D, or the systematic funding and organization of creative activities by businesses, is a critical component for the introduction of new goods and processes, as well as a requirement for productivity development and long-term viability. Go public companies undertake the majority of business R&D, it is critical to understand how their governance effects their R&D spending. A growing body of empirical research has examined the impact of corporate governance procedures on innovation, with a specific focus on businesses' R&D intensity levels.

Because a company's investment in R&D is a decision that may cause manager-shareholder disputes, the theoretical arguments in this literature are usually anchored on agency theory. Shareholders are modelled as risk-neutral in the classic agency theory because they can diversify their overall investment over multiple enterprises, but managers are modelled as risk-averse since they can only focus on one job. As a result, managers are thought to favour short-term benefits from efficiency-seeking techniques, which might stifle innovation and long-term returns. According to this viewpoint, effective corporate governance practices should seek to align the interests of shareholders and aligning managers' decisions to shareholders' interests may have a negative effect by more intensely subjecting management to shareholder will, ultimately reinforcing short-termism and discouraging R&D expenditures. Managers, resulting in a beneficial influence on R&D spending.

This paper seeks to further develop the understanding of the relationship between corporate governance and R&D strategic, by exploring the effect of board characteristics and ownership structures on R&D spending antecedents to innovation and corporate entrepreneurship. A contribution of this study, encapsulates discernments regarding the composition of boards, a consequence of which, may influence the expansion or reduction of R&D budgets. This ultimately impact firm performance.

THEORETICAL REVIEW

R&D Strategic Decision Making

Importance of R&D strategic decision making

R&D decisions are seen as strategic because "a business's R&D intensity, in comparison to its industry rivals, reflects the strategic relevance of innovation to a corporation." If companies want to be leading innovators, rapid followers, or low-cost mass manufacturers, they will value innovation differently, which means the risk, uncertainty, and costs they confront will change. A business's innovation-based competitive strategy will have an influence on the capital structure decisions made by that company (O'Brien, 2003).

Changes in a firm's social structure, particularly in managerial innovation, can explain variations in R&D performance. In terms of product innovation, it is still unclear how management innovation effects R&D effectiveness. Theoretical

reasons and facts from a large-scale survey of Dutch companies suggest that R&D has a decreasingly positive association with product innovation, especially for companies with low levels of managerial innovation. This link grows more J-shaped in organizations with strong levels of managerial innovation, especially in small and medium-sized businesses. The study's findings also suggest that managerial innovation, rather than R&D, may be more crucial for competitive advantage. Overall, the findings show that management innovation is a critical mediator in explaining a firm's ability to convert R&D into successful product innovation (Heij et al., 2019).

Importance of R&D expenditure

The majority of R&D expenses are made up of materials purchases, equipment purchases, technical people recruitment, and so on. The fact that these investments are irreversible adds to the amount of risk (Jiang & Liu, 2020). Higher levels of market uncertainty, according to the real options theory, may reduce businesses' R&D spending and enhance the value of waiting for fresh information (Bloom, 2007; Czarnitzki & Toole, 2007). Furthermore, economic political uncertainty can reduce the rate of economic growth by lowering corporate investment activities, altering the economic environment of enterprises and influencing corporate investment decisions (Kang et al., 2014).

The medical device industry, with its higher technology, large market potential, high added value of output products, low pollution, emphasis on scitech integration, and broad application, has higher risks but higher profits, is a knowledge-intensive industry, and will become a star industry leading the global economy. The medical biotechnology sector demands ongoing innovation, and it has long invested a significant amount of money in R&D to get various patent rights and R&D outcomes in order to improve its competitiveness. R&D costs and patent rights are so critical for medical biotechnology companies to maintain a competitive edge. As the research subject, 300 copies of the questionnaire are delivered to executives and staff of medical equipment businesses in Shanghai. A total of 232 genuine copies were found, with a recovery rate of 77%. The findings reveal that R&D spending and patent rights, patent rights and operational performance, and R&D expenditure and operational performance all have favorable correlations. According to the findings, recommendations are made, with the goal of assisting the medical device business in obtaining various patent rights for R&D contributions and preserving a competitive edge (Luo et al., 2018).

In this light, innovation-related activities – including finance – necessitate strategic decision-making on the part of both firm management and external donors. Ownership and control structure (governance) are influenced by capital structure, particularly when it comes to making strategic decisions in the face of several stakeholders (Sierra, 2020). Owners, according to the OECD, have the power to influence the company's operations because, in addition to receiving funding or investment, they have authority over fundamental issues such as the

ability to elect board members, changes to corporate documents such as articles of association, and approval of extraordinary transactions (OECD, 2015). However, according to a prior research, R&D strategic decision-making is also seen as a strategic change action centered on critical concerns prepared by top management team members. The two categories of R&D strategic decision-making are R&D intensity and R&D modalities. R&D intensity has a direct impact on the efficiency and efficacy of inventive operations, as well as the survival of businesses. Modes of R&D, such as independent innovation or internally directed kind, are essential boosting forces for organizations' long-term success (Yang et al., 2019).

R&D Impact Firm Value

Hsieh et al. (2003) compared the rate of return on a dollar invested in R&D to the rate of return on a dollar invested in fixed assets in the pharmaceutical and chemical industries and discovered positive correlations between R&D intensity and all firm performance variables (net margin, operating margin, sales growth, and market value), that an investment in R&D earns an operating margin return that far exceeds the industry cost of capital, and that the effect of an investment in R&D is far greater than the effect

Ruiqi et al. (2017) add to this conclusion by demonstrating that R&D expenditures are positively related with future performance of enterprises. In terms of R&D modes, Laursen & Salter (2006) stated that many innovative organizations have altered their approach to idea generation by implementing open search strategies that entail the engagement of a diverse range of external actors and sources to assist them in achieving and maintaining innovation. According to the findings, firms with open search strategies – those that do wide and in-depth searches – are more imaginative. However, it was determined that increasing the number of searches becomes unproductive, resulting in fewer results.

The ratio of R&D costs to total assets can explain a lot about a company's market to book value ratio. In comparison to the growth in connection to other regressors, the results of the study's research show a faster increase in firm value with an increase in R&D costs to total assets. A fascinating feature is that the ratio of intangible fixed assets to total assets is not statistically significant, implying that the market does not value a passive strategy of purchasing intangible assets externally rather than developing them internally (Glova & Mrazkova, 2018).

The external environment has a significant impact on the link between R&D and corporate performance. We find that a country's protections regulate the association between R&D and company performance more than the country's system, using a generalized approach of moments estimation and elasticity testing of panel data for 423 enterprises from 12 rising nations. The findings suggest that safeguarding is more significant than other country-level governance systems for the link between R&D and company success, as the former may readily attract outside capital when it is robust. The ramifications of these findings for innovation policy are considerable. Managers may aim to boost

investor protection in order to encourage high R&D expenditure and so improve corporate performance (Alam et al., 2020).

Corporate Governance and Its Impact to R&D

The Board of Directors' impact to R&D

The implementation of resource dependence theory is suggested by the management composition, which includes more top managers. According to resource dependency theory, members of a board of directors are conduits for bringing in fresh resources and knowledge. According to Kim & Kim (2015), the board of directors must be maximized between two sets of factors: it must be heterogeneous enough to offer the business with a varied collection of resources and knowledge while being homogeneous enough to function effectively.

The negative/positive effect of CEO tenure/CEO educational level on R&D investment is mitigated/enhanced by board social capital, supporting the notion that board social capital, as an important conduit for connecting firms to critical information and essential resources in the environment, may provide better counsel to CEOs and enhance their decision-making capabilities in moving toward R&D. (Chen et al., 2013).

Agency Theory on R&D decision making

Firms with incremental investments in R&D are more viable to drive corporate uniqueness, and, hence, sustainable competitive advantage and market value, over the long term (Hsieh et al., 2003).

Nevertheless, risk-averse managers will constantly underinvest in R&D and use less risky mechanism to pursue firm growth. Shaikh & Peters (2018) found that firms that are required to maintain a high R&D intensity, structure their boards with more top managers to help abate the more pressing agency cost of underinvestment.

A firm's R&D investment is nevertheless affected by the agency costs underlying the agency problem. Lin et al. (2017) viewed that financing constraints cause R&D underinvestment and agency costs lead to R&D overinvestment.

The Board as Strategic Decision Makers

The study of strategic leadership focuses on the characteristics of executives who have overall responsibility for an organization, as well as what they do, how they do it, and, most crucially, how they impact organizational outcomes. Strategic leadership research can be conducted on individuals (e.g., CEOs or division general managers), groups (top management teams), or other governing bodies (e.g., boards of directors). The board of directors is a primary focus of strategic leadership research, and it is best thought of as a supra-top

management group (TMT). The TMT is the executive body in charge of strategic choices and the firm's strategy, structure, and performance as a result of such decisions (Finkelstein et al., 2009).

Boards of directors, in principle, fulfill two purposes in organizations. The first is their external function as buffers and boundary spanners, linking firms to critical environmental resources and valuable data kept in a network of director interlocks. Second, they have an internal administrative and control function, in which they are purportedly (and legally) accountable for policymaking and management supervision (Finkelstein et al., 2009).

Additionally, the makeup of the board of directors reflects these tasks. A business board of directors summarizes each director's relationships and the talents they provide to the board. The composition is classified as "insider" and "outsider" (Finkelstein et al., 2009). Outsiders include (1) representatives of other organizations that conduct little or no business with the firm (independent directors); (2) representatives of other organizations that conduct business with the firm or with key personnel within the firm (e.g., lawyers for family owners) or are otherwise affiliated with the firm (affiliated directors); and (3) founding family members or relatives.

The board of directors' job continues to evolve throughout time. Initially, nearly everyone agreed that boards of directors are passive participants in strategy development. Later on, the board's activity level became increasingly critical. Concerns regarding director liability and the Sarbanes-Oxley Act have bolstered the idea that the board of directors have the legal authority to make significant business decisions and determine corporate direction (Kaplan & Harrison, 1993).

Nonetheless, Shivdasani and Yermack (1999) assert that the board's primary function in a business is to safeguard shareholders' interests by reviewing the corporation's major plans and actions, selecting, compensating, evaluating, and, when necessary, dismissing top managers, but not initiating any corporate strategy.

Additionally, McNulty & Pettigrew (1999) discovered that external directors seldom initiate planning. Their research identified three levels of engagement in strategic decision-making: making strategic decisions (approval or disapproval), molding strategic decisions, and altering the substance, context, and implementation of strategy. According to McNulty and Pettigrew, outside (part-time) directors make strategic decisions at the completion of the decision-making process (accept or reject them).

The tale is shaped in two ways by external directors. To begin (and most frequently), CEOs consult external directors both within and outside the boardroom when developing strategy. Second, independent directors have the ability to challenge, dissent, and test leaders both within and outside the

boardroom without having direct contact with them. External directors have this effect on strategic decisions without requiring direct consultation.

Finally, in the McNulty and Pettigrew (1999) investigation, just a few outside directors asserted an active role in strategy design (i.e., shaping the content, context and conduct of strategy). Rather than that, external directors were often involved in identifying the proportion of a plan that was deliberate and how much was emergent. By pressing and criticizing CEOs, outside directors forced them to consider things through and be prepared.

Alternatively, some outside directors created strategic controls to guarantee that strategic choices were made within a responsible and accountable framework (Beekun et al., 1998; Johnson et al., 1993).

Inside directors are responsible for developing and executing the strategic plan. In terms of strategic leadership, internal directors include chief executive officers (CEOs), business unit heads, and TMTs. According to Chen et al. (2013), the resource dependence theory posits that the CEO receives advice and resources from the TMT, which reports directly to the CEO.

Additionally, as a result of the diversified development of the firm and the divisionalization structure that preceded it, business unit executives often planned and implemented a number of strategic projects. Typically, business unit heads are in control of extremely large corporations and wield considerable authority (Finkelstein et al., 2009).

Corporate Board Precursors of R&D Investment Spending

Board Characteristic influenced R&D Expenditure

Jiang & Liu (2020) found that some the attributes of CEO such as age, tenure and marketing or sales experience led to a negative relationship between economic policy uncertainty and firm R&D expenditure. In addition, other attributes (e.g., education, overseas study/work experience, product R&D experience, and process engineering experience) lead to a positive relationship.

From 1995 to 2012, Spescha (2019) utilized panel data from Switzerland to come at his conclusions. A new study shows that smaller, more established companies had a stronger link between R&D expenditures and sales growth than both bigger and younger companies. There are advantages to small-sized companies in R&D, such as more motivated researchers who are more invested in the company's future, according to the article. Firms that have a well-established R&D department can also take advantage of the most recent technical breakthroughs. Moreover, Rivas (2012) revealed that international experience of both boards and TMTs has a good influence on internationalization; a positive association between CEO multinationality and internationalization was also discovered.

Ownership influenced R&D Expenditure

From 2007 to 2012, Ruiqi et al. (2017) used a sample of 772 Chinese listed companies. Firms' future performance is positively linked to R&D expenditures, and the R&D expenditures of SOEs lead to greater future performance than those of non-SOEs, a new study has shown. Additionally, the data show that the R&D-performance link is favourably moderated by the voting rights of ultimate owners. Large SOEs with concentrated ownership may benefit from future R&D expenditures if they file more patents and spend more on capital and operational expenses, according to the research. This research adds to the existing body of knowledge on R&D performance by taking into account the synergistic influence of ultimate ownership and control.

Beneito et al. (2015) find that firms' R&D spending is countercyclical but that credit constraints may reverse this counter cyclicity, in line with previous results in the literature. However, the study findings indicate that these results are moderated by firms' ownership. In particular, in the case of firms that are family owned and firms that are group affiliated, the responsiveness of R&D to the business cycle is considerably less dependent on being credit constrained, especially during recessions.

Agency Theory influenced R&D

Lee and Wu (2015) demonstrate, using agency theory, that absorbed slack has a deleterious effect on the relationship between R&D investment and performance. According to our findings, unabsorbed slack also has a somewhat curvilinear effect on the positive relationship between R&D capital and firm performance. When untapped slack resources are included, behavioral theory's assertion becomes more true. When assessing the impacts of R&D investment on performance, it is critical to define slack as a pool of resources that exceeds the bare minimum necessary to achieve a given level of organizational output. The two forms of slack resources are unabsorbed slack with a high degree of management discretion and absorbed slack with a low degree of managerial discretion.

According to Shaikh and Peters (2018), inside directors encourage overinvestment in R&D on average, but allow for more efficient resource allocation when a corporation has ample development opportunities. Additionally, although placing an excessive emphasis on outside directors encourages underinvestment in R&D, a more independent board promotes more efficient resource allocation when corporations generate significant free cash flows that must be given to shareholders. As a result of the findings, managers may benefit from a more broad perspective of agency theory in order to make more informed R&D investment decisions.

Yoo & Rhee (2013) present evidence in support of agency theory, which asserts that market-based governance systems increase R&D investment, by analyzing panel data on 100 large listed Korean businesses. Additionally, the

data demonstrate that a society's unique organizational characteristics, such as business-group affinity and state ownership in Korea, have no influence on dividend payments but are positively related with R&D investment. This indicates that strategic management of corporate governance changes requires a knowledge of the two competing governance rationales in their context.

According to Jiraporn et al. (2018)'s difference-in-difference estimations, board independence results in much bigger investments in innovation as well as higher innovation productivity. The findings are crucial because they establish that board governance has a tangible effect on critical organizational outcomes like as creativity and productivity.

The Effects of Board Characteristics on Firm R&D

According to Finkelstein et al. (2009), important contextual factors determine board features such as composition and organization. Critical circumstances confronting the company, institutional pressures (social class influences and managerial elites), and agency conditions are all part of the setting. Board traits, in turn, have an impact on board vigilance and conduct, both in terms of monitoring and disciplining top management as well as participation in strategy development.

According to the findings of a study by Pucheta-Martnez and Gallego-Ivarez (2020), some board characteristics, such as board size, board independence, and having a female director, are positively associated with firm performance, while CEO duality, contrary to the researchers' expectations, has a positive impact on firm performance. Furthermore, board compensation is unrelated to corporate performance.

Midavaine et al. (2016) discover that tenure diversity causes enterprises to invest less in R&D, but education and gender diversity causes firms to invest more. Gender diversity also moderates educational variety in a favorable way, enhancing the impact discovered.

According to Attia et al., 2021, having women on the board has a beneficial impact on product creativity, while having independent directors increases the amount of patents and process improvements. Second, highly educated executives are better able to comprehend difficult decisions and absorb new ideas and technology, resulting in more inventive goods. Regarding the academic degree, we point out that business-educated directors seem to overlook innovation investments in favor of activities with quick financial rewards. Then, directors from various ethnic, cultural, and national backgrounds appear to encourage a company to improve or produce new items. Furthermore, senior directors are less risk-averse than younger directors, and they spend less in high-risk R&D projects.

The Effects of Board Size on Firm R&D

The empirical findings reveal that R&D expenditure is inversely related to board size and positively related to directors' educational level. The frequency of board meetings has a favorable but insignificant effect on R&D spending. The findings have one significant management implication: organizations competing on innovation via R&D investment may consider reducing the size of their board of directors or placing a premium on the selection of highly educated members (Chen, 2012).

The frequency of board meetings and the size of the board are both substantially and adversely associated with risk-taking as assessed by R&D intensity, with a stronger correlation in Anglo-American nations than in Continental European countries. This is because the legal and accounting systems of Anglo American countries are more protected as a result of a higher emphasis on compliance and disclosure, allowing for less risk-taking (AlHares et al., 2020).

Board size has a negative and substantial influence on performance (Duppati et al., 2017). The size of the board of directors has a substantial beneficial effect on R&D expenditure ($\beta = 0.0211$, $p < 0.05$). Firms with boards of directors with a median size are often regarded more capable of promoting R&D investment, since there are fewer members monitoring the business and the function of individual members grows, hence boosting the firm's overall performance (Muhammad et al., 2022).

Song et al. (2022) examine the effect of board features on businesses' R&D intensity using 182 A-share listed companies in the Chinese equipment sector as a sample. The results indicate that while the duality of the CEO and board chair, the size of the board of directors, and the frequency of board meetings have no significant effect on R&D intensity, the proportion of independent directors and the board's shareholding has a significant positive effect on R&D intensity.

The Effects of CEO/Chairman Duality on Firm's R&D

The findings of E-Vahdati & Binesh (2021) demonstrate a substantial positive relationship between CEO education and R&D intensity, showing that when CEOs have a greater degree of education, R&D intensity is higher. According to the research, CEO duality is negatively connected with R&D intensity. CEO age, on the other hand, has no bearing on R&D intensity. Through mediation path analysis, we also show that CEO education and CEO duality have partial mediation effects, and that the CSR committee has a favorable influence on the suggested model. The current study adds to the existing body of knowledge by analyzing the mediating influence of ESG practice on the relationship between various CEO qualities and R&D intensity.

According to Naaman & Sun (2022), there is a substantial negative relationship between CEO power and R&D investment, implying that companies with more powerful CEOs are less likely to spend in R&D. Furthermore, the

study reveals that organizations with worse corporate governance are mostly responsible for this considerable negative relationship.

According to Detthamrong et al. (2017), small businesses with multiple CEOs had lower financial leverage than businesses without dual CEOs. This statistic appears to back with the idea that CEO duality dominates the board of directors. In such circumstances, a risk-averse CEO-chairman would choose for a low-leverage strategy, which would minimize the firm's risk and returns.

When information costs are large, Hsu et al. (2021) discover that CEO duality has statistically significant detrimental effects on business performance. As defined by the amount of the information costs, this finding supports the cohabitation of the agency and stewardship hypotheses, and it tends to emphasize the relevance of corporate governance in the link between CEO duality and business success.

The Effects of Board Independence on Firm R&D

Existing evidence indicates that increased Board independence – specifically structural independence, defined as increases in the ratio of outsiders to insiders, CEO/chair split, decreased CEO board friendship ties, and increased demographic distance between the CEO and outside directors does not universally lead to improved performance (Finkelstein et al., 2009).

CEOs attitude and behavior towards innovation are shown related to commitment link “manager-task” and suggests that the board of directors plays no role in the CEOs discretion management (Hamza & Jarboui, 2016).

Supervisory board independence has a negative effect on firm value. It means to create high firm value; shareholders have to appoint more members of insider supervisory board, because they can collaborate with board directors (Sahabuddin & Hadianto, 2019).

Early in CEO tenure, R&D investment is reduced by stock options and board independence, whereas in later stages these effects reverse: R&D investment is enhanced by stock options and board independence (Zona, 2016).

Using moderated regression analyses, the results confirm the study hypothesis that board independence has a significantly more positive effect on performance for firms pursuing a strategy of cost efficiency than for those pursuing a strategy of innovation (Gani & Jermias, 2006).

Sena et al. (2018) find that independent boards may mitigate the negative impact of corruption on innovation as subsidiaries located in more corrupt countries and with more independent boards tend to invest more in R&D and register more valuable patents. These results still hold after controlling for the

average age of the directors, the proportion of directors with no local business affiliations and government effectiveness.

The Effects of Ownership Structures on Firm R&D

The findings suggest that ownership concentration has a detrimental impact on R&D intensity, which may be mitigated by bettering external governance and the Regional Governance Environment (RGE). Meanwhile, the ownership limit has a favorable impact, which is bolstered greatly by the improvement in RGE (Wan et al., 2021).

The findings reveal that there is no substantial link between ownership concentration and R&D spending. Only when the authors investigate the character of the principal shareholder do they discover that in family businesses, there is an inverted U connection between ownership and R&D, with R&D increasing at low levels of ownership and decreasing at high levels of ownership (about 54 percent). In addition, when the primary shareholder is an institutional investor, the larger the R&D spending, the bigger the institutional investor's shareholding. Finally, the authors examine whether, contrary to popular belief, contestability in family businesses rises when ownership in the hands of other family shareholders grows (Garca-Garca et al., 2020).

According to Yousaf et al., (2019), R&D intensity shows a positive and substantial link with all three proxies of firm performance: ROA, ROE, and Tobin's Q. Following that, the researchers looked at the effect of ownership structure and board structure in moderating the relationship between R&D intensity and three proxies of company success. It is also determined that the association between research and development intensity and business success is negatively moderated by ownership and board structure, raising doubts about the efficiency of corporate governance mechanisms in terms of R&D performance.

The link between financial slack and R&D investments is positively moderated by family ownership, whereas the relationship is adversely moderated by local institutional investors and international investors. The findings of the study demonstrate that differentiating between different types of owners is critical to better understanding the nature of the link between financial slack and R&D spending (H. Kim et al., 2008).

The findings show a positive association between R&D intensity and a firm's leverage, meaning that Indian enterprises with high leverage spend in R&D. In contrast to previous research, there is no evidence of a detrimental association between family ownership and R&D investments. Institutional ownership and R&D spending have a negative association, implying that institutions have a myopic view of enterprises and are primarily interested in their short-term success. There is also a negative correlation between domestic

institutional ownership and R&D spending, reinforcing the widespread perception that domestic financial institutions do not back creative businesses. Finally, it is discovered that foreign institutional ownership and R&D investments have a beneficial association. This demonstrates that international institutional investors encourage Indian enterprises to spend money on R&D and that they are active monitors who assist companies with new ideas and encourage the flow of creative information (Gupta, 2019).

The size of the board of directors, the number of independent board members, the gender diversity of the board of directors, the chairman's term, the frequency of board meetings, and the size of the company all had a statistically significant and favorable impact on realized R&D costs. Furthermore, it was shown that the number of foreign board members, board ownership, and organizational age all had a statistically significant negative impact on nominal R&D expenditures. The job duality and business scale, on the other hand, were found to have a statistically significant and favorable influence. The foreign member ratio on the board of directors, on the other hand, had a statistically significant and negative influence on innovation costs, as did organizational age (Kutlu & Gerekan, 2021).

The Effects of Blockholders Ownership on Firm R&D

The findings suggest that there is a negative and substantial association between block ownership and risk-taking, with Continental European nations having a bigger significance than Anglo-American countries. The explanation behind this is that block owners in Continental European nations are more likely to be co-founders and owners of their firms. Furthermore, due of the legal systems in both nations, minority shareholders in Anglo American corporations are provided greater protection than block owners (AlHares et al., 2018).

Atallah et al. (2021) find that institutional blockholder ownership and the number of institutional owners both enhance R&D spending, demonstrating the importance of institutions in enterprises' innovation activities. Firms with more independent boards, more female board members, and more outside directorships held by directors had greater R&D levels, according to the study. According to the researchers, organizations with CEO/chair of the board duality, as well as firms with larger director ownership and a higher mean board age, had lower R&D intensity. The ratio of incentives to total remuneration is positively associated to innovation, showing that incentives help align shareholders and management interests, resulting in better long-term decisions. These incentives, however, diminish the amount of patents issued. There are no significant changes in R&D for the 2000 recession, but there is an increase for the 2008 financial crisis, according to the study.

Blockholder ownership is utilized as a monitoring instrument to ensure that managerial decisions are made in the best interests of shareholders. As a result, by exerting their corporate authority, blockholders may have a personal

motivation to expropriate the wealth of minority owners. By using both market and accounting-based data, Ibrahimy & Ahmad (2020) discovered a positive significant association with a minor influence of beta coefficients. The conformity of monitoring hypothesis is the beneficial association of blockholders as institutions. The findings point to a very close examination of the influence of blockholders on CEOs' decisions to increase business performance through lowering agency expenses. Furthermore, until a certain level, the relatively low positive influence of profit volatility represents the efficacy of blockholders.

The Effects of Financial Institutional Ownership on Firm R&D

When bank holding companies (BHC) were allowed to engage in investment banking and insurance businesses with less regulatory scrutiny, the favorable correlations between institutional ownership and geographic, revenue, and activity diversity became more prominent. This finding implies that huge institutional investors' market discipline can act as a replacement for regulatory regulation. The study also discovered that institutional investors with larger stakes in investee BHCs had a stronger effect on BHC diversification decisions during the crisis, which reduced the probability of the business going bankrupt (Deng et al., 2013).

Insider ownership and company performance have an inverse "U-shaped" connection, according to Shin-Ping & Tsung-Hsien (2009). The ownership of government institutions and incorporated corporations is proven to have a considerable negative relationship with corporate performance. However, the performance of securities investment trust funds and that of corporations are linked. The consequences of Financial Institutional Ownership are insignificant.

Three forms of ownership serve as defining characteristics of company groupings and possible moderators of this relationship: family, domestic financial institution, and international corporation. Purkayastha et al. (2017) discovered that depending on the extent of internationalization of the business group, these three ownership models had a varying influence on the internationalization-performance connection. Family and foreign business ownership has a positive moderating impact at lower degrees of internationalization, but domestic financial institution ownership has a negative moderating effect. Family and foreign corporate ownership, on the other hand, has a negative moderating impact at increasing degrees of internationalization, whereas domestic financial institutions ownership has a positive moderating effect.

Panicker et al. (2021) discover a negative relationship between the proportion of lenders on boards of directors and corporate internationalization. Furthermore, family ownership has a beneficial effect on this connection, but foreign institutional investors, local banks, and financial institutional investors have a negative effect.

The Effects of Board of Directors Ownership on Firm R&D

The study notes an interesting result in the impact of board ownership: for U.S. firms (and full sample), an increase in the percentage owned by the board, collectively, is associated with smaller R&D expense, all else equal, while Canadian firms exhibit the opposite relationship: higher board ownership is associated with higher R&D expenses (Atallah et al., 2021).

Board ownership is defined whether any of the board members has more than 5% equity stake or not. If any members hold equity stake more than 5%, that member can control firm decision which might not work for the sake of firms' interest rather focus on personal interest. Hence, this situation will affect firm performance negatively in the short run and long run. The power strike balance is important amid the board members for better governance of the firm (Sheikh & Alom, 2021).

A high level of board ownership is associated will is less risk-taking, implying that board ownership aligns the directors' interests with those of shareholders. Therefore, by encouraging higher board ownership, firms will maintain an optimal risk level that guarantees superior returns (Soi, 2021).

A panel data of 300 companies from Anglo American and European countries between 2010 and 2016 were used. The ordinary least square multiple regression analysis procedure is used to examine the relationships. The findings are robust to alternative measures and endogeneities. The results show that institutional ownership, board size, independent directors and board diversity are negatively related to risk-taking, with greater significance among Anglo American countries than among Continental European countries. In contrast, the results show that director ownership is statistically insignificant (AlHares, 2020)

The Effects of Executives and Managers Ownership on Firm R&D

Over various quantiles of the R&D distribution, this analysis demonstrates a nonmonotonic sensitivity of R&D spending to the amount of management ownership. That is, for low R&D intensity enterprises, management ownership improves R&D spending. However, it reduces R&D spending at companies with a high R&D intensity. These findings show that there is a limit to how much money can be spent on R&D before owners and management become hesitant to do so (Hassanein et al., 2022).

The findings suggest that lower levels of managerial ownership have a beneficial influence on R&D investment, whereas larger levels of managerial ownership have a negative impact. The data point to an inverse U-shaped nonlinear link between company management ownership and R&D spending choices. The findings also show that institutional investors' ownership has an influence on R&D expenditure decisions only at a lower degree of management ownership and vanishes at a larger level (Hassanein et al., 2021).

Prior research backs up the idea that increasing management ownership leads to opposing interest alignment and entrenchment, resulting in a nonlinear connection between managerial ownership and company performance. The precise nature of this nonlinear link, however, varies between investigations. The current study looks at the link between management ownership and performance for NYSE, AMEX, and NASDAQ-listed high-R&D companies. Tobin's Q decreases with management ownership at first, then rises, then falls, then rises again, and eventually rises again – a W-shaped connection. The study's findings suggest that industry impacts are important in the link between managerial ownership and company success (Cui & Mak, 2002).

According to agency theory, managers may underinvest in R&D due to risks associated with project failure, such as lower salary and job loss. Managers, on the other hand, have an incentive to over-invest in innovation for the sake of growth, which entails increased salary, power, and reputation. Beyer et al., (2012) use a sample of 1406 Belgian enterprises to discover, first, that managers with no company shares invest less in R&D than those who control 100 percent of the company, giving rise to the risk argument. Second, there is an inverse u-shaped link between management ownership and R&D spending. This shows that supervisors become entrenched, or powerful enough to pursue their own goals. Managers who are well-established do not fear the negative consequences of hazardous innovation initiatives on their careers, and they are more likely to over-invest in innovation for the sake of growth.

CONCLUSIONS AND RECOMMENDATIONS

R&D decisions are strategic because they reflect a company's strategic value of innovation. If a company wants to be a leading innovator, a rapid follower, or a low-cost mass manufacturer, it will value innovation differently. Changes in a firm's social structure, particularly in managerial innovation, can explain variations. R&D spending has a favorable correlation with a company's future performance. An investment in R&D generates an operating margin that considerably surpasses the cost of capital in the business. By implementing open search tactics, innovative companies have revolutionized the way they look for fresh ideas. The protections of a country tend to regulate the association between R&D and corporate performance more than the country's system.

Managers that are fearful of taking risks will consistently underinvest in research and development (R&D). The Board of Directors may be able to provide greater advice to CEOs and help them make better decisions. Strategic leadership study often focuses on the board of directors. In terms of concept, boards of directors serve two purposes in organizations. They serve as buffers and boundary spanners for organizations, connecting them to important resources. Second, they play a role in administration and internal control on the inside. Inside directors are in charge of initiating and implementing the strategic strategy. A negative link between economic policy uncertainty and corporate R&D investment was found due to several CEO characteristics.

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