UNPACKING THE CONTEXT OF COOPETITION: THE MODERATING ROLE OF FIRM AND INDUSTRY LEVEL CHARACTERISTICS IN THE COOPETITION-FIRM PERFORMANCE RELATIONSHIP

Master Thesis

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Abstract

Coopetition, defined as the collaboration between firms operating in the same industry, is often pursued to improve performance, yet empirical findings remain mixed. This study examines how firm size, financial constraints, innovation intensity, and market concentration moderate the relationship between coopetition and firm performance one year after a coopetitive joint venture. Using the Resource-Based View as the theoretical lens, this study analyses 825 firm-year observations of publicly listed companies that engaged in within-industry joint ventures – ranging from 100 percent to minority stake joint ventures – between 2010 and 2016. Hierarchical regression results reveal that, on average, coopetitive joint ventures have a negative effect on Return on Assets (ROA) one year after a coopetitive joint venture. Contrary to theoretical expectations, none of the proposed firm- or industry-level moderators significantly influenced this relationship. These findings contribute to coopetition theory by demonstrating that its short-term performance outcomes are more contingent and complex than often assumed. Performance may be shaped by deeper relational or governance mechanisms not captured by the hypothesised firm- or industry characteristics. For managers, this study cautions that coopetition is not a guaranteed path to increased firm performance; instead, outcomes may hinge on how partnerships are aligned, structured, and managed in practice.

Keywords: Coopetition, Firm Performance, Resource-Based View, Joint Ventures

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1. Introduction

Coopetition has emerged as a strategic approach for enhancing firm performance, yet its effects remain inconsistent across different business contexts (Meena et al., 2023; Czakon et al., 2020). Coopetition is defined as "a strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value." (Bouncken et al., 2015, p. 591). Coopetition is a paradoxical relationship, with firms collaborating and sharing resources and knowledge while also maintaining a competitive stance with the overall aim of improving firm performance (Dawood, 2023; Ritala, 2012). Coopetition can reduce costs, spur innovation, and improve market access (Dorn et al. 2016). However, while some firms experience significant performance gains from engaging in coopetition strategies, others struggle to capture its benefits due to conflicts of interest, resource asymmetries, or market conditions in which firms operate (Klimas et al., 2024). This research adopts the Resource-Based View (RBV) as its theoretical lens. According to RBV, firms achieve competitive advantages by acquiring and combining resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). In the context of coopetition, firms engage with competitors to access complementary, external, resources that they lack internally, like technological capabilities, knowledge, and innovative expertise to strengthen their resource base and enhance performance (Bouncken et al., 2015; Wang & Chen, 2022). By sharing resources with competitors, firms can strengthen their resource base, enhance their innovation, and improve performance outcomes (Ferreira et al., 2020; Yang & Zhang, 2021).

Research problem and relevance

Despite the benefits of coopetition, it does not yield uniform results; some firms benefit significantly, whilst others struggle (Bouncken et al., 2015; Klimas et al., 2024). The varying results may be due to other factors, which raises the question of when coopetition is more or less effective. For instance, Yang et al. (2021), in a meta-analysis, found that industry-specific factors influence coopetition outcomes, particularly for innovation, but their effect on financial performance remains inconsistent, warranting further study. Similarly, Modi and Cantor (2020) showed that financial slack moderates coopetition benefits, though in the context of environmental performance, not financial performance. Moreover, firms with limited financial resources, operating in highly concentrated industries, may struggle to leverage coopetition effectively (Bouncken et al., 2019; Crick, 2019).

Meena et al. (2023) highlight that industry characteristics are critical for new coopetition research. Firm size has been used in prior studies as a control variable, but not as a moderator on firm performance (Meena et al., 2023; Xie et al., 2023). In addition, Bouncken et al. (2015) argue that small firms enter coopetition to overcome financial and innovation constraints, whilst larger firms tend to benefit from coopetition due to their ability to absorb knowledge, resource redundancy, and knowledge management. Ritala & Hurmelinna-Laukkanen (2013) state that competitive intensity is a critical factor

influencing the outcomes of coopetition, where previous studies highlight both the benefits and risks associated with innovation in a coopetitive setting. Vanyushyn et al. (2018) show that firms engaged in international coopetition are more likely to introduce radical innovations where coopetition is most beneficial during the launch of a radical innovation. However, coopetition can also negatively impact an organisation, due to increasing knowledge leakage risks (Vanyushyn et al., 2018).

Xie et al. (2023) in their meta-analysis examined industry type and found that industry context positively and negatively moderates the relationship. Moreover, Dorn et al. (2016) also identified characteristics, like firm size and capabilities, and environmental characteristics, like industry structure and market dynamism, as possible moderating effects. Lastly, Vanyushyn et al. (2018) control for firm size and market competitiveness in their research, yet do not focus on these as moderating variables. All things considered, this shows that there are positive and negative sides of innovation intensity affecting the coopetition-firm performance relationship. Crick (2019) calls for further investigation of the moderating factors of the competitive business environment and organisational resources and capabilities. The lack of empirical evidence on these firm-specific and industry characteristics in shaping the coopetition-firm performance relationship, indicates a gap in understanding their impact.

Research objective and research question

To bridge this gap, empirical research is required to examine these moderating effects. The objective of this study is to examine whether the four specific factors – firm size, financial constraints, innovation intensity, and market concentration – moderate the impact of coopetition on firm performance, as prior research indicates these firm-specific and industry-level factors may influence the effectiveness of coopetition strategies, yet also remain empirically underexplored (Bouncken et al., 2015; Crick, 2019; Meena et al., 2023). Wang & Chen (2022) present that the effectiveness of coopetition strategies, in driving innovation, depends on pressures that come from outside of the firm, like competitive intensity, but also on internal capabilities, especially the ability to acquire, absorb, and use complementary resources. Getting access to a competitor's resources is critical for firms that use coopetition strategies to achieve innovation (Wang & Chen, 2022).

Prior studies often treat these firm-specific and industry-specific moderators as control variables that create empirically untested expectations and findings. However, this study posits that these factors are, possibly, key in shaping a firm's ability to absorb, leverage, or sustain coopetitive strategies. Studying and testing these moderators will clarify, confirm, or deny the theoretical expectations and findings that come from prior studies. In doing so, it contributes to defining the boundary conditions of coopetition success, making coopetition an even more viable strategic option. These insights lead to the following research question: *To what extent do the firm-specific factors of firm size, financial constraints, and innovation intensity; and the industry factor of market concentration, moderate the effect of coopetition on firm performance?* Without the insights on these moderator effects, firms could

overestimate benefits and expose themselves to strategic and financial vulnerabilities because of the general belief that coopetition has a positive influence on firm performance (Crick & Crick, 2021).

Contributions

This study contributes to the coopetition literature by addressing the observed inconsistency in its effect on firm performance. Specifically, it researches how firm-specific and industry-level factors moderate the coopetition-firm performance relationship. By empirically testing the roles of firm size, financial constraints, innovation intensity, and market concentration, the study identifies boundary conditions under which coopetition is better or worse for a firm's performance, addressing an important gap in the literature (Crick, 2019; Meena et al., 2023). In doing so, it also responds to calls in the literature for greater clarity and empirical research on the contextual factors that influence coopetition outcomes (Bouncken et al., 2015; Meena et al., 2023; Xie et al., 2021). The study of Modi and Cantor (2020) offers one of the few empirical insights into the role of financial constraints, showing that financial slack negatively moderates the relationship between a coopetitor's and focal firms' environmental performance. While their focus was on environmental outcomes, this study extends their findings by examining whether financial constraints also moderate the coopetition-firm performance relationship. In practice, many firms form coopetitive alliances to improve firm performance, yet not all firms see improved performance (Crick & Crick, 2021). Lastly, from a theoretical point of view, this study contributes to the RBV by examining how internal resources, like financial constraints and innovation intensity, together with external conditions in market concentration, shape the value of coopetition. Practically, the study provides decision-makers and managers with possible boundary conditions of coopetition to determine whether coopetition is a viable strategy under their specific characteristics.

2. Theoretical framework

Background information and key concepts

Firm performance is the dependent variable in this study; it refers to a firm's ability to achieve financial and non-financial success through strategic actions. Prior studies measured firm performance using financial indicators such as Return on Assets (ROA), Return on Equity (ROE), revenue growth (Runge et al., 2021), and innovation-based indicators such as patent development and R&D efficiency (Xie et al., 2023). With diverse ways of looking at firm performance, this study is focused on financial performance. This refers to the level of financial success that firms have secured within their markets, which can be determined from indicators described earlier (Morgan et al., 2009).

Coopetition, the independent variable in this study, is defined as "a strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value." (Bouncken et al., 2015, p. 591). Coopetition reflects the simultaneous pursuit of cooperation and competition between firms. Closely related is the

concept of coopetition strategy "seeking coopetitive partners with the intent of enhancing performance by: 1) simultaneously increasing private benefits and common benefits; 2) committing resources; 3) establishing appropriate governance structures; 4) intended and emerging actions involving joint or coordinated action with competitors; and 5) instituting mechanism for managing the contradictory logics of cooperation and competition." (Czakon et al., 2020, p. 2).

Coopetition on firm performance

Existing literature indicates that coopetition positively influences firm performance, especially looking at mechanisms like cost reductions, knowledge-sharing, and innovation capabilities (Ritala, 2022). Firms in coopetitive alliances have higher productivity, R&D efficiency, and improved market positioning compared to non-coopetitive firms (Meena et al., 2023). Prior research shows that resource-constrained firms may struggle to extract value, whereas larger, financially stable firms leverage coopetition more effective (Bouncken et al., 2015). Additionally, firms with greater dynamic capabilities are better able to engage in coopetition strategies successfully (Dawood, 2023). Firms with higher innovation intensity can derive greater benefits from coopetition-based knowledge sharing and joint R&D efforts, as these enhance their absorptive capacity (Wang & Chen, 2022). Xie et al. (2023) confirm that coopetition is significantly related to the financial, market, and innovation performance of a firm, which in turn, lead to cost reductions, accelerated innovation, and expanded market access.

However, coopetition does not universally enhance firm performance; its effectiveness varies across firms, which all depend on their own firm-specific characteristics, different industry structures, and strategic intent (Dawood, 2023). Firm size reflects the scale of internal resource availability. Typically, smaller firms face greater resource constraints, making coopetition a crucial mechanism for accessing complementary capabilities (Crick, 2019; Dorn et al., 2016; Yang & Zhang, 2021). Bouncken et al. (2015) indicate that small firms engage in coopetition to overcome resource limitations, leveraging these partnerships to access financial and technological assets that they otherwise could not get access to. In contrast, large firms that possess strong R&D capabilities extract greater value from coopetition due to superior absorptive capacity and stronger intellectual property protection (Wang & Chen, 2022). Crick (2019) further emphasises the importance of organisational resources and capabilities differentiating in small and large firms. Smaller firms lack sufficient resources to engage effectively in coopetition, limiting their potential performance gains (Crick, 2019). In contrast, larger firms are more likely to gain benefits from coopetition strategies and combine acquired value with their existing capabilities and resources, enabling them to develop superior products and sustain competitive advantages (Crick, 2019). These insights underscore the role of firm size and need to be studied empirically to be justified.

Furthermore, Crick (2019) states that the competitiveness of the business environment is another important moderator "If markets are competitive, there is a reasonable chance that there will be a high-level of distrust between such companies." where market competitiveness would negatively

affect firm performance (Crick, 2019, p 523) and "However, an alternative viewpoint to the above-described research proposition, is that as industry rivalry becomes fiercer, a greater number of rivals could mean that management teams have more opportunities to engage in coopetition." (Crick, 2019, p. 523) which implies that a competitive environment could positively affect firm performance. Again, while not empirically tested, firms in highly competitive industries, may be more reluctant to share knowledge and resources due to fears of opportunism. In contrast, in less competitive contexts, firms are more inclined to engage in coopetition, suggesting that the market environment and its competitiveness influences coopetition and its outcomes. Firms in highly competitive environments are better able to leverage coopetition for knowledge exchange due to their ability to absorb knowledge (Ritala & Hurmelinna-Laukkanen, 2013).

In summary, coopetition has a positive influence on firm performance (Bouncken et al., 2015; Crick & Crick 2021), but Yang et al. (2021) suggest that simply engaging in more coopetition does not necessarily improve firm performance. "Park et al. (2014) and Wu (2014) argues that coopetition has an inverted-U relationship with innovation, as beyond a certain point, the coopetitive tensions become too high, limiting knowledge sharing and hampering innovative outcomes." (Vanyushyn et al., 2018, p. 538). This challenges the assumption that more coopetition leads to greater firm performance. The study of Yang et al. (2021) proposes that industry factors influence performance outcomes, yet competitive dynamics like market concentration remain underexplored. Similarly, Xie et al. (2023) emphasise substantial variation across industries. Interestingly, they found that coopetition had a greater impact on firm performance in low-tech industries than in high-tech industries. They also note that "the effects in both high-tech and low-tech subgroups also appear to be heterogeneous, indicating that other moderators may exist." (Xie et al., 2023, p. 11).

Theoretical lens

The Resource-Based View (RBV) provides the central theoretical lens for understanding why firms engage in coopetition strategies and how this could influence firm performance (Bouncken et al., 2015). RBV holds that sustained competitive advantages stems from internal resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). It has become a dominant framework in coopetition-based literature, as coopetition enables firms to augment their resource base by accessing complementary knowledge, technology, and financial assets (Bouncken et al., 2015; Klimas et al., 2024; Meena et al., 2023). However, RBV also highlights that the effectiveness of such strategies depends on firm-specific characteristics, such as size, financial resources, and innovation capabilities (Barney, 1991). Firms with limited internal resources would rely on coopetition to overcome resource and financial deficits, while resource-rich firms may be better positioned to absorb new external knowledge (Ferreira et al., 2020; Yang & Zhang, 2021). With this, Xie et al. (2023), emphasise that performance outcomes of coopetition depend on both a firm's internal resources and external contextual conditions, reinforcing the relevance of RBV as a theoretical lens.

Several alternative theories have been used to study coopetition and offer valuable perspectives. However, these theories tend to focus specifically on external mechanisms or boundary conditions, while several firm-specific and industry-specific factors may moderate the coopetition-firm performance relationship. To give some examples, Game theory conceptualizes coopetition as a positive-sum strategy but tends to oversimplify relational risks (Klimas et al., 2024; Okura, 2007). Network theory highlights the role of inter-organisational structures but lacks firm-level specificity. Institutional theory emphasises external pressure shaping coopetition (Xu et al., 2023), while dynamic capabilities theory focuses on a firm's adaptability to change (Guo et al., 2023). Although informative, these perspectives often overlook internal firm-specific characteristics central to this study. RBV, in contrast, directly links resource endowments to performance outcomes, making it the primary theoretical lens for this study.

Research gap

Despite extensive research on coopetition, there remains limited empirical understanding of how firm-specific and industry-specific factors influence the coopetition-firm performance relationship. Prior studies highlight the potential benefits and risks of coopetition, but the mechanisms that determine why and when coopetition succeeds or fails remains unclear. With that, prior research highlights the innovation benefits of coopetition, only few explore how a firm's innovation intensity might influence the firm's ability to benefit from coopetitive partnerships. Firms with high innovation intensity are believed to be better able to absorb and apply externally sourced knowledge, which in turn makes them more likely to realise performance gains from engaging in coopetitive strategies (Wang & Chen, 2022). Yet, empirical research on this as a direct moderating effect remains scarce.

Financial constraints is another moderator expected to shape coopetition outcomes. Whilst it is believed that firms with limited financial resources may face greater challenges in leveraging coopetition effectively (Crick, 2019; Bouncken et al., 2019). However, Modi and Cantor (2020) challenge the assumption that financially constrained firms do not benefit from coopetition by showing the opposite in their research findings, that financially constrained firms can also gain from engaging in coopetitive strategies, highlighting the need for further research.

With Crick (2019) mentioning that larger firms benefit more from coopetition than smaller firms, there is also no definitive outcome of the effect of the competitive environment on the coopetition-firm performance relationship. Although firm size is frequently included as a control variable in studying the coopetition-firm performance relationship, it is rarely tested as direct effect, despite theoretical arguments that firm size does influence absorptive capacity and therefore helps to manage coopetitive risks (Crick, 2019; Wang & Chen, 2022).

Industry-level factors also play an important contextual role, yet structural factors remain empirically untested. Xie et al. (2023) show that firms in high-tech industries benefit more from coopetition than firms in low-tech industries, suggesting that industry context influences the effectiveness of coopetition. However, their meta-analysis does not examine market concentration.

Crick (2019) in his literature review introduces the idea that "if markets are competitive, there is a reasonable chance that there will be a high-level of distrust between such companies." (p. 523), which implies that high concentration may hinder trust and reduce coopetition effectiveness. Contradictory, Crick (2019) acknowledges another possibility: "as industry rivals become fierce, a great number of rivals could mean that management teams have more opportunities to engage in coopetition." (p.523). With this, he calls for empirical research to test these statements. Later, Crick et al. (2024) extended this line of inquiry by empirically testing competitive intensity. They found that "competitive intensity and technological turbulence positively and significantly moderated the link between coopetition strategies and company performance." (Crick et al., 2024, p.67), which contradicted their initial expectations and hypothesis that "Competitive intensity negatively moderates the relationship between coopetition strategies and company performance." (Crick et al., 2024, p.62). Important to mention is that their operationalisation of competitive intensity was built upon a perceptual survey data send out to managers of different firms, which captured managerial impressions of market rivalry rather than looking at structural indicators like market share. This justifies the gap, although perceptual competition has been tested, market concentration based on an objective and structural measure, has not been empirically tested.

This study examines whether the coopetition-firm performance relationship is moderated by firm size, financial constraints, innovation intensity, and market concentration. Studying and testing these factors empirically will give a more comprehensive understanding of the boundary conditions of coopetition, thereby addressing the mentioned gaps in the literature.

Hypotheses

Previous research suggests that coopetition has a positive influence on firm performance. Like the literature review of Meena et al. (2023) states that managers can utilise coopetition strategies to enhance customer value and leverage this for an increase in firm performance. Furthermore, Yang et al. (2021, p.314) empirically stated that "Overall, coopetition has a significant positive effect on firm performance." Firms engaging in coopetitive strategies augment their resources by gaining access to complementary knowledge, innovative technologies, and financial assets (Bouncken et al., 2015; Meena et al., 2023). Moreover, coopetition enables faster development of innovations by combining internal and external knowledge (Wang & Chen, 2022). Furthermore, coopetition allows firms to share costs and possibly reduce financial risks (Yang & Zhang, 2021). This study proceeds on the assumption that coopetition generally has a positive influence on performance, although it will not focus on directly re-testing this. However, researchers also emphasise the need to examine moderating factors that have a, possible, impact on the coopetition-firm performance relationship (Crick, 2019; Dorn et al., 2016; Meena et al., 2023). Firm size, financial constraints, innovation intensity, and market concentration are four firm- and industry-specific factors that determine the extent to which firms benefit from coopetition (the conceptual model is to be found in figure 1).

Firm size refers to the total resources and capabilities a firm possesses, which is often measured by the total assets of the firm, or the number of employees like in the work of Crick (2019). From a Resource-Based View perspective, larger firms typically have broader resource endowments, that include financial, technological, and managerial assets. These enhance their absorptive capacity to integrate new externally gained knowledge (Barney, 1991; Bouncken et al., 2015). These larger firms, in general, have more established knowledge management and resource redundancy. This knowledge allows them to recombine internal and external resources more effectively, which in turn can generate performance benefits (Vanyushyn et al., 2018; Ferreira et al., 2020). Moreover, larger firms are better able to manage opportunistic behaviour and knowledge leakage due to their bargaining power, intellectual property protection, and already established governance systems (Teece, 2007; Gnyawaly & Park, 2011). In contrast, smaller firms may lack absorptive capacity and protective mechanisms to fully benefit from coopetition. Their limited resources and liability of newness make them more dependent on relational partners, which increases their exposure to opportunistic behaviour (Bouncken et al., 2015; Wang & Chen 2022). Given these factors, the following hypothesis is created:

H1: The positive coopetition-firm performance relationship is stronger for larger firms than for smaller firms.

Financial constraints, defined as limitations in a firm's ability to fund investment due to internal cash flow shortages and restricted access to external capital (Hadlock & Pierce, 2010). Financially constrained firms often lack internal resources to engage in innovation or strategic investments, which in turn may motivates them to seek these resources externally, to overcome deficiencies (Bagherzadeh et al., 2021; Bouncken et al., 2015). They face significant resource deficits that may prevent them from pursuing innovation, harming firm performance (Bouncken et al., 2015). Under these conditions, coopetition can serve as an attractive strategy, as it enables financially constrained firms to get access to these resources and sharing investment risks with their competitors (Bagherzadeh et al., 2021). From a Resource-Based View perspective, coopetition allows financially constrained firms to access, external, complementary resources and thereby possibly enhancing their performance (Meena et al., 2023; Bagherzadeh et al., 2021). Empirical research, in very specific context, shows that financially constrained firms can benefit from coopetition. Bagherzadeh et al. (2021) find that small, financially constrained firms are more likely to benefit from coopetition, under the circumstances when there are resource similarities that facilitate the integration of external knowledge. Similarly, Modi and Cantor (2020) show that financially constrained firms may outperform their partners in certain performance domains, like the environmental outcomes.

However, despite these potential benefits, financially constrained firms could still be at a disadvantage compared to firms that are not financially constrained. This is in line with the view of this study because, with coopetition, firms require not only access to external resources but are also required to possess sufficient internal capacity to absorb, integrate, and recombine those external resources

(Ferreira et al., 2020). Financially unconstrained firms possess more financial flexibility, allowing them to invest in complementary capabilities and implement governance mechanisms to monitor partners and manage relational risks like opportunism (Bouncken et al., 2015; Meena et al., 2023). In contrast, firms that are financially constrained, often lack resources necessary to fully benefit from coopetition and to protect themselves from opportunistic behaviour and power asymmetries (Bouncken et al., 2015; Dorn et al., 2016). To conclude, financially constrained firms may engage in coopetitive strategies and see benefits in certain contexts. However, unconstrained firms are better equipped to fully exploit coopetition because they can invest more in absorptive capacity (Ferreira et al., 2020) and they can also protect themselves better against opportunism (Bouncken et al., 2015; Dorn et al., 2016). Therefore, coopetition will yield a worse performance for financially constrained firms.

H2: The positive coopetition-firm performance relationship is stronger for financially unconstrained than financially constrained firms.

Innovation intensity is defined as the proportion of a firm's resources dedicated to R&D activities and technological advancements (Wang & Chen, 2022). From a RBV perspective, firms with a strong absorptive capacity are better able to recombine internal and external resources. Prior research confirm coopetition has a positive effect on innovation (Wang & Chen, 2022) but the moderating effect of innovation intensity of a firm on the coopetition-firm performance relationship needs empirical testing. In joint research and development projects, firms with stronger absorptive capacity benefit more than their partners due to integrating external resources into their internal resources more efficiently (Meena et al., 2023). Empirically, Estrada et al. (2016), as cited in Wang & Chen (2022), demonstrate that coopetition facilitates joint R&D efforts and product development. These collaborations give highly innovative firms the opportunity to accelerate innovation output by combining internal R&D expertise with external knowledge, strengthening their competitive position (Bouncken et al., 2015; Meena et al., 2023). Furthermore, firms with higher innovation intensity, in general, are better able to govern relationships. They allocate significant resources to R&D, which fosters stronger absorptive capacity. This enhanced absorptive capacity not only enables firms to integrate external knowledge more effectively but also equips these firms with capabilities to protect proprietary knowledge and mitigate risks of opportunism (Bouncken et al., 2015; Meena et al., 2023). Conversely, firms with lower innovation intensity may not possess absorptive capacities, making it more difficult for them to integrate external knowledge (Wang et al., 2021). Therefore, firms with higher innovation intensity are expected to be better able to extract value from coopetition, both by leveraging and absorbing external knowledge more effectively due to created experience and by being able to protect proprietary knowledge assets.

H3: The positive coopetition-firm performance relationship is stronger for firms with high innovation intensity than for firms with low innovation intensity.

Market concentration refers to the degree to which an industry is dominated by a small number of firms. From a RBV perspective, power asymmetries in highly concentrated markets create unequal bargaining positions between partners (Barney, 1991), possibly affecting the outcomes of coopetition. In such contexts dominant firms often control access to complementary resources and could capture a disproportionate share of jointly created value by exposing the weaker partners to opportunistic behaviour (Bouncken et al., 2015; Meena et al., 2023). Crick (2019) presents two conceptual perspectives on the role of market conditions in coopetition. On the one hand, a greater number of rivals may offer more opportunities for collaboration, "*as industry rivals become fierce, a great number of rivals could mean that management teams have more opportunities to engage in coopetition"* (p.523). On the other hand, markets with intense rivalry may generate distrust between firms, as "i*f markets are competitive, there is a reasonable chance that there will be a high-level of distrust between such companies*" (Crick, 2019, p 523). Similarly, Xie et al. (2023) emphasise the importance of industry characteristics influencing coopetition outcomes and note significant heterogeneity in performance across different industries, suggesting that high competitiveness creates potential tension and the risk of losing resources.

Empirical evidence from Peng and Lu (2022), in the airline industry, show that in highly concentrated industries, dominant firms leverage home-ground advantages to solidify their positions. These dominant firms may still engage in coopetition, but they increase partner dependency, resulting that weaker firms may experience limited bargaining power and restricted access to complementary resources (Peng & Lu, 2022). Gnyawaly and Park (2011) and Ritala (2012) similarly highlight that concentrated markets increase relational risks due to opportunism and resource misappropriation. While these perspectives acknowledge that both concentrated and fragmented markets offer challenges, most studies view that high market concentration creates relational risks, possible reducing coopetition benefits (Bouncken et al., 2015; Crick, 2019; Meena et al., 2023). That is why this study follows the argument that firms operating in highly concentrated markets benefit less from coopetition due to increased power asymmetries, possible opportunistic behaviour, and relational dependency.

H4: The positive coopetition-firm performance relationship is stronger for firms in less concentrated markets than for firms in highly concentrated markets.

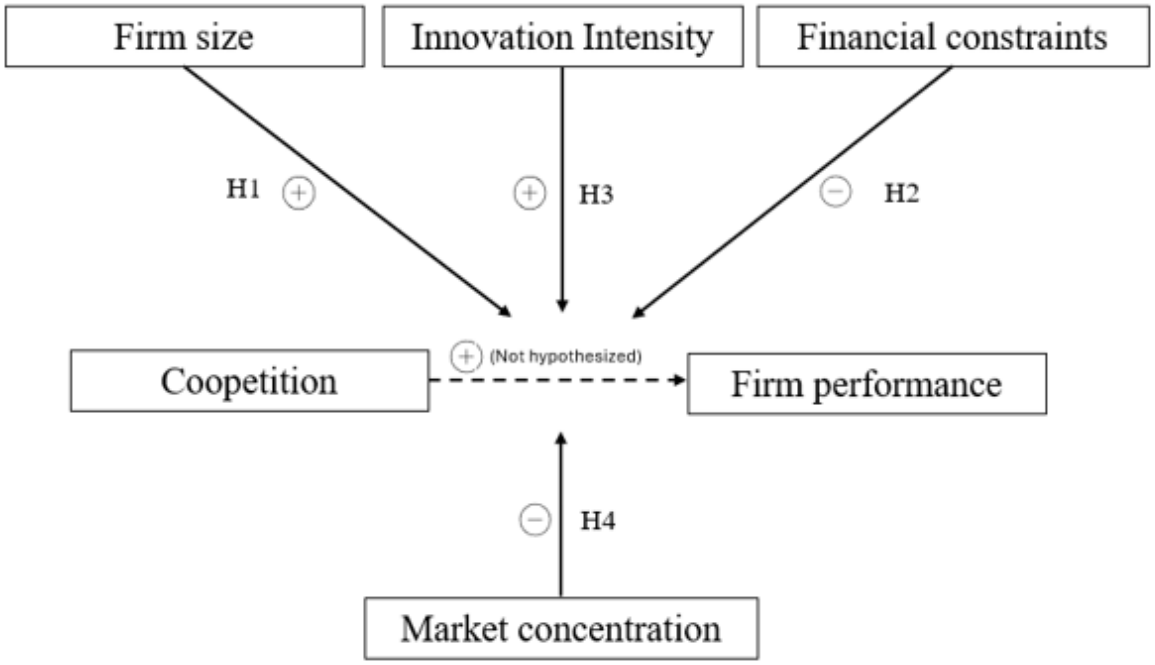

Figure 1, Conceptual Framework. **Note**. Solid arrows represent hypothesized relationships tested in the study (H1-H4). The dashed arrow indicates an assumed direct positive effect of coopetition on firm performance, which underlies the theoretical rational for the moderation hypotheses but was not formally hypothesized.

3. Methodology

Research setting

This study empirically studies how firm size, financial constraints, innovation intensity, and market concentration may moderate the coopetition-firm performance relationship. Coopetition is proxied by joint ventures and minority stake joint ventures between firms operating within the same industry, in line with the approach used by Runge et al. (2021). The broader sample includes all firms that engaged in a joint venture between 2005 and 2024. This broad window ensures sufficient data coverage for all variables, with joint venture activity observed between 2010 and 2021. However, the empirical analysis focuses on the period 2010 and 2016, which includes firms that engaged in coopetition. Firms that only entered joint ventures during 2017 and 2021 were used to construct the control group of non-coopetitive firms, thereby ensuring sufficient variation in the independent variable. To prevent contamination of the control group, 69 firms that engaged in a joint venture in 2017 are also excluded from the control group. To isolate treatment effects, the empirical design accounts for temporal separation and limits the analysis to initial coopetition events. This design avoids the risk that repeated coopetitive engagements would distort the performance effect attributable to a firm's initial coopetition event.

Data collection and sources

Publicly listed joint ventures between firms operating within the same 4-digit SIC code were selected as the proxy for coopetition because they represent formal, strategic collaborations involving resource

sharing and mutual commitment between competitors. This operationalisation is consistent with the approach used by Runge et al. (2021), allowing for comparability in measuring coopetitive dynamics. Data on joint ventures and minority stake joint ventures were extracted from Orbis M&A. The initial extraction included all deals labelled as completed or announced joint ventures and minority stake joint ventures between January 1, 2005, and January 1, 2024, yielding 129,118 deals. Removing deals without an ISIN reduced the sample by 23,438, resulting in 105,680 observations. To identify coopetitive arrangements, only deals in which the acquiring and target firms shared the same four-digit Standard Industrial Classification (SIC) codes were retained, eliminating 93,788 observations and resulting in 12,892 coopetition cases. Deals lacking a completion date were dropped, leaving 8,453 firms. Duplicate ISIN-year combinations and observations without valid ISINs were also removed, reducing the sample to 6,258 unique firm-year observations.

Subsequently, the extracted data from Orbis M&A were merged with LSEG firm-level data. A total of 1,436 observations were excluded due to unavailable ISIN-year combinations, resulting in 4,822 firm-year observations. Additional exclusion of firms lacking SIC codes yielded a final dataset of 3,105 deals between 2005 and 2024. For analytical purposes, the sample was split into two time periods, 2010-2016 and 2017-2021 to create variation in the independent variable. The empirical analysis now included both coopetitive and non-coopetitive firms, with the 2010-2016 period representing the treatment group of firms that engaged in coopetition. The 2017-2021 period served as the basis for the control group consisting of firms that had not yet engaged in any joint venture during the treatment window of 2010-2016. Lastly, only the first joint venture per firm in the period of 2010-2016 was retained. A total of 51 firms engaged in two or more joint ventures during the observed period, resulting in 69 coopetition observations being deleted. This resulted in a cross-sectional dataset of 826 unique firm-joint venture observations, comprising 404 coopetitive firms and 422 non-coopetitive firms.

Independent variable

Coopetition was measured through the occurrence of joint ventures and minority stake joint ventures between firms operating in the same industry, following the approach of Runge et al. (2021) and Peng & Lu (2022). In this study, joint ventures were identified using the Orbis M&A database, focusing on deals categorised as joint ventures and minority stakes, matching them based on four-digit SIC codes to ensure that partnering firms are in the same industry.

Dependent variable

Firm performance, the dependent variable in this study, was measured based on financial performance one year after a joint venture took place. Financial performance was measured using return on assets (ROA), calculated as net income divided by total assets, following prior studies (Xie et al., 2023; Runge et al., 2021). This measures the firm's profitability and efficiency that allow comparison between firms

and industries and is defined as *"the level of financial success that organizations have secured within their markets"* (Xie et al., 2023, p3).

Moderators

Firm size was measured based on the number of employees a firm has and is operationalized as a dichotomous variable where the distinction was between a 'small' and 'large' firm, using the conditions of the boundaries opted by the European Commission (2003). SMEs, in this study referred to as the small firms, have 250 or fewer employees, where large firms have over 250 employees. *Financial constraints* were measured by a debt-to-asset ratio; this is a standard indicator of financial leverage that measures the firm's reliance on debt financing (Kaplan & Zingales, 1997; Whited & Wu, 2006). *Innovation intensity* was operationalized as R&D spending as a percentage of total sales, this is a ratio of R&D expenditures divided by sales; this ratio captures the proportion of the firm's resources invested in innovation activities (Wang & Chen, 2022). Lastly, *market concentration* was measured using the Herfindahl-Hirschman Index (HHI) following the study of (Peng & Lu, 2022). This index measures the industry concentration by summing up the squared market shares of all firms within a specific industry, determined by industry codes. The HHI ranges from 0, which represents very high competition, to 10,000, which represents a theoretical monopoly where a single firm holds the entire market share.

Controls

To strengthen the validity of the analysis and to be able to account for alternative explanations of firm performance, control variables were included in the analysis. These variables were included based on prior literature studies that also measured the effect of coopetition on firm performance (Runge et al., 2021). *Firm age,* measured in years since the founding, was included as a control variable because older firms may perform differently due to accumulated experience or organisational inertia (Wang & Chen, 2022; Runge et al., 2021). Another important control variable is *Prior-year Firm Performance*, which makes it possible to account for pre-existing differences between firms when examining the effects of coopetition on firm performance. This was operationalized as the return on assets (ROA) in the year preceding a coopetitive joint venture, following Runge et al. (2021). *Joint Venture Experience* captured the number of joint ventures formed by a firm in the five years preceding the coopetitive joint venture (Runge et al., 2021). Lastly, *Industry* was controlled for by aggregating the 4-digit SIC codes, originally used for the Coopetition variable, into a 2-digit SIC code; then aggregating them into 11 industry sectors following the criteria of the US Department of Labor (2025). This approach aligns with Hair et al. (2018), who recommend aggregating categorical controls to ensure sufficient group sizes. Given the large number of unique SIC codes in the dataset, using each as a separate dummy would consume excessive degrees of freedom and introduce redundancy or overfitting. Aggregating to the industry level addresses structural heterogeneity while avoiding multicollinearity and inflated standard errors due to sparse subgroup sizes. A similar argument can be made for the control variable *Country*. The dataset

included many different countries; creating separate dummies for each country would reduce statistical power and consume many degrees of freedom. To address this problem, countries were grouped into macro-regions that are based on the World Bank's regions to control for institutional, cultural, but also economic differences.

These control variables were added in the regression models to account for additional factors, possibly, affecting the outcome of the dependent variable, but they are not the focus of this study. Including these variables increases internal validity and strengthens the interpretation of the other causal relationships (Hair et al., 2018). The operationalisation of all variables is summarised in the appendix.

Analytical Approach

To examine the hypothesised moderating effects on the coopetition-firm performance relationship, a hierarchical multiple regression was conducted using cross-sectional firm-level data. Variables were entered in SPSS in sequential models to isolate the contribution of each construct. Model 1 included all control variables, Model 2 added the independent variable coopetition, to test its direct effect on firm performance. Model 3 introduced firm size, financial constraints, innovation intensity, and market concentration individually in separate models to assess its direct effect on firm performance. Model 4 added the interaction term between coopetition and each individual moderator, with interaction terms again introduced separately, enabling the test of moderation effects and hypotheses.

After assessing these models separately, model 5 was specified as a fully saturated direct-effects model including all control variables, the independent variable, and all four moderators simultaneously. Model 6 extended this specification by adding all four interaction terms from the hypotheses to the full set of controls, the independent variable, and the moderators, thereby testing H1-H4 within a single, fully saturated model. According to Hair et al. (2018), such models allow for assessing the unique and combined contributions of predictors while controlling for multicollinearity and interaction effects. Importantly, the fully saturated model tests whether the effects observed in earlier models persist in a more comprehensive specification, thereby strengthening causal interpretation. The exact equations of each model used in SPSS are provided in Appendix A. This setup is in line with previous empirical studies like Wang and Chen (2022), who used multiple linear regression, Runge et al. (2021) who used fixed-effects regressions with moderators and controlling for alliance experience and prior performance. Furthermore, it aligns with the methodological guidance of Hair et al. (2018) for testing moderation effects in regression models.

Statistical significance is assessed using conventional thresholds of $p < 0.05$. To assess multicollinearity, Variance Inflation Factor (VIF) and tolerance values are examined, using the guidelines of Hair et al. (2018), where VIF values should be below 10, and tolerance above 0.10. Variables were mean centred to reduce multicollinearity between main effects and interaction terms in the moderation models. Additionally, transformations, like logarithmic and square root, may be applied if skewness and kurtosis exceed acceptable levels of |2| for skewness and |7| for kurtosis (Bouncken et

al., 2019; Hair et al., 2018). These transformations helped ensure that assumptions of normality, linearity, and homoscedasticity were met. Normality of residuals was assessed using P-P plots and histograms, while scatterplots of standardized residuals were used to verify linearity and homoscedasticity (Hair et al., 2018).

Ethical Considerations

The study will rely on publicly available and secondary data, so ethical concerns in terms of confidentiality were limited. To make sure the research is as transparent as possible, all sources are properly cited, and analyses are performed unbiasedly. Limitations of the research were discussed and are reported at the end of the research in combination with future research recommendations.

In addition, the effort is also made to ensure compliance with the research integrity code of conduct. This organisation describes several principles: honesty, scrupulousness, transparency, independence, and responsibility (Netherlands code of conduct for research integrity, 2018). This study will respect such consideration in the following ways: honest is respected by not making allegations without adequate evidence; scrupulousness is respected by trying to do research worthy of scientific paper; transparency is respected by being clear on what data is used, what allegations are based on what evidence, and by sharing what the results of the research are; independence is respected by keeping from having another agenda next to performing independent research; lastly, responsibility is respected by stating and acknowledging limitations of the research in an unbiased manner.

During the writing process of this thesis, ChatGPT is used purely as a language and writing support tool. The assistance provided was strictly limited to improving clarity, structure, and coherence of the text. Specifically, ChatGPT helped to refine sentence structure and paragraph transitions, enhanced consistency in terminology, and check for grammar mistakes throughout the text. The full prompts are to be found in the appendix L.

4. Results

Descriptive statistics

After the deletion of one influential case, the final dataset consists of a total of 825 unique firm-year observations from the period 2010-2016, with an average Return on Assets (ROA) of 3.52 percent. Among these firms, 403 engaged in coopetition, of which 279 entered minority stake joint ventures, and 124 formed 100 percent joint ventures (Figure 2). The remaining 422 firms did not engage in coopetition and serve as the control group (Figure 3). Within the firm size distribution, the treatment group consists of 58 small firms and 345 large firms. The control group includes 67 small firms and 355 large firms, closely reflecting the overall sample distribution.

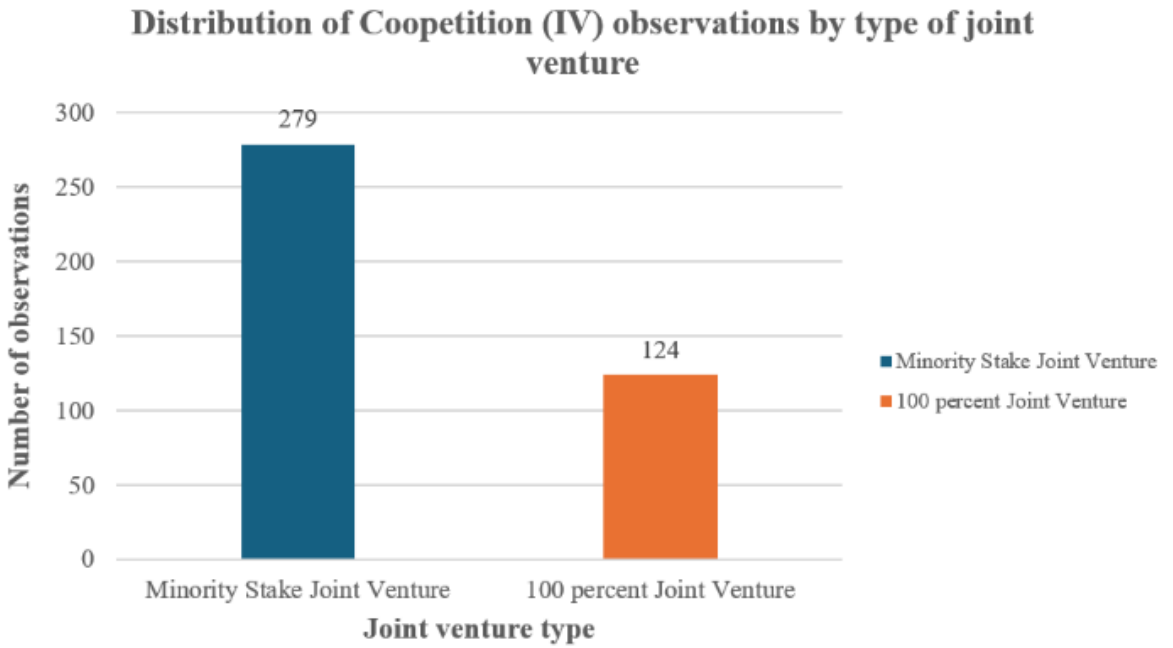

Figure 2, Distribution of joint venture types within the treatment group

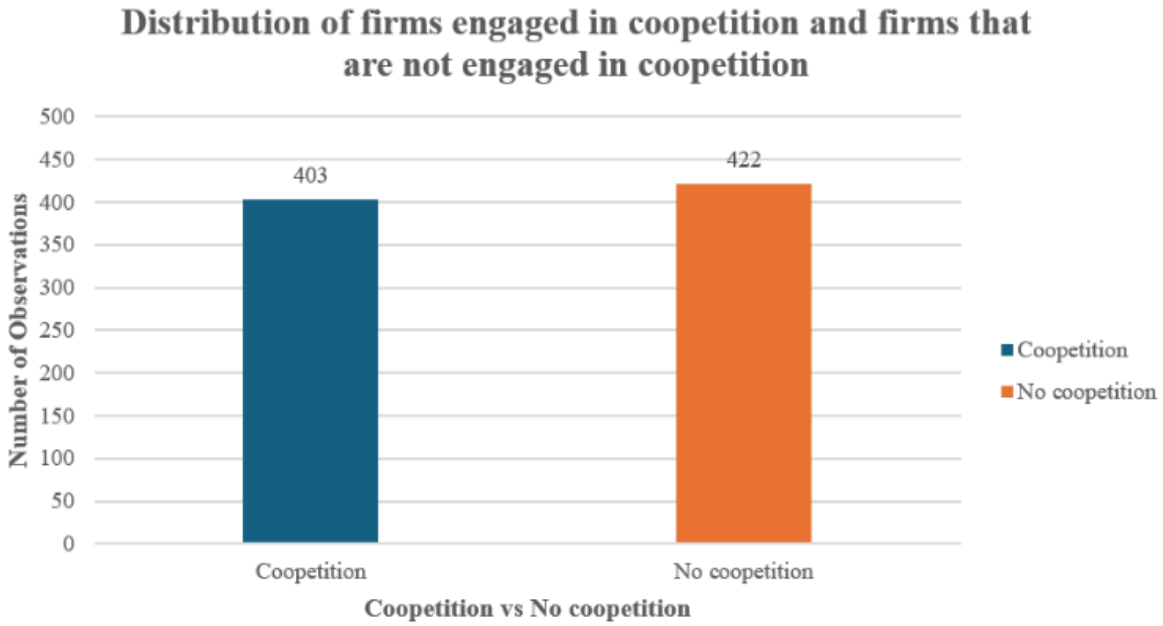

Figure 3, Distribution of firms engaged in coopetition versus non-coopetitive firms

As shown in figure 4, firm age ranges from newly established firms to firms that exist over 165 years, with a mean of the total sample of 31.19 years, where 462 firms are within the range of 0-20 years and only a small number of firms are over 100 years in age. Firm size is skewed toward larger firms, with 700 firms having over 250 employees, whereas only 125 firms are SMEs with 250 or less employees. The control group consists of 67 small firms and 355 large firms, and the coopetition group (treatment group) consists of 58 small firms and 345 large firms (Figure 5).

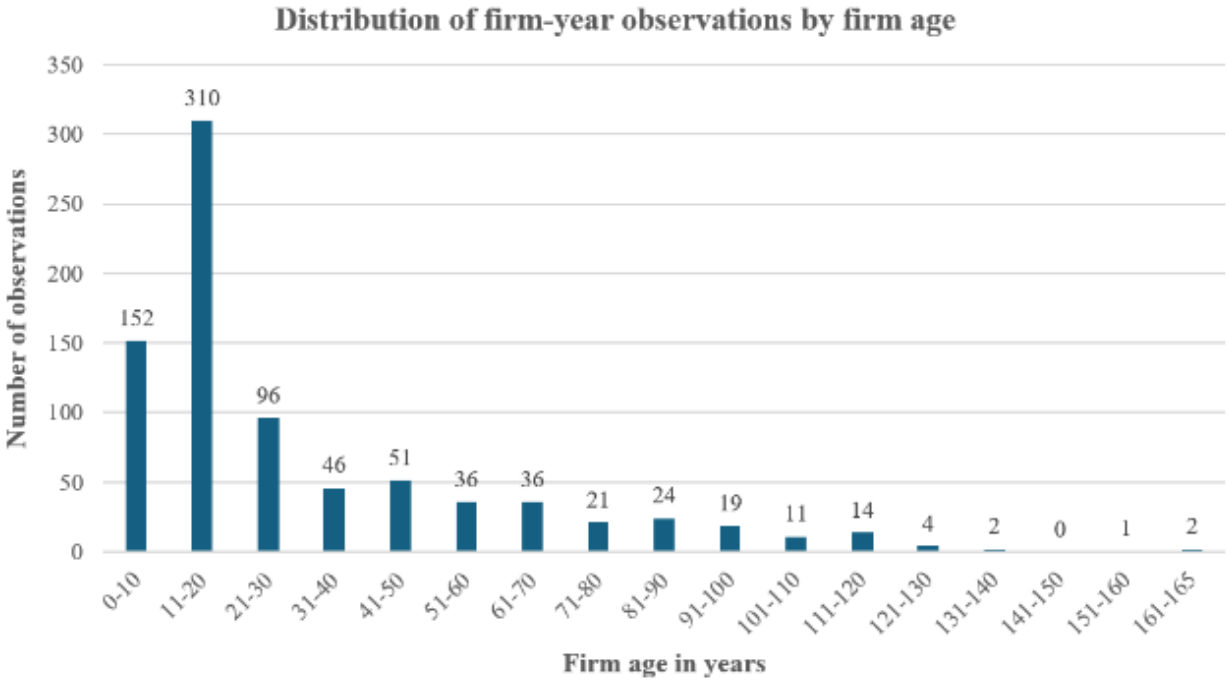

Figure 4, Distribution of firm-year observations by firm age.

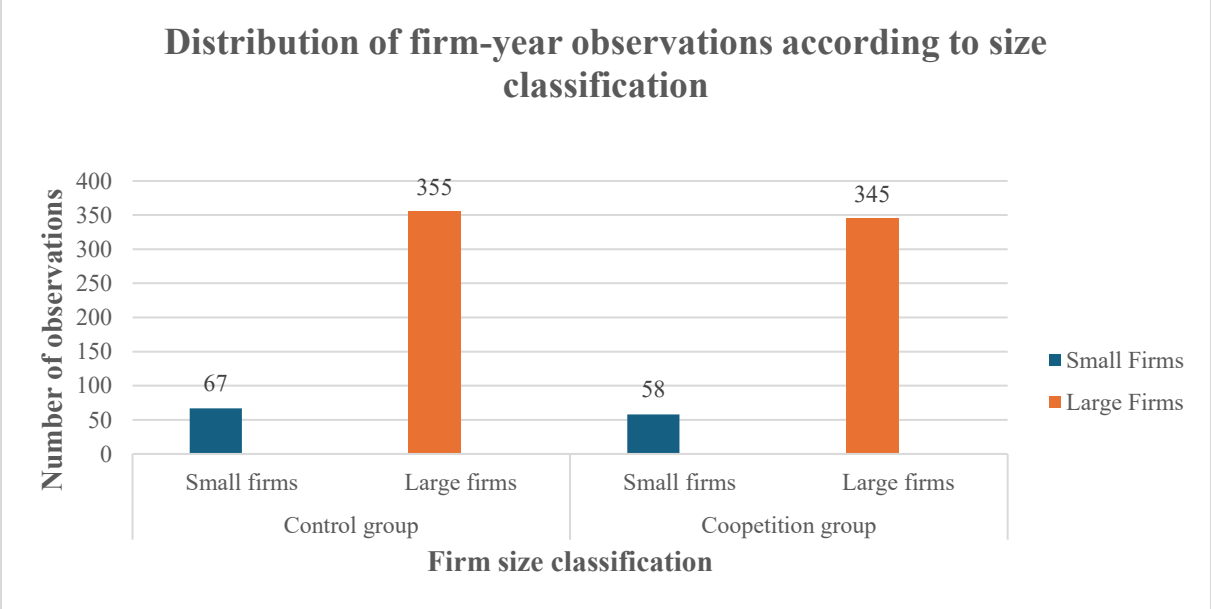

Figure 5, Distribution by Firm Size, small versus large firms

Regionally, most firms are in East Asia and Pacific region (N = 523), which is used as the reference category. Other notable regions include Europe and Central Asia (N = 141) and North America (N = 107). The full regional distribution is to be found in figure 6. Industry distribution is concentrated in Manufacturing (N = 461) which is used as the reference category, followed by Services (N = 217) and Transportation (N = 64). Other industries have fewer than 30 observations, with the full industry distribution to be found in figure 7. Public Administrations and Others are two industries based on SIC code. However, these do not have any observations in the used data set and therefore are left out.

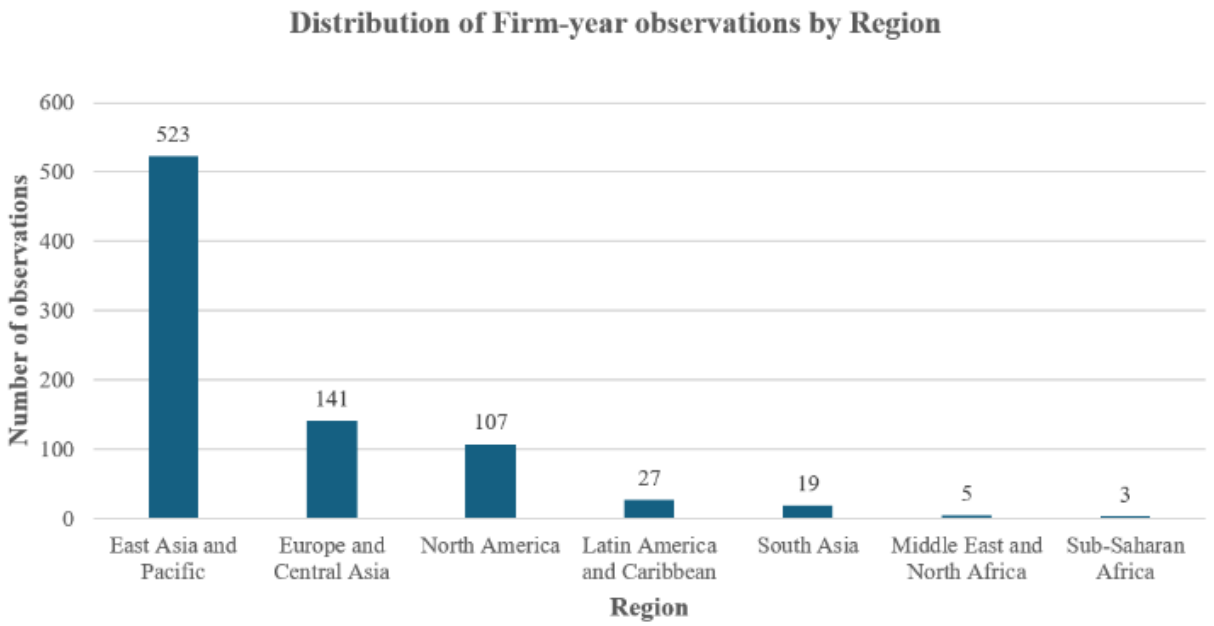

Figure 6, Distribution of firm-year observations per region

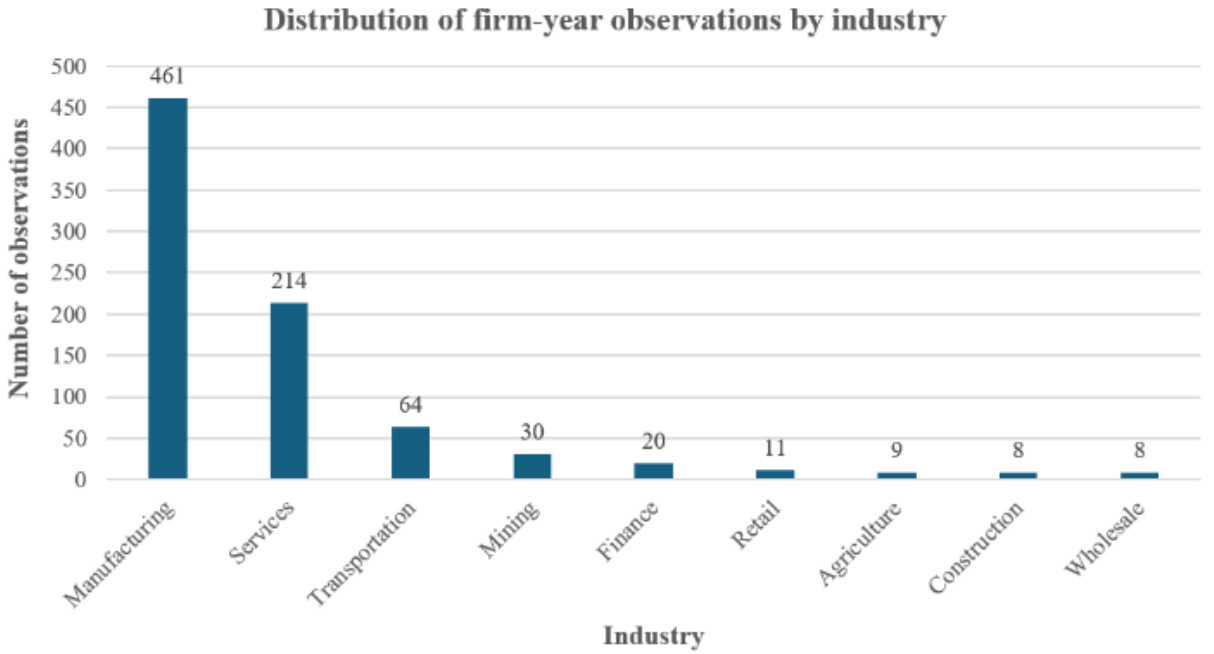

Figure 7, Distribution of firm-year observations by Industry

Notably, this sample does not contain any missing values. Prior to conducting the analysis, missing values occurred in the moderators and dependent variable due to unavailability of data in Orbis M&A and LSEG. A listwise deletion approach was applied to maintain consistency across the whole sample, resulting in a dataset without missing values (Hair et al., 2018). Subsequently, one observation was removed due to exceeding Cook's Distance threshold of 1 and substantially influencing model fit. These steps yielded a consistent and clean final sample of N = 825 observations. All descriptive statistics are to be found in Appendix C.

Univariate analysis

Upon inspecting the univariate distribution of the original variables, the moderating variables *financial constraints* and *innovation intensity* did not meet skewness |2| and kurtosis |7| thresholds. This needed to be addressed to prevent issues regarding normality and homoscedasticity (Hair et al., 2018). These two variables were logarithmically transformed, also by adding a constant of one to take care of values being 0. Before creating interaction terms, the continuous predictors financial constraints, innovation intensity, and market concentration were mean-centred to reduce multicollinearity (Hair et al., 2018). (Hair et al., 2018). For firm size, a dummy was created based on the guidelines by European Commission (2003) on SMEs and large firms.

The dependent variable was checked on influential outliers. To reduce the impact of extreme values, firm performance was winsorised at the 1st and 99th percentile. Furthermore, all variables that exceeded the skewness and kurtosis values were checked for potential influential outliers or non-linear patterns. To assess the presence of influential cases, Cook's Distance was interpreted for all observations. One observation exceeded the threshold of 1, indicating a disproportionately large influence on regression estimates. Following recommendations of Hair et al. (2018), this observation was excluded from the dataset.

Despite winsorisation at the 1st and 99th percentiles to reduce extreme values, Firm Performance remained highly skewed and leptokurtic, indicating a non-normal distribution. Prior-year Firm Performance showed similar patterns with high skewness and kurtosis. However, skewness and kurtosis values do not always signal major issues for the actual regression, especially for samples where $N > 500$ as it functions as an indicator (Hair et al., 2018). Additionally, such deviations are common in financial datasets, where extreme values and skewed distributions are often reflective of real-world conditions. Given the large sample size, these deviations are unlikely to substantially bias the model outcomes.

Hair et al. (2018) stress that multicollinearity is the greater concern. VIF values should be below 10 and tolerance values should be above 0.1. Upon inspection, all variables were within the proposed values; multicollinearity was not a concern, supporting robustness of the analysis despite the exceeding skewness and kurtosis values. Additionally, several dummy variables displayed high skewness and kurtosis due to their binary nature and unbalanced categories. These were not transformed, as such distributions are acceptable in large-sample regression (Hair et al., 2018). Regarding the correlations, Hair et al (2018) state that values above 0.7 are strong and values that exceed 0.9 are not acceptable. Upon inspecting the correlation table, to be found in table 1, no correlations exceeded the threshold of 0.7.

Table 1, Descriptive statistics and Pearson correlation matrix (Two-tailed bivariate test)

		Descriptive Statistics				Correlation matrix								
No.	**Variable**	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9
1	Firm performance	3.505	16.623	-251.920	36.680	—								
2	Coopetition	0.490	0.500	0.000	1.000	-0.058 [0.095]	—							
3	Prior-year Firm Performance	5.033	15.894	-195.730	113.150	0.638 [<.001]	-0.049 [0.160]	—						
4	Joint Venture Experience	0.080	0.377	0.000	5.000	0.010 [0.783]	0.227 [<.001]	-0.001 [0.972]	—					
5	Firm Age	31.190	29.286	0.000	164.000	0.068 [0.050]	0.151 [<.001]	-0.034 [0.325]	0.062 [0.077]	—				
6	Firm Size	0.849	0.359	0.000	1.000	0.315 [<.001]	0.021 [0.553]	0.212 [<.001]	0.031 [0.374]	0.137 [<.001]	—			
7	Financial Constraints (Log, MC)	0.000	1.302	-2.470	4.070	0.050 [0.152]	0.061 [0.079]	-0.066 [0.059]	0.041 [0.235]	0.188 [<.001]	0.166 [<.001]	—		
8	Innovation Intensity (Log, MC)	0.000	1.225	-1.300	6.980	-0.317 [<.001]	0.044 [0.210]	-0.228 [<.001]	-0.054 [0.121]	-0.155 [<.001]	-0.190 [<.001]	-0.314 [<.001]	—	
9	HHI (MC)	0.000	3038.562	-3632.020	6367.980	0.025 [0.469]	-0.027 [0.436]	-0.011 [0.760]	-0.043 [0.221]	0.101 [0.004]	0.006 [0.872]	0.022 [0.533]	-0.099 [0.004]	—
	N	825	825	825	825	825	825	825	825	825	825	825	825	825

Note: "Log" = Logarithmic transformed, "MC" = Mean centred. Pearson correlations are reported. Industry dummies Agriculture, Mining, Construction, Transportation, Wholesale, Retail, Finance, and Services and Region dummies, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa are included in the regression models but omitted from this table for parsimony.

Assumption testing

Before conducting the multiple linear regression, key assumptions were tested (Hair et al., 2018). The residuals' normality, independence (Durbin-Watson statistics), linearity, homoscedasticity, and multicollinearity were all assessed and found to be within thresholds. Minor deviations, slight non-linearity in innovation intensity, and slight heteroscedasticity, were addressed through variable transformation, robust standard errors, and winsorisation of the dependent variables. Visualizations and detailed statistics supporting these checks are provided in Appendices E-H.

Hypotheses test results

To examine whether firm size, financial constraints, innovation intensity, and market concentration moderate the coopetition-firm performance relationship, a hierarchical linear regression analysis was conducted (table 2). The dependent variable is firm performance, measured as Return on Assets (ROA) one year after a joint venture.

Model 1 included the control variables firm age, prior-year firm performance, joint venture experience, and a series of industry and regional dummies and explained about 42.8 percent of the variance in performance adjusted-R^2 = 0.428. Prior-year firm performance (β = 0.642, $p < .001$) and firm age (β = 0.065, p = 0.021) were both significant and positively associated with financial performance one year after a joint venture. Joint venture experience was not significant (β = 0.011, P =0.690). Among the regional dummies, only the Middle East and North Africa region showed a significant negative effect (β = -0.071, p = .008), however, this result should be interpreted cautiously given that this variable only has 5 observations. Lastly, no industry effect reached significance.

In model 2, the independent variable coopetition was added to test the main effect, expecting that coopetition positively affects firm performance. The opposite was found, coopetition has a significant negative effect (β = -0.071, p = .012) contradicting the theoretical view that coopetition enhances firm performance. With this, the positive significance of prior-year firm performance and firm age observed in model 1 persisted, while joint venture experience remained non-significant. Lastly, the inclusion of coopetition resulted in a modest increase in explained variance, raising adjusted-R^2 from 0.428 to 0.431.

Individual moderator models

Hypothesis 1 posited that *the positive coopetition-firm performance relationship is stronger for larger firms than for smaller firms.* In model 3A, the direct effect of firm size was added to the regression model alongside coopetition and control variables. Firm size demonstrated a statistically significant and positive direct effect on firm performance (β = 0.195, $p < .001$). However, this reflects the direct effect of firm size on firm performance. The inclusion of firm size did lead to a meaningful increase in explanatory power (ΔAdjusted-R^2 = 0.034) and an improved model fit, with adjusted-R^2 rising from

0.431 to 0.465. In other words, larger firms performed better overall, but this advantage was not contingent on coopetition.

In model 4A, the interaction term between coopetition and firm size was added to test the moderating effect. The interaction term was statistically non-significant ($\beta = -0.046$, $p = 0.518$), and the change in explained variance was almost non-existent (ΔAdjusted-$R^2 = 0.000$). The negative sign of the coefficient suggests that if anything, larger firms benefitted slightly less from coopetition than small firms, the opposite of the hypothesis. However, as this interaction is statistically non-significant, there is no evidence to support H1.

Hypothesis 2 posited that *the positive coopetition-firm performance relationship is stronger for financially unconstrained firms than for financially constrained firms.* To evaluate this, model 3B tested the direct effect of financial constraints on firm performance. The inclusion of financial constraints led to an almost non-existent increase in explained variance with adjusted-R^2 staying at 0.431. With this, the direct effect of financial constraints on firm performance was positive, contradicting the hypothesis, though not being statistically significant ($\beta = 0.025$, $p = 0.378$). This suggests that firms with greater financial constraints did not differ significantly from unconstrained firms in their performance, regardless of whether they engaged in coopetition or not.

In model 4B, the interaction term between coopetition and financial constraints was added. The interaction term's direction was negative, as expected, but not statistically significant ($\beta = -0.055$, $p = 0.130$). Moreover, the addition of the interaction term led to only a negligible increase in explained variance, raising adjusted-R^2 from 0.431 to 0.432. Therefore, hypothesis 2 is not supported. While the negative direction of the interaction aligns with theoretical expectations, the statistical evidence does not suggest a significant moderating effect of financial constraints on the coopetition-firm performance relationship. In other words, financially constrained firms versus financially unconstrained firms experienced no significant difference in performance outcomes from coopetition.

Hypothesis 3 posited that *the positive coopetition-firm performance relationship is stronger for firms with high innovation intensity than for firms with low innovation intensity.* To evaluate this, model 3C included the direct effect of innovation intensity, together with coopetition and control variables. The addition of innovation intensity led to a small increase of explained variance from 43.1 percent to 44.1 percent (ΔAdjusted-$R^2 = 0.010$). The coefficient's direction of innovation intensity was negative and statistically significant contradicting theoretical expectations ($\beta = -0.120$, $p < .001$). In other words, firms with high R&D intensity underperformed relative to less innovative firms, regardless of whether they engaged in coopetition or not.

In model 4C, the interaction term between coopetition and innovation intensity was added to formally test the moderation effect. The interaction term's direction was positive but not statistically significant ($\beta = 0.034$, $p = 0.401$), and the model did not explain additional variance, with adjusted-R^2

staying at 0.441. Thus, there is no statistical evidence of a moderation effect by innovation intensity. Hypothesis 3, therefore, is not supported. In substantive terms, the performance effect of coopetition did not differ significantly between high-innovation and low-innovation firms.

Hypothesis 4 posited that t*he positive coopetition-firm performance relationship is stronger for firms in less concentrated markets than for firms in highly concentrated markets*. In model 3D, the direct effect of market concentration was added to the regression together with the controls and coopetition. The addition of market concentration did not significantly improve explained variance of the model, with adjusted-R^2 increasing only marginally from 43.1 percent to 43.2 percent. The main effect of market concentration on firm performance was statistically non-significant ($\beta = 0.035$, $p = 0.210$), indicating that on average, firms operating in highly or less concentrated markets do not differ meaningfully in their post-joint venture performance outcomes.

In model 4D, the interaction term between coopetition and market concentration was added to examine whether the performance effects of coopetition differ based on the level of market concentration. The inclusion of the interaction term did not lead to a significant increase in explained variance by the model, as the explained variance of the model remained at 43.2 percent. The interaction term's direction itself was positive, contradicting the hypothesis, but was not statistically significant ($\beta = 0.026$ $p = 0.461$). In other words, there is no significant difference in post-joint venture firm performance between firms operating in highly concentrated markets and those in less concentrated markets. Therefore, hypothesis 4 is not supported.

Additional findings

In addition to the hypothesised relationships, several control variables demonstrated statistically significant effects across all models. Most notably, prior-year firm performance emerged as a robust and consistent predictor ($p < .001$) throughout all models. Firm age also showed a significant relationship with performance in all models except the one testing firm size. Finally, the regional dummy Middle East and North Africa showed a significant, negative, association with firm performance throughout all models, except the one testing Firm Size, pointing to potential contextual heterogeneity in post-coopetition outcomes. Again, this result should be interpreted cautiously given that this variable only has 5 observations.

Table 2, Regression results for individual moderator models predicting firm performance one year after a coopetitive joint venture.

Variable	Controls	Coopetition	Firm size		Financial Constraints		Innovation Intensity		Market concentration	
Models	Model 1	Model 2	Model 3	**Model 4 H1**	Model 3	**Model 4 H2**	Model 3	**Model 4 H3**	Model 3	**Model 4 H4**
Constant	1.061 (0.604) [0.079]	1.709 (0.654) [0.009]	-3.283 (0.943) [<.001]	-3.728 (1.164) [0.001]	1.722 (0.654) [0.009]	1.696 (0.654) [0.010]	1.850 (0.649) [0.004]	1.811 (0.651) [0.006]	1.680 (0.654) [0.010]	1.706 (0.655) [0.009]
Coopetition	-	-0.071 (0.653) [0.012]	-0.069 (0.633) [0.011	-0.029 (1.564) [0.664]	-0.071 (0.653) [0.011]	-0.071 (0.653) [0.011]	-0.068 (0.647) [0.015]	-0.068 (0.648) [0.014]	-0.070 (0.653) [0.013]	-0.069 (0.0653) [0.014]
Firm Size			0.195 (0.884) [<.001]	0.210 (1.173) [<.001]						
Coopetition * Firm Size (H1)				**-0.046 (1.688) [0.518]**						
Financial Constraints					0.025 (0.251) [0.378]	0.062 (0.334) [0.096]				
Coopetition * Financial Constraints (H2)						**-0.055 (0.484) [0.130]**				
Innovation Intensity							-0.120 (0.296) [<.001]	-0.145 (0.408) [<.001]		
Coopetition * Innovation Intensity (H3)								**0.034 (0.510) [0.401]**		
Market Concentration									0.035 (0.000) [0.210]	0.018 (0.000) [0.614]
Coopetition * Market Concentration (H4)										**0.026 (0.000) [0.461]**
Prior Firm Performance	0.642 (0.020) [<.001]	0.640 (0.020) [<.001]	0.600 (0.019) [<.001]	0.602 (0.019) [<.001]	0.642 (0.020) [<.001]	0.648 (0.020) [<.001]	0.616 (0.020) [<.001]	0.618 (0.020) [<.001]	0.641 (0.020) [<.001]	0.641 (0.020) [<.001]
Joint Venture Experience	0.011 (0.835) [0.690]	0.025 (0.851) [0.361]	0.022 (0.825) [0.410]	0.022 (0.826) [0.402]	0.025 (0.851) [0.364]	0.026 (0.850) [0.341]	0.021 (0.844) [0.449]	0.022 (0.846) [0.418]	0.025 (0.850) [0.357]	0.026 (0.852) [0.339]
Firm Age	0.065 (0.011) [0.021]	0.072 (0.011) [0.011]	0.048 (0.011) [0.082]	0.049 (0.011) [0.077]	0.068 (0.011) [0.017]	0.070 (0.011) [0.015]	0.058 (0.011) [0.039]	0.060 (0.011) [0.034]	0.069 (0.011) [0.016]	0.067 (0.011) [0.018]
Country dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.428	0.431	0.465	0.464	0.431	0.432	0.431	0.431	0.432	0.432
Δ Adjusted R^2	-	0.004	0.033	-0.001	0.000	0.001	0.000	0.000	0.001	0.000
F-value	F (17, 807) = 37.215, p <.001	F (18, 806) = 35.735, p <.001	F (19, 805) = 38.656, p <.001	F (20, 804) = 36.718, p <.001	F (19, 805) = 33.885, p <.001	F (20, 804) = 32,358, p <.001	F (19, 805) = 35.213, p <.001	F (20, 804) = 33.475, p <.001	F (19, 805) = 33.961, p <.001	F (20, 804) = 32,272, p <.001
Observations	825	825	825	825	825	825	825	825	825	825

Note. The dependent variable is firm performance one year after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with each moderated tested in a separate set of models.

Fully saturated model

Finally, a fully saturated model, including all moderators and their interaction terms simultaneously, was estimated (Table 3). This comprehensive model examines whether the earlier findings hold when all effects are considered together. The control variables showed a similar pattern to the models testing the hypotheses individually. Prior-year firm performance was significant throughout all models whilst firm age lost its significance from model 5 onwards. The direct effect of coopetition, again, was negative and significant in the 5th model (β = -0.065, p = 0.016) but lost its significance in model 6 (β = -0.030, p = 0.664).

Model 5 included all four direct effects alongside coopetition and the control variables. This model explained 47.0 percent of the variance, a notable improvement to the previous model with the adjusted-R^2 improving by 3.9 percent. Among the direct effects, firm size remained positively and significantly related to firm performance (β = 0.187 p < .001), while innovation intensity, again, had a significant negative direct effect (β = -0.096 p = 0.003). Financial constraints and market concentration did not exhibit significant direct effects.

Model 6 introduced all interaction terms simultaneously. The addition of these terms did not significantly improve model fit, with adjusted-R^2 slightly decreasing to 0.469. With this, none of the interaction terms were statistically significant, with the interaction of firm size (β = -0.041 p = 0.571) contradicting its hypothesised direction. Furthermore, financial constraints (β = -0.031 p = 0.409), innovation intensity (β = 0.022 p = 0.604), and market concentration (β = 0.031 p = 0.374) did follow the hypothesised direction but again, did not reach statistical significance. In summary, none of the four hypothesised moderating effects reached statistical significance, providing no support for the hypotheses H1-H4.

Variable	Controls	Coopetition	Moderators	Interactions terms
Models	Model 1	Model 2	Model 5	**Model 6 (H1-H4)**
Constant	1.061 (0.604) [0.079]	1.709 (0.654) [0.009]	-3.016 (0.951) [0.002]	-3.406 (1.177) [0.004]
Coopetition	-	-0.071 (0.653) [0.012]	-0.065 (0.631) [0.016]	-0.030 (1.591) [0.664]
Firm Size			0.187 (0.893) [<.001]	0.200 (1.191) [<.001]
Coopetition * Firm Size (H1)				**-0.041 (1.721) [0.571]**
Financial Constraints			-0.023 (0.253) [0.407]	-0.002 (0.343) [0.968]
Coopetition * Financial Constraints (H2)				**-0.031 (0.496) [0.409]**
Innovation Intensity			-0.096 (0.303) [0.003]	-0.111 (0.420) [0.012]
Coopetition * Innovation Intensity (H3)				**0.022 (0.530) [0.604]**
Market Concentration			0.032 (0.000) [0.239]	0.010 (0.000) [0.770]
Coopetition * Market Concentration (H4)				**0.031 (0.000) [0.374]**
Prior Firm Performance	0.642 (0.020) [<.001]	0.640 (0.020) [<.001]	0.581 (0.020) [<.001]	0.587 (0.020) [<.001]
Joint Venture Experience	0.011 (0.835) [0.690]	0.025 (0.851) [0.361]	0.019 (0.822) [0.478]	0.022 (0.826) [0.409]
Firm Age	0.0.65 (0.011) [0.021]	0.072 (0.011) [0.011]	0.039 (0.011) [0.168]	0.040 (0.011) [0.151]
Country dummies	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included
Adjusted R^2	0.428	0.431	0.470	0.469
Δ Adjusted R^2	-	0.004	0.039	-0.001
F-value	F (17, 807) = 37.215, p <.001	F (18, 806) = 35.735, p <.001	F (19, 805) = 34.238, p <.001	F (20, 804) = 29.026, p <.001
Observations	825	825	825	825

Note. The dependent variable is firm performance one year after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with all direct effects (Model 5) and interaction terms (Model 6) included simultaneously.

Table 3, Regression results for the fully saturated model predicting firm performance one year after a coopetitive joint venture.

Robustness

To test whether the results hold over longer time horizons, the analysis was replicated using dependent variables measuring firm performance in the second and third year after a coopetitive joint venture. The model specifications, equations, transformations, and operationalisations were identical to the baseline analysis. Across both subsamples, none of the hypothesised moderating effects, H1-H4, reached statistical significance. Full results are provided in Appendices J and K.

Some small, non-significant, differences emerged when comparing the results of the additional analyses to the baseline analysis. The independent variable coopetition was significant only in the first- and second-year analysis. In the second-year models, the coefficient remains negative and approaches a significance of 0.05, indicating a weakening effect over time. In the third-year models, the effect of coopetition remained negative but was not significant anymore.

Other small differences were to be found for firm size and innovation intensity. For firm size, the positive effect observed in the first- and second-year models, turned negative but still non-significant, in the third year ($\beta = -0.036$, $p = 0.698$), contradicting the hypothesised direction and earlier findings. For innovation intensity, the positive hypothesised relationship was not supported in all years, but the direction turned negative in the second year ($\beta = -0.044$, $p = 0.361$), further diverging from the theoretical expectation.

These results should be interpreted with caution, as the control group, though still significantly large, decreases from 422 firms in the first year, to 337 in the second-year analysis, to 249 firms in the third-year analysis. The decline in the control group size is due to potential overlap with the coopetition group when examining ROA in subsequent years. Overlapping cases were removed from the control group to prevent contamination between treatment and control observations.

5. Discussion and Conclusion

Theoretical contributions

This study set out to unpack the boundary conditions under which coopetition influences firm performance, focusing on firm size, financial constraints, innovation intensity, and market concentration. It was theoretically expected that coopetition would have a positive effect on firm performance, and that firm size and innovation intensity would positively moderate this relationship. It was further expected that financial constraints and market concentration would negatively moderate the relationship.

Coopetition

First and foremost, the expected positive effect of coopetition on firm performance was not supported. Instead, coopetition itself had a negative effect on firm performance, which was significant in most first-year models. This finding contradicts the theoretical expectation of a positive coopetition-performance relationship, as suggested by prior studies (Crick, 2019; Ritala, 2022; Meena et al., 2023). Yang et al.

(2021) found that overall, coopetition has a significant positive effect on firm performance, aligning with the RBV argument that pooling complementary resources with a competitor should enhance performance. The negative direction of the coefficient for coopetition implies that, at least in the short run, firms in this sample engaging in coopetition underperformed relative to those that did not engage in coopetition. This counterintuitive outcome aligns with Crick and Crick (2021), who showed that relational tensions – such as competitive aggressiveness – can undermine trust and increase opportunism, ultimately limiting value capture from coopetition. Such "dark side" dynamics, which were not included in this analysis, may help explain why coopetition in this sample was associated with short-term performance decline. This finding reinforces and strengthens arguments by researchers who have mentioned that collaboration with competitors can backfire due to, for instance, opportunism, knowledge leakage, or coordination costs, limiting some firms' ability to capture value from coopetition (Bouncken et al., 2015; Crick & Crick, 2021).

Firm Size

The empirical results did not show a significant interaction between firm size and the coopetition-firm performance relationship. The findings suggest that, for this sample, the number of employees – and by implication the knowledge base associated with firm size – did not significantly influence the short-term performance outcomes of coopetitive joint ventures. This contrasts with the RBV-based expectation and H1 that larger firms, possessing more complementary assets, bargaining power, and broader resources, would capture greater benefits from coopetition (Barney, 1991; Ferreira et al., 2020; Klimas et al., 2024). This suggests that large and small firms in this sample experienced similar short-term performance effects from coopetition. In turn, this challenges the assumption that greater resource endowments translate into superior coopetition outcomes. Alternatively, smaller firms could be better able to mitigate their assumed disadvantages by carefully managing the partnership scope or focusing on coopetition in reaching specific strategic goals (Wang & Chen, 2022). Therefore, theoretically this means that in this sample, size alone is not a decisive boundary condition for short-term coopetition success. Size may provide the means, but without effective deployment of those resources, performance advantages may not materialise.

Financial Constraints

Financially unconstrained firms, with greater flexibility, are theoretically better positioned to invest in absorptive capacity and governance structures to exploit benefits of coopetition (Bouncken et al., 2015; Ferreira et al., 2020). The empirical results did not support H2, as no significant interaction effect was found between financial constraints and the coopetition-firm performance relationship. Theoretically, this finding refines RBV-based assumptions by showing that the presence of greater financial resources does not, on its own, guarantee superior short-term coopetition outcomes. Thereby indicating that financially constrained and unconstrained firms, in this sample, experienced similar short-term

performance outcomes. This challenges the assumption that financial constraints disadvantage firms in coopetitive contexts. From a theoretical perspective, this outcome suggests that financial constraints alone may not be a decisive boundary condition for short-term coopetition success. The absence of a significant moderating effect does, however, align with prior studies suggesting that unconstrained firms do not strictly outperform constrained firms. By pooling complementary assets, financially constrained firms could overcome initial internal deficits and perform on par compared to unconstrained firms further strengthening the findings of Bagherzadeh et al. (2021) and Modi & Cantor (2020).

Innovation Intensity

The empirical results did not support H3, as no significant interaction effect was found between innovation intensity and the coopetition-firm performance relationship. RBV-based reasoning suggests that firms with higher absorptive capacity – often associated with greater innovation intensity – should be better positioned to integrate and leverage external knowledge in coopetitive settings (Barney, 1991; Bouncken et al., 2015; Meena et al., 2023). Prior studies have similarly argued that R&D-intensive firms should capture greater benefits from coopetition through joint innovation and learning (Estrada et al., 2016; Wang & Chen, 2022). However, the findings indicate that highly innovative and less innovative firms in this sample experienced similar short-term performance outcomes from coopetition. In model 4C, testing innovation intensity as the sole moderator, the interaction term was positive but not significant. In this model, the direction of the interaction term's coefficient was consistent with the hypothesis. In contrast, in the fully saturated model 6, which included all four interaction terms, the coefficient turned negative but remained non-significant. This inconsistency in direction across the models suggests that the performance implications of innovation intensity in coopetition are not robust in this sample. The absence of a significant moderating effect challenges RBV-based assumptions, indicating that innovation-related resource advantages, as measured in this study, are not a decisive short-term boundary condition for capturing value from coopetition.

Market Concentration

The empirical results did not support H4, as no significant interaction effect was found between market concentration and the coopetition-firm performance relationship. In both model 4D and the fully saturated model 6, the interaction term's coefficient was positive but not significant, contradicting the hypothesised negative direction. These findings challenge RBV-based arguments that access to and control over critical resources in concentrated markets can create dependency and reduce the ability of less powerful firms to capture value from coopetition (Barney, 1991). It also contrasts with prior theoretical reasoning that industry concentration increases relational risks, such as opportunism, which may suppress performance benefits (Bouncken et al., 2015; Meena et al., 2023). Furthermore, the results are inconsistent with prior studies showing that dominant firms in concentrated markets often capture a larger share of value (Peng & Lu, 2022). With this, these findings also challenge that in fragmented

industries, greater collaboration opportunities may be offset by higher distrust among partners which would lead to worse performance (Crick, 2019). Furthermore, it is also possible that structural concentration does not capture perceived rivalry, which may better predict performance differences (Crick, 2019), although not tested in this study. Lastly, while existing literature underscores that concentrated markets can foster dependency and elevate relational risks (Gnyawaly & Park, 2011; Ritala, 2012), the absence of a significant effect in this study implied that market concentration, as measured in this study, is not a decisive short-term boundary condition for capturing value from coopetition.

This study contributes to the theoretical understanding of coopetition by demonstrating that its performance outcomes are more context-dependent and less uniformly positive than commonly assumed in literature (Ritala & Hurmelinna-Laukkanen, 2013; Yang et al., 2021). While previous studies have emphasised the value-generating potential of coopetition through resource pooling and complementarity (Bouncken et al., 2015; Wang & Chen, 2022), this perspective often assumes that collaborations generally enhance performance. However, the findings in this study challenge these dominant views by showing a negative short-term performance effect of coopetition. With this, no significant moderation effects of firm size, financial constraints, innovation intensity, and market concentration – factors frequently cited as possible boundary conditions in RBV-based reasoning (Crick, 2019; Dorn et al., 2016; Meena et al., 2023; Xie et al., 2023) – were found. These results matter because they suggest that the ability to extract value from coopetition may not only depend on these firm-level or industry-level factors, but potentially on other unobserved mechanisms. For researchers, this study underscores the need to revisit and refine theories developed around coopetition by considering underexplored or expanding beyond firm-level and industry-level factors that may influence performance outcomes. Overall, this study contributes to theoretical clarity and the empirical understanding of the boundary conditions under which coopetition creates or erodes value, thereby advancing both theoretical clarity and the empirical evidence base in coopetition literature.

Practical contributions

The key takeaway of this study for boards and management is that coopetition is not a guaranteed pathway to short-term performance gains, with no specific type of firm in this study systematically benefitting more from coopetitive joint ventures than others. While theory suggests that larger, financially unconstrained, highly innovative, or operating in less concentrated markets, are better positioned to capture value from coopetition, the results of this study do not support these expectations.

For managers, this underscores that entering a coopetitive partnership via a joint venture, even under seemingly favourable internal or external conditions, does not automatically lead to superior outcomes. The assumed advantages of combining strengths with a competitor may be offset by variables that go deeper into the organisation and relation on which coopetition is based. These findings should

not lead managers to conclude that coopetition cannot create value; rather, they should be viewed as a caution that its outcomes are not universally positive.

Therefore, coopetition should not be viewed as a guaranteed route to financial improvement, but rather as a context-dependent one. Managers are encouraged to critically assess not just whether a firm appears 'ready' for coopetition on paper, but how well the partnership is aligned, structured, and governed in practice. Careful partner selection and strong relational safeguards may be more important than structural firm- and industry attributes in determining whether coopetition leads to value creation.

Limitations & Future research

Although the original dataset was panel-structured, this study uses a cross-sectional design by retaining only the first joint venture per firm during 2010-2016. The control group exists of firms that had not engaged in any joint venture between 2010-2016 but did so between 2017-2021, ensuring temporal separation and reducing treatment contamination. However, this limits the ability to analyse within-firm variation over time. As a result, longitudinal methods could not be applied. The empirical analysis primarily focuses on firm performance one year after the joint venture, as this constitutes the core focus of the study. The performance effects in the second and third year are examined solely as robustness tests to assess the consistency of the main findings over time. Coopetition, especially when proxied through joint ventures, could potentially yield delayed or cumulative benefits over time. Therefore, these findings need to be interpreted as short-term effects, not long-term strategic impacts. To tackle this, future research should adopt a longitudinal design to capture within firm dynamics and the longer-term performance implications of coopetition. By tracking multiple coopetitive engagements per firm over time, and assessing performance trajectories beyond the initial years, researchers can better understand how value creation from coopetition unfolds. This allows the use of panel data techniques to isolate intra-firm variation and assess whether benefits, or risks, of coopetition are cumulative, delayed, or conditional on temporal or relational factors. Additionally, such design would help distinguish between short-term disruptions and long-term strategic gains, offering a more complete picture of coopetition outcomes.

This study examines short-term financial performance, operationalised as return on assets. While theoretically relevant, it may overlook other potential benefits of coopetition such as innovation output or strategic repositioning. As a result, the broader impact of coopetition may be underestimated in contexts where non-financial outcomes are central. Moreover, by restricting the scope of the research to joint ventures, the study excludes other coopetition forms like strategic- or contractual alliances, which differ in levels of risk, governance, or partner commitment. These are factors that could influence performance and moderating effects. Finally, while this study includes both 100 percent joint ventures and minority stake joint ventures, it does not account for variation in, for instance, governance design within these joint ventures. Therefore, future research should incorporate a broader set of outcome

measures alongside ROA, such as innovation output, knowledge development, or strategic repositioning. Comparing these non-financial performance dimensions could reveal moderating effects not visible through financial metrics alone. Additionally, future studies should examine different forms of coopetition, including contractual alliances, strategic alliances, and R&D agreements. This could give more clarity on whether the nature of the alliance influences performance implications of firm- and industry-level moderators. Finally, incorporating variables that reflect governance design, such as equity stakes, decision rights, or trust mechanisms, could offer deeper insight into how coopetition structures shape value creation.

Lastly, this study exclusively relied on secondary data sources, which limited the ability to capture the relational and processual mechanisms underlying coopetition. While large-scale databases such as Orbis M&A and LSEG provide valuable breadth and objectivity, they do not include insights into how coopetition is initiated, governed, or experienced by the firms involved. As such, the motivations behind alliances, the quality of inter-firm relationships, or the presence of trust remain unobserved. These qualitative dimensions are likely to play a part in whether value is successfully created and extracted. Future research should therefore complement archival data with for instance field data, by interviews, surveys, or observations to gain richer insights into qualitative mechanisms, which are otherwise omitted from large-scale quantitative studies. A mixed-method approach could enrich the field by linking observable outcomes with the underlying dynamics that drive them.

Conclusion

This study set out to examine whether firm-specific and industry-level factors – namely firm size, financial constraints, innovation intensity, and market concentration – moderate the relationship between coopetition and firm performance. Drawing on a dataset of 825 firm-level observations, this study found that none of these moderators significantly alter the short-term financial impact of coopetitive joint ventures. The expected advantages of being a large, financially unconstrained, highly innovative, or operating in a fragmented market did not materialise. Instead, the key main effect observed is that coopetition itself was associated with a slight decline in return on assets one year after a coopetitive joint venture. Taken together, these results suggest that the benefits of coopetition are more context-dependent and less uniformly positive than commonly assumed. In the short run, engaging in coopetitive joint ventures can have a negative impact on performance, regardless of firm size, financial constraints, innovation intensity, or market context. These results temper optimistic assumptions about coopetition and indicate that understanding when coopetition creates value will require looking beyond the firm- and industry-level factors examined in this study.

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Appendices

Operationalisation table

Variable	Definition	Operationalisation	Measurement	Measurement level	Data source
Main effect					
Coopetition	"A strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value" (Bouncken et al., 2015, p. 591).	Joint ventures between firms operating in the same industry, based on four-digit SIC codes (Runge et al., 2021).	Identically matching the 4-digit SIC codes of the two firms engaging in a joint venture.	Dummy 0 = no joint venture, 1 = joint venture in that specific year	Orbis M&A
Firm performance	*"The level of financial success that organizations have secured within their markets"* (Xie et al., 2023, p3).	A firm's net income divided by total assets.	This will be a lagged variable, measured using Return on Assets (ROA) including three years after the joint venture.	Ratio (scale)	LSEG
Moderators					
Firm size	The number of employees a firm has. The distinction will be between a 'small' firm, having 250 or less employees, and 'large' firms based on the condition of	A firm is small when it has 250 or less employees. When a firm has over 250 employees it is considered	Dummy variable indicating firm size: 1 = large (> 250 employees), 0 = small (≤ 250 employees), per European Commission (2003).	Dummy variable, coded as: 0 = small, 1 = large	LSEG

	having over 250 employees (European Commission, 2003).	large (European Commission, 2003).			
Financial Constraints	Standard indicator of financial leverage that measures the firm's reliance on debt financing (Kaplan & Zingales, 1997; Whited & Wu, 2006).	The ratio of a firm's debt to total assets, expressed as a percentage (Kaplan & Zingales, 1997; Whited & Wu, 2006).	Continuous ratio, calculated as the total debt divided by the total assets of a firm. The higher the value, the more financially constrained a firm is.	Ratio (scale)	LSEG
Innovation Intensity	A ratio of R&D expenditures divided by sales, capturing the proportion of a firm's resources invested to innovation activities (Wang & Chen, 2022).	R&D spending as a percentage of total sales.	Ratio of R&D expenditures divided by total sales.	Ratio (scale)	LSEG
Market Concentration	The competitive tensions under which a firm operates within its industry.	Industry concentration level, measured by the Herfindahl-Hirschman index (HHI) (Scherer & Ross, 1990) for the firm's 4-digit SIC codes.	HHI, calculated as sum of squared market share percentages of all firms in the industry, ranging from 0 to 10.000 (Peng & Lu, 2022)	Ratio (scale)	LSEG
Control variables					
Firm age	The total years that a firm exists. To control for "*to mitigate the effects of the firm's establishment in its industry over time, which may affect collaborative*	The total years that a firm exists.	Measured in years since the founding.	Ratio (scale)	LSEG

	innovation activities between competitors." (Ritala & Hurmelinna-Laukkanen, 2013, p. 163).				
Joint venture experience	Experience in forming and managing alliances (Runge et al., 2021). This study will focus on joint ventures instead of alliances.	A firms accumulated experience in managing coopetitive strategies. It is also possible that a firm has no experience.	Counting the number of joint ventures a firm was active in five years prior to the joint venture within the same industry (Runge et al., 2021).	Ratio (scale)	LSEG
Prior -year Firm Performance	Defined as the financial performance of a firm the year preceding the joint venture.	The financial baseline of the study, it captures the Return on Assets of a firm in the year preceding to the joint venture (Runge et al., 2021).	The Return on Assets of the firm in the year preceding to the joint venture.	Ratio (scale)	LSEG
Country	The national context in which a firm's headquarters is established.	Country is coded by using regional dummies to reflect shared economic, regulatory, and institutional conditions.	The World Bank's regions are used to group the countries into regional clusters: "East Asia & Pacific", "Europe & Central Asia", "Latin America and Caribbean", "Middel East & North Africa, "North America", "South Asia" "Sub Saharan Africa" like Feiyang et al. (2020) did in their study.	Nominal (Categorical), based on 7 regional dummy variables.	Orbis M&A

Industry	The economic sector in which the firm operates.	Aggregated from the four-digit SIC codes that are also used for the coopetition variable.	The SIC codes are grouped based on the high-level divisions of industries, being the sector level. The sector levels are as follows: “Agriculture, Forestry, and Fishing”, “Mining”, “Construction”, “Manufacturing”, “Transportation and Communications”, “Wholesale”, “Retail”, “Finance, Insurance, and Real Estate”, “Services”, and “Public Administration” (US Department of Labor, 2025).	Nominal (Categorical), 10 sector dummies based on SIC aggregation.	Orbis M&A

Appendix A: Research model equations

Model 1 includes the controls only, establishing how they influence performance, “Firm Performance t+1 = β0 + β1FirmAge + β2JointVentureExperience + β3Prior-year Firm Performance + β4Country + β5Industry + ε”. This model sets the baseline and isolates the effects of the control variables on the dependent variable. Establishing a baseline model assesses incremental validity of the control variables (Hair et al., 2018).

Model 2 introduces the independent variable, coopetition, operationalised as a binary variable where a 1 means that a firm engaged in at least one joint venture during 2010-2016, and a 0 means a firm did not engage in a joint venture in this period. This allows to estimate the direct effect of coopetition on firm performance, “Firm Performance t+1, = β0 + β1Coopetition + ∑βControls + ε”.

Model 3A-3D consists of subsequent steps, each moderator is added individually following Hair et al. (2018). The estimation process proceeds as follows: “Firm Performance t+1, = β0 + β1Coopetition + β2Moderator x + ∑βControls + ε”. This approach is repeated for Firm Size, Financial Constraints, Innovation Intensity, and Market Concentration each.

Model 4A-4D would look as follows “Firm Performance t+1, = β0 + β1Coopetition + β2Moderator x + β3(Coopetition*moderator x) + ∑βControls + ε”. This approach is repeated for Firm Size, Financial Constraints, Innovation Intensity, and Market Concentration each, to test the hypotheses.

Model 5 includes all moderators at once, which would look like: “Firm Performance t+1, = β0 + β1Coopetition + β2FirmSize + β3FinancialConstraints + β4InnovationIntensity + β5MarketConcentration + ∑βControls + ε”.

Model 6 includes all the interaction terms, originating from the hypotheses, to test the moderation hypotheses H1-H4 in the full model: “Firm Performance t+1 = β0 + β1FirmSize + β2FinancialConstraints + β3InnovationIntensity + β4MarketConcentration + β5(Coopetition*FirmSize) + β6(Coopetition*FinancialConstraints) + β7(Coopetition*InnovationIntensity) + β8(Coopetition*MarketConcentration) + ∑βControls + ε”.

Appendix B: Assumptions and variable tables

After examining and preparing the data, the following assumptions need to be met prior to conducting the multiple linear regression analysis (Hair et al., 2018).

The normality of residuals was assessed through a P-P plot. While some deviations from the ideal line were observed, the distribution remained sufficiently close to normal. Given the sample size being over 500, minor departures from normality are acceptable (Hair et al., 2018). Regarding skewness and kurtosis, Firm Performance, Prior-Year Firm Performance, and Joint Venture Experience are not within the thresholds that are used for skewness and kurtosis. Firm Performance remains highly skewed and leptokurtic, indicating a non-normal distribution. Prior-year Firm Performance shows similar patterns with high skewness and kurtosis. However, skewness and kurtosis values do not always signal major issues for the actual regression, especially for samples where N > 500 as it functions as an indicator (Hair et al., 2018). A more detailed inspection of skewness, kurtosis, and diagnostic plots is provided in Appendices D and E.

The independence of residuals, to be found in Appendix F, is verified using the Durbin-Watson statistic, which has a value of 1.721 which in turn falls within the threshold of 1-3 (Hair et al., 2018). The Durbin-Watson statistics for the individual moderator models are available upon request but all range around 1.7.

The scatterplot of standardized residuals versus predicted values, to be found in Appendix G, showed no discernible patterns, supporting a linear relationship between predictors and the dependent variables.

The scatterplot of ZPRED and ZRESID was also used to assess homoscedasticity. Based on the scatterplot, the residuals' spread is relatively homogeneous, though a small number of residuals are further away from the regression line. Given the large sample size, this minor heteroscedasticity is not considered as problematic (Hair et al., 2018). Nevertheless, to account for potential violations, robustness checks using robust standard errors are reported in Appendix G.

Multicollinearity is assessed using the VIF and tolerance values, applying the thresholds recommended by Hair et al. (2018), whereby VIF values should be below 10 and tolerance values above 0.10, with the full model to be found in Appendix H. While coopetition and firm size do not fall within these ranges, this is due to their binary nature and their inclusion in an interaction term, that is why these values do not indicate problematic multicollinearity nor compromise interpretability of the regression estimates, Appendix H.

Lastly, based on Cook's distance, case US74112E2081 is excluded do to being an outlier influencing the model summary a lot. Removing the outlier increases the model fit from an R^2 of 0.375 to an R^2 of 0.486.

Appendix C: Descriptive statistics

Variable	N	Missing Count	Missing Percent
Firm Performance	825	0	0%
Coopetition	825	0	0%
Prior-year Firm Performance	825	0	0%
Joint Venture Experience	825	0	0%
Firm Age	825	0	0%
Firm Size	825	0	0%
Financial Constraints (Log, MC)	825	0	0%
Innovation Intensity (Log, MC)	825	0	0%
HHI (MC)	825	0	0%
Europe and Central Asia	141	0	0%
Latin-America and Caribbean	27	0	0%
Middle East and North-Africa	5	0	0%
South Asia	19	0	0%
Sub-Saharan Africa	3	0	0%
North America	107	0	0%
* East Asia and Pacific	523	0	0%
Agriculture	9	0	0%
Mining	30	0	0%
Construction	8	0	0%
Transportation	64	0	0%
Wholesale	8	0	0%
Retail	11	0	0%
Finance	20	0	0%
Services	214	0	0%
* Manufacturing	461	0	0%

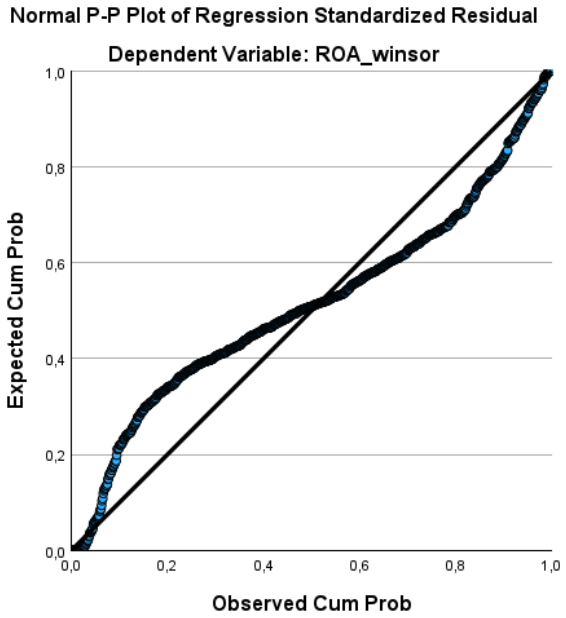
Note. Dependent variable = Firm performance one year after a coopetitive joint venture. *Log* = Logarithmic transformed. *MC* = Mean centred. Variables market with * (East Asia and Pacific; Manufacturing) represent the reference categories for region and industry, respectively. These variables are not included in the regression analysis but are reported to provide full descriptive context of the sample composition.

Appendix D: Univariate Analysis

Variable	N	Min	Max	Mean	SD	Skewness	Kurtosis
Firm Performance	825	-251.920	36.680	3.505	16.623	-7.504	89.258
Coopetition	825	0.000	1.000	0.490	0.500	0.046	-2.003
Prior-year Firm Performance	825	-195.730	113.150	5.033	15.894	-3.580	40.735
Joint Venture Experience	825	0.000	5.000	0.080	0.377	6.327	53.561
Firm Age	825	0.000	164.000	31.190	29.287	1.624	2.235
Firm Size (Dummy)	825	0.000	1.000	0.849	0.359	-1.947	1.797
Financial Constraints (Log, MC)	825	-2.470	4.070	-0.001	1.302	-0.740	-0.560
Innovation Intensity (Log, MC)	825	-1.300	6.980	-0.003	1.225	1.575	4.326
HHI (MC)	825	-3.632	6.368	0.000	3.039	0.918	-0.407

Note: "Log" = Logarithmic transformed, "MC" = Mean centred. Dependent variable is Firm performance one year after a coopetitive joint venture.

Appendix E: Normality



Appendix F: Independence of Error terms

Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,663[a]	,439	,428	8,82383	,439	37,215	17	807	<,001	
2	,666[b]	,444	,431	8,79466	,004	6,361	1	806	,012	
3	,696[c]	,484	,470	8,48962	,040	15,740	4	802	<,001	
4	,697[d]	,486	,469	8,49665	,002	,668	4	798	,614	1,721

a. Predictors: (Constant), Services_dummy, SubSaharanAfrica_dummy, MiddleEastNorthAfrica_dummy, EuropeCentralAsia_Dummy, Construction_dummy, Wholesale_dummy, Agriculture_dummy, Retail_dummy, SouthAsia_Dummy, ROA_lag1, Mining_dummy, LatinAmericaCaribbean_dummy, JointVentureExperience, Finance_dummy, Transportation_dummy, NorthAmerica_Dummy, FirmAge

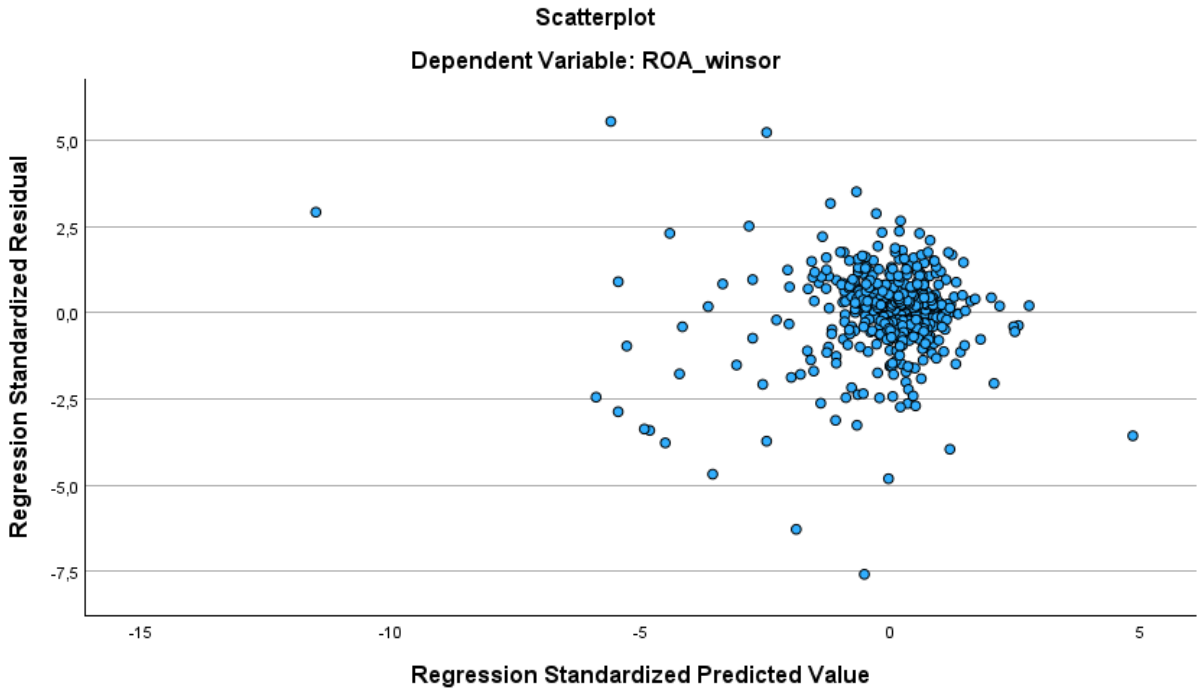
b. Predictors: (Constant), Services_dummy, SubSaharanAfrica_dummy, MiddleEastNorthAfrica_dummy, EuropeCentralAsia_Dummy, Construction_dummy, Wholesale_dummy, Agriculture_dummy, Retail_dummy, SouthAsia_Dummy, ROA_lag1, Mining_dummy, LatinAmericaCaribbean_dummy, JointVentureExperience, Finance_dummy, Transportation_dummy, NorthAmerica_Dummy, FirmAge, JointVenture_dummy

c. Predictors: (Constant), Services_dummy, SubSaharanAfrica_dummy, MiddleEastNorthAfrica_dummy, EuropeCentralAsia_Dummy, Construction_dummy, Wholesale_dummy, Agriculture_dummy, Retail_dummy, SouthAsia_Dummy, ROA_lag1, Mining_dummy, LatinAmericaCaribbean_dummy, JointVentureExperience, Finance_dummy, Transportation_dummy, NorthAmerica_Dummy, FirmAge, JointVenture_dummy, HHI_MC2, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC

d. Predictors: (Constant), Services_dummy, SubSaharanAfrica_dummy, MiddleEastNorthAfrica_dummy, EuropeCentralAsia_Dummy, Construction_dummy, Wholesale_dummy, Agriculture_dummy, Retail_dummy, SouthAsia_Dummy, ROA_lag1, Mining_dummy, LatinAmericaCaribbean_dummy, JointVentureExperience, Finance_dummy, Transportation_dummy, NorthAmerica_Dummy, FirmAge, JointVenture_dummy, HHI_MC2, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC, HHI_Interactie, FinancialConstraints_interactie, InnovationIntensity_interactie, Firmsize_interactie

e. Dependent Variable: ROA_winsor ROA_winsor

Appendix G: Linearity and Homogeneity of variances



Appendix H: Multicollinearity

Variable	Tolerance	VIF
Prior-year Firm Performance	0.842	1.188
Joint Venture Experience	0.903	1.107
Firm Age	0.816	1.226
Europe and Central Asia	0.814	1.228
North America	0.843	1.186
South Asia	0.965	1.036
Middle East and North-Africa	0.941	1.063
Sub-Saharan Africa	0.971	1.029
Latin-America and Caribbean	0.935	1.069
Agriculture	0.969	1.032
Mining	0.903	1.107
Construction	0.965	1.036
Transportation	0.828	1.207
Wholesale	0.944	1.059
Retail	0.956	1.046
Finance	0.888	1.126
Services	0.793	1.261
Coopetition	0.138	7.228
Firm Size	0.480	2.083
Financial Constraints (Log, MC)	0.439	2.277
Innovation Intensity (Log, MC)	0.331	3.017
Market Concentration (MC)	0.533	1.876
Coopetition * Market Concentration	0.545	1.836
Coopetition * Innovation Intensity	0.366	2.734
Coopetition * Financial Constraints	0.467	2.140
Coopetition * Firm Size	0.121	8.235

Note. Dependent variable = Firm Performance one year after a coopetitive joint venture. VIF and Tolerance values originated from the 6th model, the fully saturated regression model. *Log* = logarithmic transformation. *MC* = mean centred. Country and industry dummy variables included in the model; however, the dummy variables East Asia and Pacific (Country) and Manufacturing (Industry) are omitted as reference groups to avoid perfect multicollinearity.

Appendix J: Robustness test

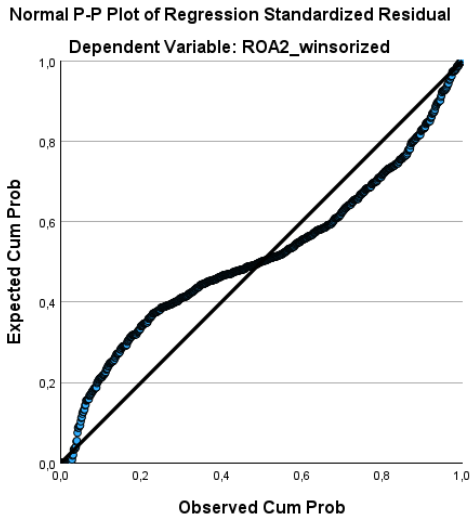
The robustness models applied the same specifications, regression models, transformations, and operationalisations as the baseline models. Assumption checks indicated no violations, consistent with the baseline analysis. The full regression results including descriptive statistics, the corresponding correlation table, and assumptions, are presented in the tables below.

Correlation table

		Descriptive statistics				Correlation matrix								
No.	Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9
1	Firm Performance	3.290	11.335	-59.410	26,400	-								
2	Coopetition	0.550	0.498	0.000	1.000	-0.074 [0.045]	-							
3	Prior-Year Firm Performance	4.401	18.510	-264.489	56.620	0.586 [<.001]	-0.049 [0.182]	-						
4	Joint Venture Experience	0.090	0.397	0.000	5.000	0.000 [0.990]	0.214 [<.001]	0.007 [0.851]	-					
5	Firm Age	31.220	28.843	0.000	164.000	0.076 [0.040]	0.171 [<.001]	-0.012 [0.750]	0.066 [0.073]	-				
6	Firm Size	0.845	0.362	0.000	1.000	0.337 [<.001]	0.028 [0.452]	0.260 [<.001]	0.035 [0.343]	0.150 [<.001]	-			
7	Financial Constraints (Log, MC)	0.000	1.295	-2.490	4.060	0.028 [0.452]	0.062 [0.092]	-0.047 [0.203]	0.042 [0.251]	0.184 [<.001]	0.182 [<.001]	-		
8	Innovation Intensity (Log, MC)	0.000	1.244	-1.310	6.970	-0.308 [<.001]	0.042 [0.249]	-0.273 [<.001]	-0.059 [0.110]	-0.167 [<.001]	-0.219 [<.001]	-0.313 [<.001]	-	
9	Market Concentration (MC)	0.000	3049.170	-3650.550	6349.450	0.019 [0.600]	-0.032 [0.382]	-0.037 [0.310]	-0.046 [0.207]	0.102 [0.006]	-0.011 [0.761]	0.006 [0.869]	-0.091 (0.013]	-
	N	740	740	740	740	740	740	740	740	740	740	740	740	740

Note: Dependent variable = Firm performance two years after a coopetitive joint venture. A two-tailed bivariate correlation is presented. “Log” = Logarithmic transformed, “MC” = Mean centred. Peason correlations are reported. Industry dummies, Agriculture, Mining, Construction, Transportation, Wholesale, Retail, Finance, and Service and Region dummies Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa are included in the regression models but omitted from this table for parsimony.

Normality



Independence of error terms

Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,616[a]	,380	,365	9,03104	,380	26,046	17	723	<,001	
2	,619[b]	,383	,368	9,01201	,003	4,056	1	722	,044	
3	,646[c]	,417	,399	8,78566	,034	10,421	4	718	<,001	
4	,648[d]	,420	,399	8,78944	,003	,846	4	714	,496	1,913

a. Predictors: (Constant), Services, SubSaharanAfrica, MiddleEastNorthAfrica, EuropeCentralAsia, Construction, Retail, Wholesale, Agriculture, ROA_lag1, SouthAsia, Mining, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge

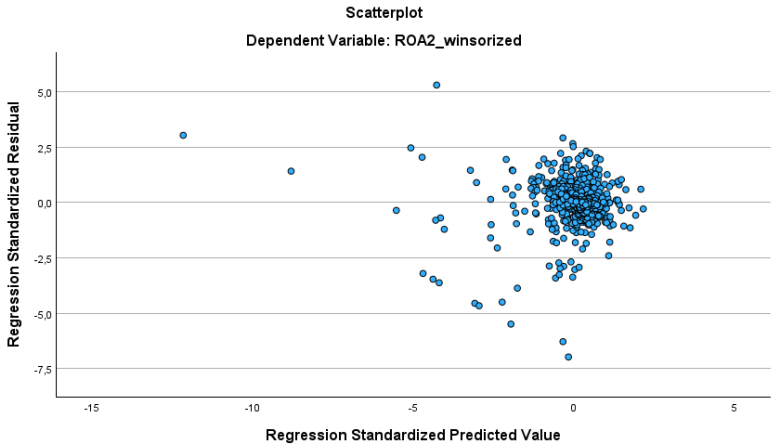
b. Predictors: (Constant), Services, SubSaharanAfrica, MiddleEastNorthAfrica, EuropeCentralAsia, Construction, Retail, Wholesale, Agriculture, ROA_lag1, SouthAsia, Mining, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy

c. Predictors: (Constant), Services, SubSaharanAfrica, MiddleEastNorthAfrica, EuropeCentralAsia, Construction, Retail, Wholesale, Agriculture, ROA_lag1, SouthAsia, Mining, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy, HHI_MC, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC

d. Predictors: (Constant), Services, SubSaharanAfrica, MiddleEastNorthAfrica, EuropeCentralAsia, Construction, Retail, Wholesale, Agriculture, ROA_lag1, SouthAsia, Mining, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy, HHI_MC, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC, HHI_Interactie, FinancialConstraints_Interactie, InnovationIntensity_Interactie, FirmSize_Interactie

e. Dependent Variable: ROA2_winsorized

Linearity and Homogeneity of variances



Multicollinearity

Variable	Tolerance	VIF
Prior-year Firm Performance	0.808	1.238
Joint Venture Experience	0.905	1.105
Firm Age	0.814	1.228
Europe and Central Asia	0.817	1.224
North America	0.839	1.192
Latin-America and Caribbean	0.931	1.074
South Asia	0.963	1.038
Middle East and North Africa	0.938	1.066
Sub-Saharan Africa	0.970	1.031
Agriculture	0.969	1.032
Mining	0.907	1.102
Construction	0.966	1.035
Transportation	0.819	1.222
Wholesale	0.942	1.062
Retail	0.965	1.037
Finance	0.903	1.107
Services	0.797	1.254
Coopetition	0.143	7.012
Firm Size	0.425	2.351
Financial Constraints (Log, MC)	0.395	2.529
Innovation Intensity (Log, MC)	0.290	3.448
Market Concentration (MC)	0.492	2.033
Coopetition * Market Concentration	0.495	2.018
Coopetition * Innovation Intensity	0.321	3.120
Coopetition * Financial Constraints	0.419	2.378
Coopetition * Firm Size	0.120	8.313

Note. Dependent variable = Firm Performance two years after a coopetitive joint venture. VIF and Tolerance values originated from the 6th model, the fully saturated regression model. *Log* = logarithmic transformation. *MC* = mean centred. Country and industry dummy variables included in the model; however, the dummy variables East Asia and Pacific (Country) and Manufacturing (Industry) are omitted as reference groups to avoid perfect multicollinearity.

Fully saturated model, firm performance two years after a coopetitive joint venture

Variable	Controls	Coopetition	Moderators	Interactions terms
Models	Model 1	Model 2	Model 5	**Model 6**
Constant	1.609 (0.648) [0.013]	2.215 (0.713) [0.002]	-1.351 (1.034) [0.192]	-1.295 (1.322) [0.327]
Coopetition	-	-0.063 (0.707) [0.044]	-0.058 (0.691) [0.057]	-0.052 (1.717) [0.491]
Firm Size			0.153 (0.981) [<.001]	0.154 (1.367) [<.001]
Coopetition * Firm Size (H1)				**-0.007 (1.866) [0.936]**
Financial Constraints			-0.039 (0.278) [0.224]	0.000 (0.397) [0.996]
Coopetition * Financial Constraints (H2)				**-0.049 (0.542) [0.267]**
Innovation Intensity			-0.132 (0.331) [<.001]	-0.082 (0.482) [0.124]
Coopetition * Innovation Intensity (H3)				**-0.062 (0.583) [0.217]**
Market Concentration			0.012 (0.000) [0.695]	-0.017 (0.000) [0.684]
Coopetition * Market Concentration (H4)				**0.040 (0.000) [0.323]**
Prior Firm Performance	0.574 (0.018) [<.001]	0.571 (0.018) [<.001]	0.499 (0.019) [<.001]	0.307 (0.019) [<.001]
Joint Venture Experience	-0.010 (0.859) [0.748]	0.002 (0.874) [0.940]	-0.003 (0.852) [0.912]	-0.093 (0.856) [0.913]
Firm Age	0.059 (0.012) [0.060]	0.067 (0.012) [0.034]	0.035 (0.012) [0.261]	0.012 (0.012) [0.318]
Country dummies	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included
Adjusted R^2	0.365	0.368	0.399	0.399
Δ Adjusted R^2	-	0.003	0.031	0.000
F-value	F (17, 723) = 26.046, p <.001	F (18, 722) = 24.928, p <.001	F (19, 721) = 23.355, p <.001	F (20, 720) = 19.875, p <.001
Observations	740	740	740	740

Note. The dependent variable is firm performance two years after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with all direct effects (Model 5) and interaction terms (Model 6) included simultaneously.

Individual moderator models, firm performance two years after a coopetitive joint venture

Variable	Controls	Coopetition	Firm size		Financial Constraints		Innovation Intensity		Market concentration	
Models	Model 1	Model 2	Model 3	**Model 4 H1**	Model 3	**Model 4 H2**	Model 3	**Model 4 H3**	Model 3	**Model 4 H4**
Constant	1.609 (0.648) [0.013]	2.215 (0.713) [0.002]	-1.699 (1.025) [0.098]	-1.568 (1.302) [0.229]	2.227 (0.714) [0.002]	2.221 (0.714) [0.002]	2.385 (0.707) [<.001]	2.430 (0.708) [<.001]	2.195 (0.714) [0.002]	2.246 (0.715) [0.002]
Coopetition	-	-0.063 (0.707) [0.044]	-0.062 (0.695) [0.042]	-0.073 (1.684) [0.323]	-0.063 (0.708) [0.043]	-0.063 (0.708) [0.042]	-0.059 (0.700) [0.054]	-0.059 (0.700) [0.055]	-0.062 (0.708) [0.048]	-0.061 (0.708) [0.049]
Firm Size			0.163 (0.972) [<.001]	0.158 (1.337) [<.001]						
Coopetition * Firm Size (H1)				**0.013 (0.013) [1.824]**						
Financial Constraints					0.016 (0.272) [0.617]	0.051 (0.381) [0.239]				
Coopetition * Financial Constraints (H2)						**-0.050 (0.522) [0.242]**				
Innovation Intensity							-0.144 (0.320) [<.001]	-0.111 (0.461) [0.028]		
Coopetition * Innovation Intensity (H3)								**-0.044 (0.552) [0.361]**		
Market Concentration									0.019 (0.000) [0.542]	-0.014 (0.000) [0.734]
Coopetition * Market Concentration (H4)										**0.049 (0.000) [0.237]**
Prior Firm Performance	0.574 (0.018) [<.001]	0.571 (0.018) [<.001]	0.529 (0.019) [<.001]	0.529 (0.019) [<.001]	0.572 (0.018) [<.001]	0.576 (0.018) [<.001]	0.538 (0.019) [<.001]	0.535 (0.019) [<.001]	0.572 (0.018) [<.001]	0.574 (0.018) [<.001]
Joint Venture Experience	-0.010 (0.859) [0.748]	0.002 (0.874) [0.940]	0.001 (0.858) [0.978]	0.001 (0.859) [0.982]	0.002 (0.874) [0.944]	0.003 (0.874) [0.918]	-0.003 (0.865) [0.928]	-0.005 (0.867) [0.882]	0.002 (0.874) [0.937]	0.004 (0.875) [0.892]
Firm Age	0.059 (0.012) [0.060]	0.067 (0.012) [0.034]	0.046 (0.012) [0.139]	0.046 (0.012) [0.143]	0.064 (0.012) [0.043]	0.066 (0.012) [0.038]	0.049 (0.012) [0.120]	0.047 (0.012) [0.140]	0.065 (0.012) [0.041]	0.062 (0.012) [0.049]
Country dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.365	0.368	0.390	0.389	0.367	0.368	0.382	0.381	0.367	0.368
Δ Adjusted R^2	-	0.003	0.022	-0.001	-0.001	0.001	0.014	-0.001	-0.001	0.001
F-value	F (17, 723) = 26.046, p <.001	F (18, 722) = 24.928, p <.001	F (19, 721) = 25.922, p <.001	F (20,720) = 24.594, p <.001	F (19, 721) = 23.605, p <.001	F (20,720) = 22.505, p <.001	F (19, 721) = 25.031, p <.001	F (20,720) = 23.816, p <.001	F (19, 721) = 23.615, p <.001	F (20,720) = 22.517, p <.001
Observations	740	740	740	740	740	740	740	740	740	740

Note. The dependent variable is firm performance two years after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with each moderated tested in a separate set of models.

Appendix K: Robustness test

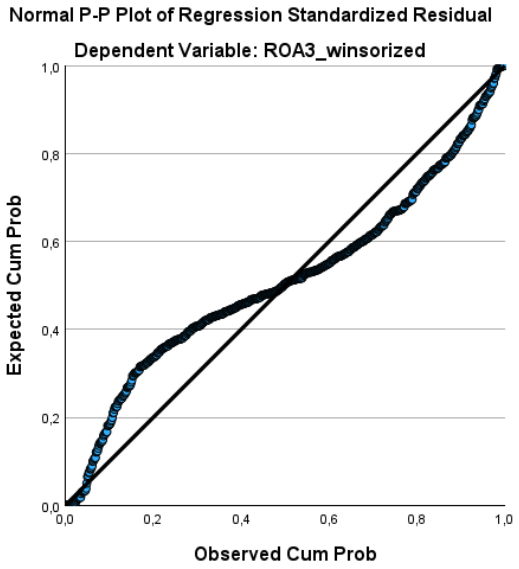
The robustness models applied the same specifications, regression models, transformations, and operationalisations as the baseline models. Assumption checks indicated no violations, consistent with the baseline analysis. The full regression results including descriptive statistics, the corresponding correlation table, and assumptions, are presented in the tables below.

Correlation table

		Descriptive statistics				Correlation matrix								
No.	Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9
1	Firm Performance	3.467	10.253	-48.540	32.400	-								
2	Coopetition	0.620	0.486	0.000	1.000	-0.039 [0.316]	-							
3	Prior-Year Firm Performance	4.451	17.470	-264.490	56.620	0.514 [<.001]	-0.064 [0.102]	-						
4	Joint Venture Experience	0.110	0.421	0.000	5.000	-0.004 [0.909]	0.197 [<.001]	0.007 [0.856]	-					
5	Firm Age	31.820	29.152	0.000	164.000	0.072 [0.066]	0.171 [<.001]	-0.012 [0.764]	0.065 [0.100]	-				
6	Firm Size	0.8438	0.363	0.000	1.000	0.268 [<.001]	0.036 [0.363]	0.264 [<.001]	0.038 [0.334]	0.161 [<.001]	-			
7	Financial Constraints (Log, MC)	0.000	1.279	-2.480	1.970	0.058 [0.136]	0.075 [0.055]	0.021 [0.586]	0.046 [0.239]	0.191 [<.001]	0.191 [<.001]	-		
8	Innovation Intensity (Log, MC)	0.000	1.277	-1.340	6.940	-0.297 [<.001]	0.014 [0.713]	-0.306 [<.001]	-0.068 [0.083]	-0.178 [<.001]	-0.221 [<.001]	-0.332 [<.001]	-	
9	Market Concentration (MC)	0.000	3039.051	-3673.290	6326.710	-0.002 [0.968]	-0.047 [0.230]	-0.054 [0.167]	-0.052 [0.187]	0.099 [0.011]	-0.018 [0.645]	-0.007 [0.861]	-0.101 [0.010]	-
	N	652	652	652	652	652	652	652	652	652	652	652	652	652

Note: Dependent variable = Firm performance three years after a coopetitive joint venture. A two-tailed bivariate correlation is presented. "Log" = Logarithmic transformed, "MC" = Mean centred. Peason correlations are reported. Industry dummies, Agriculture, Mining, Construction, Transportation, Wholesale, Retail, Finance, and Service and Region dummies Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa are included in the regression models but omitted from this table for parsimony.

Normality



Independence of error terms

Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,560[a]	,314	,296	8,60610	,314	17,088	17	635	<,001	
2	,560[b]	,314	,295	8,61124	,000	,243	1	634	,622	
3	,577[c]	,333	,310	8,51816	,019	4,483	4	630	,001	
4	,578[d]	,334	,306	8,54151	,001	,140	4	626	,967	1,771

a. Predictors: (Constant), Services, EuropeCentralAsia, SubSaharanAfrica, Construction, MiddleEastNorthAfrica, Retail, Agriculture, Wholesale, SouthAsia, Mining, ROA_lag1, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge

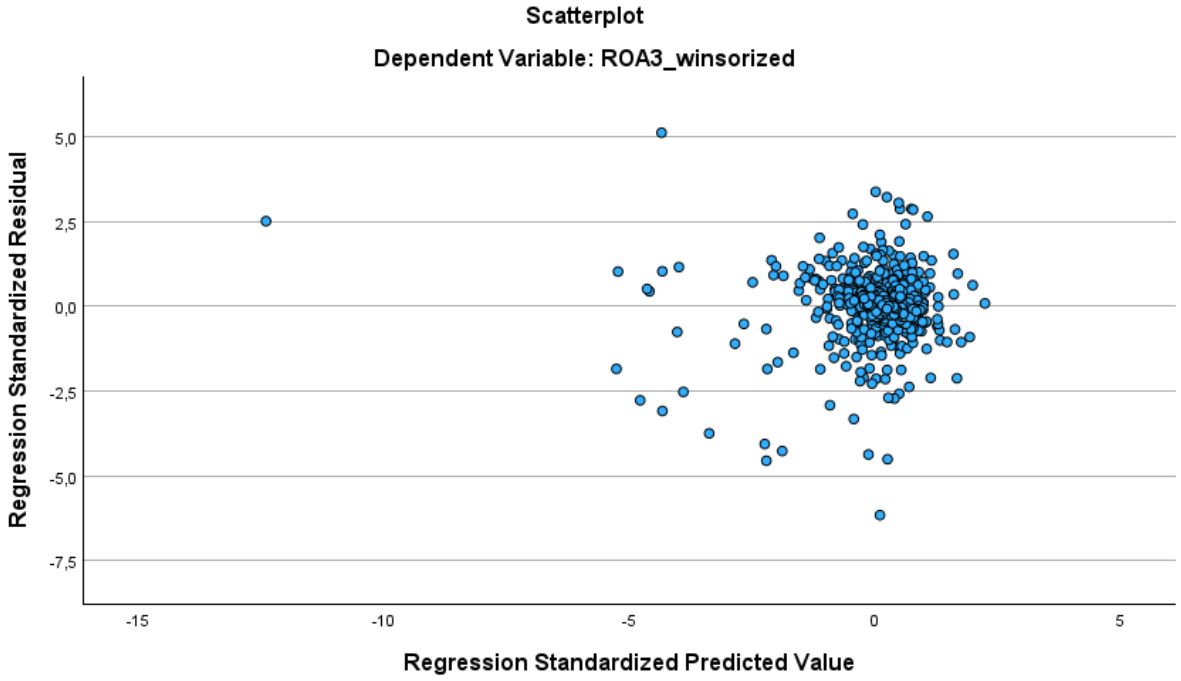
b. Predictors: (Constant), Services, EuropeCentralAsia, SubSaharanAfrica, Construction, MiddleEastNorthAfrica, Retail, Agriculture, Wholesale, SouthAsia, Mining, ROA_lag1, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy

c. Predictors: (Constant), Services, EuropeCentralAsia, SubSaharanAfrica, Construction, MiddleEastNorthAfrica, Retail, Agriculture, Wholesale, SouthAsia, Mining, ROA_lag1, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy, HHI_MC, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC

d. Predictors: (Constant), Services, EuropeCentralAsia, SubSaharanAfrica, Construction, MiddleEastNorthAfrica, Retail, Agriculture, Wholesale, SouthAsia, Mining, ROA_lag1, LatinAmericaCaribbean, Finance, JointVentureExperience, Transportation, NorthAmerica, FirmAge, JointVenture_dummy, HHI_MC, FinancialConstraints_Log_MC, FirmSize_dummy, InnovationIntensity_Log_MC, HHI_interactie, FinancialConstraints_interactie, Innovation_interactie, FirmSize_interactie

e. Dependent Variable: ROA3_winsorized

Linearity and Homogeneity of variances



Multicollinearity

Variable	Tolerance	VIF
Prior-year Firm Performance	0.803	1.245
Joint Venture Experience	0.904	1.106
Firm Age	0.803	1.246
Europe and Central Asia	0.816	1.226
North America	0.824	1.214
Latin-America and Caribbean	0.926	1.080
South Asia	0.960	1.041
Middle East and North Africa	0.934	1.071
Sub-Saharan Africa	0.968	1.033
Agriculture	0.969	1.032
Mining	0.914	1.094
Construction	0.959	1.042
Transportation	0.820	1.220
Wholesale	0.941	1.063
Retail	0.970	1.031
Finance	0.907	1.102
Services	0.796	1.256
Coopetition	0.145	6.896
Firm Size	0.364	2.748
Financial Constraints (Log, MC)	0.326	3.069
Innovation Intensity (Log, MC)	0.250	3.995
Market Concentration (MC)	0.429	2.332
Coopetition * Market Concentration	0.426	2.350
Coopetition * Innovation Intensity	0.276	3.628
Coopetition * Financial Constraints	0.341	2.935
Coopetition * Firm Size	0.116	8.622

Note. Dependent variable = Firm Performance three years after a coopetitive joint venture. VIF and Tolerance values originated from the 6th model, the fully saturated regression model. *Log* = logarithmic transformation. *MC* = mean centred. Country and industry dummy variables included in the model; however, the dummy variables East Asia and Pacific (Country) and Manufacturing (Industry) are omitted as reference groups to avoid perfect multicollinearity.

Fully saturated model, firm performance three years after a coopetitive joint venture

Variable	Controls	Coopetition	Moderators	Interactions terms
Models	Model 1	Model 2	Model 5	**Model 6**
Constant	2.396 (0.662) [<.001]	2.573 (0.753) [<.001]	0.765 (1.081) [0.479]	0.383 (1.464) [0.794]
Coopetition	-	-0.017 (0.736) [0.622]	-0.017 (0.731) [0.616]	0.017 (1.807) [0.846]
Firm Size			0.091 (1.014) [0.011]	0.107 (1.526) [0.048]
Coopetition * Firm Size (H1)				**-0.043 (1.966) [0.657]**
Financial Constraints			-0.035 (0.290) [0.334]	-0.014 (0.458) [0.809]
Coopetition * Financial Constraints (H2)				**-0.028 (0.584) [0.613]**
Innovation Intensity			-0.131 (0.341) [0.002]	-0.127 (0.523) [0.051]
Coopetition * Innovation Intensity (H3)				**-0.006 (0.611) [0.922]**
Market Concentration			-0.009 (0.000) [0.801]	-0.011 (0.000) [0.831]
Coopetition * Market Concentration (H4)				**0.001 (0.000) [0.988]**
Prior Firm Performance	0.498 (0.020) [<.001]	0.497 (0.020) [<.001]	0.439 (0.021) [<.001]	0.441 (0.021) [<.001]
Joint Venture Experience	-0.021 (0.826) [0.536]	-0.018 (0.839) [0.599]	-0.023 (0.830) [0.496]	-0.023 (0.835) [0.511]
Firm Age	0.034 (0.012) [0.328]	0.037 (0.012) [0.302]	0.013 (0.013) [0.723]	0.014 (0.013) [0.691]
Country dummies	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included
Adjusted R^2	0.296	0.295	0.310	0.306
Δ Adjusted R^2	-	-0.001	0.015	-0.004
F-value	F (17, 635) = 17.088, p <.001	F (18,634) = 16.133, p <.001	F (22, 630) = 14.305, p <.001	F (26, 626) = 12.060, p <.001
Observations	652	652	652	652

Note. The dependent variable is firm performance three years after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with all direct effects (Model 5) and interaction terms (Model 6) included simultaneously.

Individual moderator models, firm performance three years after a coopetitive joint venture

Variable	Controls	Coopetition	Firm size		Financial Constraints		Innovation Intensity		Market concentration	
Models	Model 1	Model 2	Model 3	**Model 4 H1**	Model 3	**Model 4 H2**	Model 3	**Model 4 H3**	Model 3	**Model 4 H4**
Constant	2.396 (0.662) [<.001]	2.573 (0.753) [<.001]	0.399 (1.066) [0.708]	0.033 (1.423) [0.981]	2.584 (0.755) [<.001]	2.597 (0.755) [<.001]	2.748 (0.749) [<.001]	2.737 (0.752) [<.001]	2.571 (0.755) [<.001]	2.578 (0.757) [<.001]
Coopetition	-	-0.017 (0.736) [0.622]	-0.018 (0.732) [0.609]	0.012 (1.757) [0.889]	-0.018 (0.738) [0.615]	-0.019 (0.738) [0.594]	-0.018 (0.731) [0.606]	-0.018 (0.731) [0.603]	-0.017 (0.738) [0.626]	-0.017 (0.739) [0.627]
Firm Size			0.102 (1.003) [0.004]	0.117 (1.478) [0.026]						
Coopetition * Firm Size (H1)				**-0.036 (1.909) [0.698]**						
Financial Constraints					0.009 (0.280) [0.806]	0.043 (0.425) [0.415]				
Coopetition * Financial Constraints (H2)						**-0.045 (0.545) [0.386]**				
Innovation Intensity							-0.133 (0.324) [0.001]	-0.142 (0.488) [0.020]		
Coopetition * Innovation Intensity (H3)								**0.011 (0.565) [0.845]**		
Market Concentration									0.002 (0.000) [0.958]	-0.003 (0.000) [0.952]
Coopetition * Market Concentration (H4)										**0.007 (0.000) [0.893]**
Prior Firm Performance	0.498 (0.020) [<.001]	0.497 (0.020) [<.001]	0.471 (0.020) [<.001]	0.473 (0.020) [<.001]	0.497 (0.020) [<.001]	0.498 (0.020) [<.001]	0.462 (0.020) [<.001]	0.463 (0.021) [<.001]	0.497 (0.020) [<.001]	0.497 (0.020) [<.001]
Joint Venture Experience	-0.021 (0.826) [0.536]	-0.018 (0.839) [0.599]	-0.019 (0.834) [0.586]	-0.018 (0.835) [0.593]	-0.018 (0.839) [0.598]	-0.017 (0.840) [0.612]	-0.023 (0.833) [0.503]	-0.023 (0.835) [0.511]	-0.018 (0.839) [0.600]	-0.018 (0.841) [0.604]
Firm Age	0.034 (0.012) [328]	0.037 (0.012) [0.302]	0.023 (0.013) [0.523]	0.024 (0.013) [0.509]	0.035 (0.013) [0.324]	0.037 (0.013) [0.308]	0.017 (0.013) [0.590]	0.020 (0.013) [0.579]	0.036 (0.013) [0.307]	0.036 (0.013) [0.314]
Country dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.296	0.295	0.303	0.302	0.294	0.293	0.305	0.304	0.294	0.292
Δ Adjusted R^2	-	-0.001	0.008	-0.001	-0.001	-0.001	0.010	-0.001	-0.001	-0.002
F-value	F (17, 635) = 17.088, p <.001	F (18,634) = 16.133, p <.001	F (19, 633) = 15.891, p <.001	F (20, 632) = 15.083, p <.001	F (19, 633) = 15.265, p <.001	F (20, 632) = 14.533, p <.001	F (19, 633) = 16.090, p <.001	F (20, 632) = 15.264, p <.001	F (19, 633) = 15.260, p <.001	F (20, 632) = 14.476, p <.001
Observations	652	652	652	652	652	652	652	652	652	652

Note. The dependent variable is firm performance three years after a coopetitive joint venture. Coefficient values are reported as standardized coefficients (β), followed by the standard error in parentheses, and the p-values in brackets: β (Std. error) [p-value]. For the constant (intercept), unstandardized coefficients (B) are reported: B (Std. error) [p-value]. **Bolded** variables, models, and values indicate the tests of the hypotheses, with each moderated tested in a separate set of models.

Appendix L: Use of AI

During the writing process of this thesis, I have used ChatGPT as a language and writing support tool. The assistance provided was strictly limited to improving clarity, structure, and coherence of the text. All the analyses, and substantive content were independently conducted by myself, where ChatGPT was used during the writing process to improve clarity and academic tone of my self-written texts.
Specifically, ChatGPT helped to:

- Refine sentence structure and paragraph transitions.
- Enhance consistency in terminology.
- Check for spelling and grammar mistakes throughout the text.

Please review the following text and give recommendations on how to improve the sentence structure and paragraph transitions:

- Make sure that each sentence is clear and concise
- Ensure paragraphs flow logically into one another
- Do not change academic content or meaning
- Maintain a formal academic writing tone suitable for a master thesis Strategic Management."

"Please review the following text and give recommendations on whether my text and use of terminology is consistent:

- Make sure that key terms, constructs, and variables are always referred to in the same way throughout the text.
- If different terms are used, note them and come up with suggestions to unify them.
- Do not alter academic content or arguments."

"Please review the following text for spelling, grammar, and punctuation errors:

- Correct any typos, verb tens issues, subject-verb agreement problems.
- Ensure correct use of academic English grammar and writing.
- Do not change the meaning or structure of sentences."