Complementor Dedication in Platform Ecosystems: Rule Adequacy and the Moderating Role of Flexible and Benevolent Practices

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Dedicated complementors are devoted, faithful, and willing to invest in their partnership with a platform owner. Because such complementors promise continuous value co-creation, complementor dedication is an essential objective of platform governance. However, as dedicated complementors also increase their vulnerability vis-à-vis a respective platform owner, platform governance needs to strike a balance between satisfying global ecosystem needs and local individual partnership needs. To better understand this challenge, our study develops six hypotheses on how two fundamental governance mechanisms—i.e., rules and the way in which these rules are practised—independently and symbiotically drive complementor dedication. We test these hypotheses using survey data from 181 complementors. Our findings show that complementors become more dedicated to a platform owner, the more adequate they perceive the rules to be. Our findings suggest two sensible strategies to actualise the potential of adequate rules. Platform owners should either entirely refrain from practising rules with situational flexibility and benevolence, thereby achieving moderate complementor dedication. Alternatively, they should practice rules with both flexibility and benevolence at the same time, thereby maximising complementor dedication. Our findings contribute to the literature on platform governance and broader governance literature.

Keywords: platform ecosystems, complementor dedication, platform governance, rule adequacy, governance practices, flexibility, benevolence, three-way interaction

Introduction

Major software companies like Microsoft, Oracle, or SAP have become platform owners that offer their solutions as software platforms (Parker et al., 2016). These software platforms describe the extensible codebase of software systems, whose core functionality can be complemented by outside companies, so-called complementors, through predefined interfaces (Baldwin and Woodard, 2009). Together, a platform owner and its complementors form a platform ecosystem (Cusumano and Gawer, 2002). A key governance objective of platform owners in such platform ecosystems is complementor dedication. Dedicated complementors are important because they are devoted and faithful to the platform and willing to invest into the platform partnership, thus help generate sustainable add-on value for the platform (Sarker, Xiao, et al., 2012).

However, dedication harbours risks for complementors, including the risk of creating a lock-in situation with platform-specific investments and becoming vulnerable vis-à-vis the platform owner (Kude et al., 2012). Platform owners must address these risks through adequate governance. This makes governing towards complementor dedication challenging because it requires platform owners to govern hundreds or even thousands of complementors efficiently while paying close attention to the specific needs of individual partnerships (Tiwana et al., 2010; Wareham et al., 2014). In traditional inter-organisational arrangements, such as outsourcing partnerships, dyadic contracts and relational mechanisms based on close interpersonal relationships would help address this challenge (Poppo and Zenger, 2002). However, these conventional mechanisms are not readily transferable to platform ecosystems because governance in this context is not a dyadic one-to-one problem but a multilateral one-to-many problem. Accordingly, platform owners design highly scalable governance mechanisms that equally apply to all complementors referred to as rules (Boudreau and Hagiu, 2009).

These rules can address specific complementor needs to some extent, for example, by differentiating between different partner levels with different rights and duties (Wareham, et al., 2014). However, even such complex, stratified rule systems are unlikely to fully meet all the varied complementor needs that exist in the ecosystem. To overcome these limits, research shows that it is essential to situationally vary how rules are practised in particular partnerships (Huber et al., 2017; Wareham, et al., 2014). For example, a platform owner may stretch the ecosystem-wide rules in a particular situation to provide a complementor with additional resources beyond those stipulated in the rules. In return, the complementor may reciprocate by making additional investments in its partnership with the platform owner and thus become more dedicated (Huber, et al., 2017). Therefore, the objective of this research is to bridge the gap in understanding of how the way rules are designed and practised drive complementor dedication. More specifically, we ask *how do complementor perceptions about the adequacy of rules and the way these rules are practised affect complementor dedication to a platform owner?*

As a theoretical foundation for answering this research question, we draw upon the broader literature on the governance of inter-organisational relationships by adapting the concepts of contractual and relational governance to platform ecosystems. More specifically, we draw a line from contractual governance to the design of platform rules and from relational governance to the practice of rules. Moreover, we pick up the discussion on the relationship between contractual and relational governance to theorise how the duality of rules and their practice affects complementor dedication.

Our study makes several contributions to research on platform ecosystems. First, our study is the first to provide a fine-grained understanding of the variation in and the governance-based drivers of complementor dedication. Although prior research on

platform governance has pointed to the high importance of complementor dedication (e.g., Economides and Katsamakas, 2006; Huang et al., 2013; Kude, et al., 2012; Tiwana, 2015; Zhu and Liu, 2018), it has not yet been treated as a governance objective in its own right. Second, our study extends research that has examined either the design or practice of rules by considering governance as a dual problem of designing adequate rules and skillfully combining these rules with adequate governance practices. By finding a significant positive association between rule adequacy and complementor dedication as well as a complex three-way interaction between rule adequacy and flexible and benevolent rule practices, our study quantitatively underscores that platform owners need to (1) take into account the needs of their complementors when designing standardised rules and (2) show flexibility and goodwill towards their complementors by engaging in dyadic-level variations in rule performances (Foerderer et al., 2019; Huber, et al., 2017; Sarker, Sarker, et al., 2012; Wareham, et al., 2014). In addition to these contributions to research on platform ecosystems, our study also adds to the broader governance literature outside the context of platform ecosystems (Gopal and Koka, 2012; Poppo and Zenger, 2002; Tiwana, 2009) and in particular the longstanding complements versus substitutes debate (Carson et al., 2003; Goo et al., 2009; Huber et al., 2013; Poppo, 1995; Tiwana, 2010).

The remainder of this study is organised as follows. First, we adapt classic concepts from the inter-organisational governance literature to the context of platform ecosystems and then build on this theory contextualisation to develop our hypotheses. After that, we describe our research method, followed by the presentation of results and the discussion of our findings. We conclude our article by highlighting the contributions, implications, and limitations of the study.

Theoretical and Conceptual Background

Platform ecosystems face several unique governance challenges that are grounded in the specific relationship between the platform owner and its complementors. To better understand these challenges and how they relate to the specific objective of achieving complementor dedication, it is informative to draw a line to literature on inter-organisational relationships in general and to contextualise the concepts from this literature in the platform domain (Hong et al., 2014).

Governance Objective: Complementor Dedication

In traditional inter-organisational arrangements, such as joint ventures or outsourcing partnerships, the central governance objective is to mitigate agency problems related to opportunism (Eisenhardt, 1985). In transferring this dominant principal-agent view to the platform domain, a peculiarity of platform ecosystems becomes apparent. This peculiarity lies in the role of task delegation in the platform owner—complementor-relationship and the motivation of complementors to continuously invest in partnerships with a platform owner. Instead of the platform owner hiring complementors to perform a specified task, the complementors decide for themselves how to contribute best to the co-creation of value on the platform (Tiwana, et al., 2010). Complementors thus take the metaphorical driver's seat as soon as they have joined an ecosystem: They make autonomous decisions on almost all aspects that will determine the fate of the platform partnership. For example, complementors determine by themselves what kind of software they develop (e.g., a game, a productivity app, or a health app), how much effort they invest into development, what characteristics the software should have (e.g., its features and qualities), and what innovations to pursue (Boudreau, 2012).

In turn, the role of the platform owner is chiefly that of a facilitator that sets the rules of the game seeking to ensure that the complementor makes such decisions in a way that will differentiate the ecosystem from competing ecosystems in terms of innovativeness (Boudreau, 2012; Ozalp et al., 2018; Ye and Kankanhalli, 2018) and quality (Cennamo et al., 2018; Cennamo and Santalo, 2013). Such competitive differentiation requires complementors to continuously generate platform-specific value (Boudreau and Hagiu, 2009; Tiwana, 2013) by intensively exploiting platform and ecosystem resources (Foerderer, et al.; Huber, et al., 2017), by maintaining tight-knit networks of interpersonal relationships with the platform owner's personnel (Sarker, Xiao, et al., 2012), and by continually acquiring or renewing platform-specific resources such as certificates (Kude, et al., 2012). It is these desirable behaviours that platform governance strives to foster once complementors have joined an ecosystem. To capture these desirable behaviours, we propose the governance objective of dedication, defined as the extent to which a complementor is devoted, faithful, and willing to invest in the partnership with a platform owner.

Governance Mechanisms with a Multilateral Scope

In traditional inter-organisational arrangements, one actor (e.g., the client) regulates and adjusts the other actor's (e.g., the vendor) behaviour by selecting and enacting dyadic-level contractual and relational governance mechanisms (Goo, et al., 2009; Huber, et al., 2013). Such dyadic-level mechanisms entail tailored contracts adapted to the specific needs of a relationship (Benaroch et al., 2016) and cooperative relational norms, including flexibility and benevolence (Ring and van de Ven, 1994).

In the context of platform ecosystems, governance is not exclusively focused on individual, dyadic relationships between one complementor and one platform owner. Instead, governance is more multilateral, i.e., focused on the entire ecosystem and the

many partnerships between complementors and the platform owner it entails (one-to-many relationship) (Tiwana, et al., 2010). In other words, the challenge of platform owners is that on the one hand they have to govern hundreds or even thousands of complementors, and on the other hand they have to pay attention to the needs of particular partnerships (see Figure 1) (Huber, et al., 2017; Tiwana, et al., 2010).

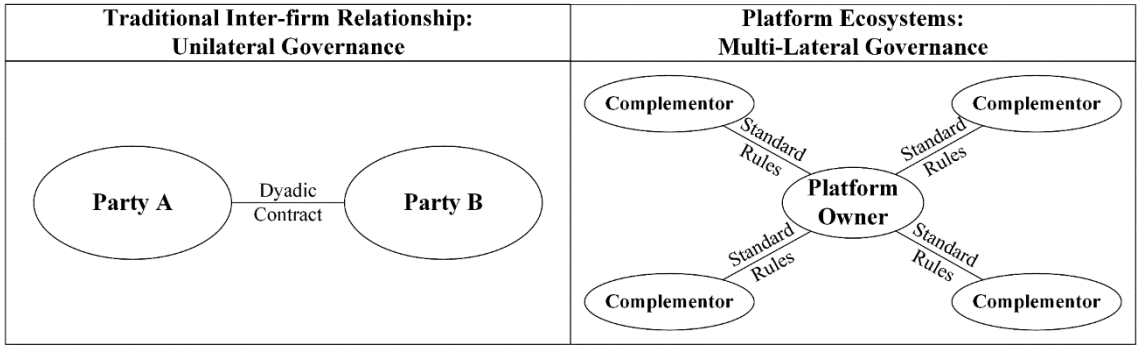

Figure 1: Classic dyadic vs multilateral governance

Rule Adequacy. In platform ecosystems, platform owners heavily rely on "scalable" formal governance mechanisms (Tiwana, et al., 2010, p. 676), including partner contracts, interface standards, and partner programmes (Huber, et al., 2017; Wareham, et al., 2014). We refer to these mechanisms as *rules* in terms of generalised mechanisms that uniformly regulate the behaviours of all complementors in the ecosystem (Boudreau and Hagiu, 2009). These rules are usually imposed unilaterally by the platform owner on all complementors of their ecosystems (Wareham, et al., 2014). Accordingly, prior quantitative research on platform governance has studied optimal design choices for standardised interfaces (e.g. open vs closed) and their role in producing desirable ecosystem-level outcomes, such as size or innovation (e.g., Baldwin and von Hippel, 2011; Boudreau, 2010; Eisenmann et al., 2009). Recent qualitative research has shown, however, that the critical challenge is to strike a balance between cross-context standardisation for an efficient orchestration of vast ecosystems *and* the consideration to the local needs of individual complementors (Foerderer, et al.,

2019; Huber, et al., 2017; Wareham, et al., 2014). After all, complementors are independent companies whose interests platform owners must consider in their standardisation calculus during rule development (Boudreau and Hagiu, 2009; Wareham, et al., 2014). To capture this twofold goal, we propose the concept of *rule adequacy*, defined as the extent to which complementors perceive the standardised ecosystem-wide rules as securing their own interests as opposed to only securing the interests of the platform owner. Rules are more adequate the more effective they are in fulfilling three distinct functions, i.e., the *protection* of complementor resources, the *prevention* of inappropriate platform owner behaviour, and the *promise* of partnership benefits (see Method for details on how these three rule functions that serve as dimensions of rule adequacy were developed).

Across partner dyads, perceptions of rule adequacy will vary for two reasons. First, between different ecosystems, rules are designed in different ways (Gulati et al., 2012) and hence the rules governing an ecosystem may more or less effectively serve the protection, prevention, and promise function. For example, the rules of one ecosystem can promise more valuable resources to complementors than the rules of another ecosystem (Ghazawneh and Henfridsson, 2013; Wareham, et al., 2014) and they can protect such promises with varying legal certainty (Foss and Foss, 2005; Williamson, 1985). Second, even if rules are identical—as is the case for complementors belonging to the same ecosystem—perceptions of adequacy likely vary due to the heterogeneity of complementors with their wide variety of specific needs. In light of this variety, complementors will develop their own subjective rule understandings (Feldman and Pentland, 2003) based on their specific product and service portfolio, resource endowment, and situation (Huang, et al., 2013; Kude, et al., 2012; Sarker, Xiao, et al., 2012). For example, whereas well-established complementors

are likely to appreciate intellectual property protection provided through rules (Huang, et al., 2013), complementors new to the ecosystem may place a stronger emphasis on access to resources. Similarly, while some resources stipulated by the rules may be valuable for certain complementors, they are useless for others (Kude, et al., 2012). Thus, even if rules are identical—as is the case for the complementors on the same partner level within an ecosystem (Boudreau, 2012)—rule adequacy is likely to vary between complementors. Therefore, we will measure rule adequacy perceptually from the perspective of the complementors—a previously under-researched perspective (McIntyre and Srinivasan, 2017).

Practising Rules in Platform Ecosystems. Relational mechanisms are generally to a lesser extent characterised by explicit prescriptions than contractual mechanisms (Goo, et al., 2009; Huber, et al., 2013; Lioliou et al., 2014). However, given the one-to-many scope of governance in platform ecosystems, relational governance is not entirely independent of contractual governance either (Wareham, et al., 2014). To capture this conceptual subtlety, we build on the concept of variations in practising ecosystem-wide rules (Huber, et al., 2017), which acknowledges that rules are carried out through specific actions by specific people (Foerderer, et al., 2019), at specific times (Huber, et al., 2017), and in specific situations (Wareham, et al., 2014). The written rules always serve as a basis for these actions, but platform owners still have some leeway to adapt to the specifics of the dyad.

Prior research in the context of platform ecosystems has shown that platform owners use their leeway to practice rules with more or less benevolence and flexibility (Huber, et al., 2017; Wareham, et al., 2014). *Perceived flexibility in practising rules* describes the extent to which complementors perceive the enactment of ecosystem-wide rules by the platform owner as responsive to their needs. This is based on the

assumption that rule designers (i.e., platform owners) can interpret rules situationally in the light of unforeseen or changing conditions (Boyle et al., 1992; Heide and John, 1992). For example, platform owners can proactively grant access to partnership benefits so that a complementor can take on a specific business opportunity (Wareham, et al., 2014). *Perceived benevolence in practising rules* describes the extent to which complementors perceive the enactment of the ecosystem-wide rules by the platform owner as kind and generous. This is based on the assumption that rule designers can treat the rules in a way that is favourable and beneficial to, as well as in the interest of the partnership (McKnight et al., 2002). For example, platform owners can grant complementors access to resources that exceed those stipulated by the rules (Huber, et al., 2017). Table 2 provides the contextualised definitions of the study's core constructs.

Table 2: Core Constructs and Definitions

Construct	**Definition**	**Role in Nomology**
Perceived Rule Adequacy	The extent to which complementors perceive the ecosystem-wide rules to secure their own interests as opposed to only securing the interests of the platform owner. • Original construct: Child et al. (2003); Gefen and Pavlou (2012) • Contextualisation basis: Huber, et al. (2017); Tiwana, et al. (2010); Wareham, et al. (2014)	Predictor
Perceived Flexibility in Practising Rules	The extent to which complementors perceive the enactment of ecosystem-wide rules (e.g., rules, codes of conduct, or partnership charters) by the platform owner as responsive to the complementor's needs. • Original construct: Boyle, et al. (1992); Heide and John (1992) • Contextualisation basis: Huber, et al. (2017); Wareham, et al. (2014)	Moderator
Perceived Benevolence in Practising Rules	The extent to which complementors perceive the enactment of the ecosystem-wide rules (e.g., rules, codes of conduct, or partnership charters) by the platform owner as kind and generous. • Original construct: McKnight, et al. (2002) • Contextualisation basis: Huber, et al. (2017); Wareham, et al. (2014)	Moderator
Complementor Dedication	The extent to which a complementor is devoted, faithful, and willing to invest in the partnership with a platform owner • Original construct: Anderson (1985); Heide and John (1992) • Contextualisation basis: Tiwana (2015)	Dependent Variable

Hypotheses Development

Our hypotheses about the independent and symbiotic effects of rule adequacy and rule practice perceptions build on one central theoretical argument: to successfully foster complementor dedication, platform governance needs to strike a balance between satisfying the global needs of the entire ecosystem and the local needs of individual partnerships. We argue that to address this challenge, platform owners will use two mechanisms, i.e., they will design rules, and they practice these rules with flexibility and benevolence. However, to maximise dedication, platform owners need to combine these two mechanisms symbiotically. Figure 2 visualises our research model.

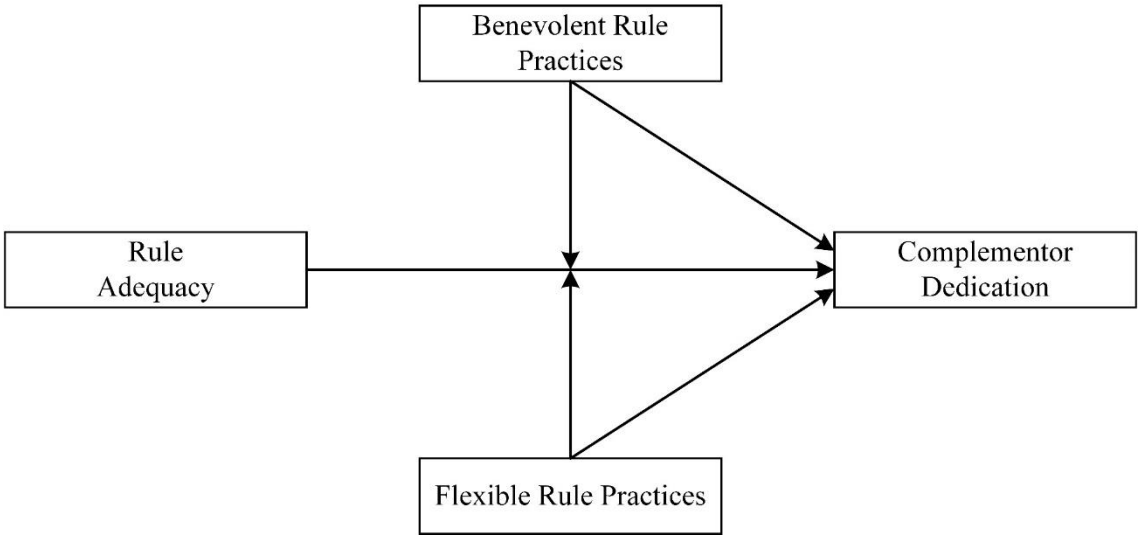

Figure 2: Research Model

The Direct Effect of Perceived Rule Adequacy

The one-to-many nature of platform ecosystems implies resource asymmetries between platform owners and complementors (Kude, et al., 2012). Platform owners, on the one hand, make investments with the goal to create and maintain resources that are valuable for many, if not all, complementors of their ecosystems (Boudreau and Hagiu, 2009; Ghazawneh and Henfridsson, 2013; Kude, et al., 2012; Wareham, et al., 2014). These ecosystem resources include the software platform, development suites, code

repositories, and marketing tools (Ghazawneh and Henfridsson, 2013; Kude, et al., 2012; Wareham, et al., 2014). Complementors, by contrast, make platform-specific investments, i.e., they create, maintain, and develop resources that cannot be easily transferred to another partnership, because they are significantly more valuable in a particular partnership than outside of it (Dyer and Singh, 1998). For example, complementors acquire platform-specific knowledge and certifications or engage with the staff of the platform owner (Kude, et al., 2012; Wareham, et al., 2014).

Against this backdrop, the platform owner is less dependent on individual complementors, but rather on the ecosystem as a whole, while complementors depend heavily on their respective platform owner (Huber, et al., 2017; Kude, et al., 2012). This means that a platform owner only requires minor benefits accruing from individual partnerships and, at the same time, faces only minor threats from opportunistic behaviour on the part of individual complementors. In contrast, a complementor needs to capitalise on its partnership to pay off its investments, while facing considerable threats of losing these investments through opportunistic behaviour on the part of a platform owner (Kude, et al., 2012). This contrast creates a twisted governance challenge for platform owners (Tiwana, et al., 2010). Different from traditional inter-organisational settings, the protection of investments is only a tangential goal—what platform owners are interested in is the value co-created by the complementor, which directly depends on complementor dedication. Ironically, to incite such dedication, platform owners need to protect the interests and investments of the complementors. Otherwise, complementors might consider the threat of opportunism as too high and therefore refrain from making additional platform-specific investments and intensifying their engagement (Williamson, 1985). Rules must therefore strengthen the confidence of complementors, for example by making believable promises that they will receive

valuable partner benefits—such as access to technical and non-technical (Ghazawneh and Henfridsson, 2013; Wareham, et al., 2014), tangible and intangible (Kude, et al., 2012) ecosystem resources. The more effectively rules protect a complementor's resources, the more effectively they prevent inappropriate platform owner behaviour, and the more valuable complementors perceive the promised resources, the more optimistic complementors will be about their current and future investments in the platform. Hence, we hypothesise:

> *H1: Higher perceived rule adequacy is associated with higher complementor dedication.*

The Direct Effects of Flexible and Benevolent Practices

The highly standardised nature of rules comes at a price: because rules are standardised they can neither be sensitive to all local needs of individual complementors (Sarker, Xiao, et al., 2012; Wareham, et al., 2014) nor can they anticipate and respond to every future eventuality (Huber, et al., 2017). Thus, even though rules may be strong in economising on governance costs (due to standardisation) and in safeguarding complementors from behavioural uncertainty, rules alone are limited in their ability to address problems related to high heterogeneity and environmental uncertainty (Rindfleisch and Heide, 1997; Williamson, 1985). Research on traditional inter-organisational arrangements has shown that managers add other types of governance mechanisms (such as relational governance), which have unique strengths that can compensate the limitations of rules (Goo, et al., 2009; Huber, et al., 2013; Poppo and Zenger, 2002).

In the context of platform ecosystems, these other types of governance mechanisms manifest themselves as variations in practising ecosystem-wide rules as embodied in the constructs of flexible and benevolent rule practices. Such flexible and

benevolent practices are stronger than rules in addressing the local and changing needs of individual complementors (Huber, et al., 2017). Hence, when rules reach their limits, platform owners may situationally show variations in practising them to address the complementors' local needs effectively (Huber, et al., 2017; Sarker, Xiao, et al., 2012; Wareham, et al., 2014). Consider a complementor in an environment with rapidly changing customer needs that face an unexpected business opportunity. To exploit it, the complementor is likely to engage in synergistic co-creation with the platform owner to develop highly innovative solutions to novel or idiosyncratic problems (Sarker, Xiao, et al., 2012). This requires (1) that the platform owner is highly adaptive to the specific, situational needs of the complementor and (2) that the complementor is willing to intensify the partnership and invest even more into it (Sarker, et al., 2012). We argue that the first condition will shape the second. More specifically, by practising rules with flexibility or benevolence, platform owners can maintain responsive despite the adaptive limits of rules. For example, the platform owner may assist the complementor beyond the stipulated support by granting access to particularly scarce ecosystem resources (benevolence) or by granting access to these resources at just the right time and situation (flexibility). Such rule practices could increase the willingness of complementors to take the risk of intensifying their partnerships and making additional investments. Therefore, we hypothesise:

H2a: Higher perceived flexibility in practising rules is associated with higher complementor dedication.

H2b: Higher perceived benevolence in practising rules is associated with higher complementor dedication.

The Moderating Effects of Flexible and Benevolent Practices

Even though platform owners have leeway as to how they practice governance in specific situations and partnerships, these governance practices are usually not detached from the ecosystem-wide rules either—instead, when platform owners show practice variations, the rules still serve as an essential reference point (Huber, et al., 2017). This points to symbiotic interactions between rule adequacy and rule practices, similar to those discussed in the broader governance literature under the umbrella of complementarity between contractual and relational mechanisms (Huber, et al., 2013; Poppo and Zenger, 2002). According to this research, complementarity between governance mechanisms occurs when one mechanism helps to better leverage the strengths of the other mechanism (Huber, et al., 2013; Poppo and Zenger, 2002). Applied to the platform ecosystem context, this means that rule practices would help better leverage the strengths of adequate rules, and vice versa. When platform owners practice rules with benevolence or flexibility, there continues to be a close link to the rules. More specifically, platform owners are looking for smart ways to repurpose existing rules, rather than informally finding solutions that are independent of the rules (Huber, et al., 2017). Importantly, more adequate rules are likely to offer more opportunities for such clever repurposing as less adequate ones. Accordingly, we expect that flexible and benevolent rule practices will strengthen the effect of perceived rule adequacy on complementors' dedication, as they help to leverage and actualise the potential benefits of rules fully. Therefore, we hypothesise:

> *H3a: The positive relationship between perceived rule adequacy and complementor dedication is stronger when rule practices are perceived as more benevolent.*
>
> *H3b: The positive relationship between perceived rule adequacy and complementor dedication is stronger when rule practices are perceived as more flexible.*

Moreover, we expect that adequate rules contribute most strongly to complementor dedication if rule practices are simultaneously benevolent and flexible. Two arguments favour such a more sophisticated (three-way) interaction: First, if practices are flexible but not benevolent, platform owners react at the right time, but not with the right resources. This circumstance will undermine the complementor's ability to respond to unforeseen circumstances effectively. Therefore, the complementor will be less prone to make additional platform-specific investments and less faithful to the platform. Likewise, if practices are benevolent but not flexible, platform owners react with valuable resources but not at the right time. Again, this will undermine the complementor's ability to leverage the business opportunities entailed in unforeseen circumstances fully. In return, the complementor may suspend additional platform-specific investments and be less faithful to the platform owner. Thus, rule practices will only fully actualise the potential of rules if they are both benevolent and flexible. For example, if a complementor receives just the right resources at just the right time.

Second, if a platform owner flexibly adapts governance practices to accommodate the needs of a complementor, the platform owner needs to comply with the broader relational values of the ecosystem, such as benevolence (Gulati, et al., 2012; Tiwana, et al., 2010). Otherwise, highly flexible governance practices can make the platform owner look like an arbitrary despot (Huber, et al., 2017). If the platform owner leaves such a negative impression, it may lead to increased uncertainty on the part of the complementors, paralysing their dedication. Thus, the potential of the ecosystem rules only actualises completely if rule practices are simultaneously flexible and benevolent. Therefore, we hypothesise:

> *H3c: The positive relationship between perceived rule adequacy and complementor dedication will be strongest when the rule practices are perceived both highly benevolent and highly flexible (as opposed to either or both low).*

Method

We conducted a survey among complementors in platform ecosystems to test our hypotheses. In the following, we outline our data gathering, measurement and analysis procedures and our results.

Data Collection

Data was collected through an online survey of companies operating in the software industry (software companies) as part of a larger research project. Our target population were those software companies that currently act as complementors in platform ecosystems. To prevent confounding by cross-national differences, such as cultural and legal norms, we conducted our study in a single European country (Switzerland). To ensure the highest possible coverage of software companies in Switzerland, we drew on a commercial contact database.

Additionally, we matched the contacts from the commercial database with the available contact databases of multiple industry associations in Switzerland as well as with the contact database of a leading Swiss IT consulting company to double-check for a comprehensive list. Then we screened every single contact to verify each company's existence and relation to the broader software industry. The overall contact screening took place in the summer and fall of 2014. From initially about 15,000 contacts, 4,955 hand-sorted contacts remained in the database.

Data collection was initiated in May 2015 using a commercial online survey tool (Qualtrics). Invitations for the survey were sent out by email to senior members of the companies. Six hundred thirty-two surveys were completed (12.75% response rate). To identify the complementors among these 632 companies, we asked whether they were collaborating with a platform owner. For this purpose, we defined our understanding of a software platform: *"Under software partner, we understand legally independent*

companies which develop own software based on a software platform [e.g. extension of SAP R/3], or configure an existing platform [e.g. parameterisation of SAP ERP in customer projects], and are members of the partner programme of the corresponding platform owner". From the 632 companies, 196 indicated to be in a relationship with a platform owner. These 196 companies were then asked questions about their relationship with their most important platform owner.

We screened the responses of the 196 companies that indicated to be in a relationship with a platform owner using the recommendations by Hair et al. (2006). We dropped 15 responses because they were either unengaged or showed missing values in more than 10% of the survey items (Hair, et al., 2006, p. 36). The data screening resulted in our final sample of 181 complete survey responses.

Appendix B and Table 6 show the characteristics of our final sample. Most complementors (76) indicated that Microsoft was their most important platform owner, followed by IBM (11), Apple (11), and SAP (10). Since Microsoft's desktop operating systems (e.g. Windows 10 and Windows 7) dominate the market for desktop operating systems, complementors might have mentioned Microsoft because they had hardly any option but to develop their software for Microsoft desktop operating systems. However, according to the information that 75 of the 76 Microsoft complementors provided in a free-text field, 69 (92%) mentioned software platforms other than Microsoft desktop operating system, including Microsoft Dynamics, Sharepoint, Azure,.Net, and Microsoft SQL. Hence, the vast majority of the Microsoft complementors extended or configured a software other than Microsoft desktop operating systems.

Measurement Contextualisation

The contextualisation procedure of the study's core constructs (i.e., perceived rule adequacy, perceived flexibility in practising rules, perceived benevolence in practising

rules, and complementor dedication[1]) followed the multi-step recommendations of MacKenzie et al. (2011). The first step involved a literature review of the broader governance literature, which led to the identification of constructs, such as rules, flexibility, benevolence, and dedication. Since these constructs were initially developed in other contexts, the second step focused on developing an understanding of how governance is different in the context of platform ecosystems (Huang, et al., 2013). For this purpose, we content-analysed two sets of documents: (1) the academic literature on platform governance (see *'Literature Review and Contextualisation'* for more details) and (2) the documents in which the rules of ecosystems are formalised. The latter document corpus entailed partner contracts, partner guides, and codes of conduct from major platform owners operating in Switzerland (i.e., Microsoft, SAP, IBM, Oracle, Google, Salesforce, Apple, and Adobe), resulting in 558 pages of analysed documents. We used these documents to arrive at a rich and contextualised understanding of the mechanisms through which rules may help secure the complementors' interests, resulting in our classification of three rule functions (protect, prevent, and promise). These three rule functions served as the basis for the three items of your rule adequacy construct (see Appendix D for detailed examples of these functions).

In a third step, after having gained an understanding of the nature of governance in platform ecosystems, we began to collaboratively adapt the original constructs from the broader governance literature to our context. While doing so, we placed great

[1] Dedication is conceptualized as an organisation-level construct instead of an individual-level construct. Similar to inter-organizational trust research, we therefore collect data at the organizational level by surveying the key individuals "through whom inter-firm relations come into effect" (Janowicz and Noorderhaven, 2006, p. 277). This approach is particularly appropriate in the context of our study, as partnership managers play an even more important role in software ecosystems than normal boundary spanners in traditional inter-organisational arrangements (Kude, et al., 2012; Sarker, Sarker, et al., 2012). The reason for this is that after a partnership is formed, only one (as opposed to several) dedicated boundary spanner of the platform owner is responsible for interaction with the complementor, while complementors, due to their limited size, usually also assign only one individual as boundary spanner.

emphasis on maintaining their original intentions. In a fourth step, we invited three experienced practitioners from complementor companies, and four senior IS scholars to review our constructs to assess and ensure the content validity of the resulting items. To that end, we asked both the scholars and the practitioners to provide feedback and to rate the extent to which each item captures each aspect of the construct domain (i.e. construct definition) using five-point Likert scales (Hinkin and Tracey, 1999). We used the information gleaned from this construct review to refine our items. In a fifth step, we formally specified the measurement model to conduct a pre-test in a culturally similar country (Austria). Based on an exploratory factor analysis of the collected data, we decided to use the constructs for our actual survey. Each of the final constructs used a five-point Likert scale and is listed in Table 2 with definitions, and references to both the original governance literature and the contextualisation literature. Appendix A provides further information regarding our constructs.

To identify relevant control variables, we reviewed prior qualitative and quantitative research on platform ecosystems and related fields. This led to the inclusion of the following seven control variables: age of the relationship, partner manager, complementor size, (seller-level) multi-homing, software integrator, same layer, and dependence. The control variables were crucial, not only to control for omitted variables but also to account for the complementors' self-selection into a platform (Antonakis et al., 2014; Heckman, 1979). For example, dependence may explain platform choice (i.e., self-selection into a platform) given that complementors who are highly dependent on their platform owner may choose to stay in a platform even under unfavourable governance (e.g., low perceived rule adequacy). Appendix A provides detailed information on the control variables, including arguments for their relevance (e.g., how the control variable helps to account for self-selection).

Instrument Validation

To confirm the factor structure (Gefen and Straub, 2005), we performed a confirmatory factor analysis (Hair, et al., 2006; Muthén and Muthén, 2002) based on the final sample (n=181) using IBM SPSS AMOS. Standardised Root Mean Square Residual (SRMR) below 0.8 and a comparative fit index (CFI) above 0.95 indicated goodness-of-fit, Composite Reliability (CR) values well above 0.7 indicated good or even excellent reliability (Hong, et al., 2014), and Average Variance Extracted (AVE) values well above 0.5 speak for strong convergent validity (see Table 3).

Table 3: Confirmatory Factor Analysis Results

Construct Indicators	Item Loading (T-Values)	Cronbach's Alpha (α)	CR	AVE
Perceived Rule Adequacy		0.85	0.91	0.77
RuleAdeq_1	0.92 (43.445**)			
RuleAdeq_2	0.92 (47.580**)			
RuleAdeq_3	0.79 (16.416**)			
Perceived Benevolence in Practising Rules		0.90	0.94	0.83
BenePrac_1	0.91 (46.04***)			
BenePrac_2	0.93 (32.54***)			
BenePrac_3	0.89 (17.79***)			
Perceived Flexibility in Practising Rules		0.89	0.93	0.81
FlexPrac_1	0.94 (15.16***)			
FlexPrac_2	0.94 (16.72***)			
FlexPrac_3	0.83 (6.63***)			
Perceived Dependence		0.85	0.90	0.68
Dep_1	0.82 (4.49***)			
Dep_2	0.75 (3.80***)			
Dep_3	0.89 (5.62***)			
Dep_4	0.83 (17.77***)			
Complementor Dedication		0.89	0.92	0.75
Ded_1	0.87 (33.07***)			
Ded_2	0.92 (55.39***)			
Ded_3	0.91 (36.25***)			
Ded_4	0.75 (14.85***)			

***p<.01

To corroborate discriminant validity, we first scrutinised whether each item loaded higher on its construct than on any other construct (Gefen and Straub, 2005). For each item, the difference between the loading of the item on its construct and the cross-loadings of the item on any other construct was well above 0.2. Second, the square roots

of the AVE values exceeded correlations between latent constructs. Specifically, the square root of the lowest AVE value (.68) was well above the highest correlation between the two latent constructs (.50) (see Table 4) (Gefen and Straub, 2005).

Table 4: Discriminant Validity: Inter-Construct Correlations (Bold: Square Roots of AVE)

		1	2	3	4	5
1	Perceived Rule Adequacy	**0.77**				
2	Perceived Benevolence in Practising Rules	0.50	**0.83**			
3	Perceived Flexibility in Practising Rules	0.20	0.36	**0.81**		
4	Perceived Dependence	-0.15	-0.12	-0.12	**0.68**	
5	Complementor Dedication	0.37	0.36	0.19	0.14	**0.75**

Given our reliance on a single instrument for gathering our data, common method bias is a potential threat to validity (Podsakoff et al., 2003). However, it has been shown that tests of interaction effects, which are at the heart of our article, are not threatened by common method bias (Siemsen et al., 2010). To examine the potential role of common method bias in testing the hypothesised main effect (i.e., H1), we applied the full collinearity variance inflation factors (VIF) technique, which was suggested by Kock (2009) and Kock and Lynn (2012).[2] For this purpose, we created a dummy variable based on random values from 0 to 1 on which we pointed at every construct of our model. Common method bias is indicated when the VIF is higher than an accepted conservative threshold of 3.3 (Kock, 2009). None of the VIF values was higher than 3.3 (with a range from 1.04 to 1.42), indicating that common method bias did not confound our results.

[2] There is some disagreement among scholars regarding the likelihood and nature of common method bias as calculated with the correlation marker technique, the confirmatory factor analysis marker technique, or the unmeasured latent method construct technique (Chin et al., 2012; Richardson et al., 2009). The full collinearity VIF technique has recently been suggested as a new technique that may overcome the limitations of alternative approaches.

Regression Approach

We tested our model by estimating regression models augmented with Heckman correction and cluster-robust standard errors. Heckman correction is a method specifically designed for tackling potential endogeneity due to self-selection (Heckman, 1979). More specifically, there is the possibility that complementors choose their primary platform based on unobserved factors that correlate with dedication and with the predictors of dedication in our model, which would result in biased, inconsistent estimates (Heckman, 1979). Heckman correction accounts for the potentially endogenous choice of platforms and removes such endogeneity by controlling for the likelihood of selecting a particular platform.

Heckman correction required building a selection model that predicts the likelihood of selecting a particular platform as well as a treatment model that controls for the likelihood of selection and thereby provides consistent estimates of the hypothesised effects. We built the selection model to predict the choice of Microsoft as the platform owner given that Microsoft was by far the most frequently selected platform in our sample (see also Appendix B). Selection models should include all predictors of the treatment model and exclusion restrictions, i.e., exogenous variables that help predict the selection variable (i.e., choice of Microsoft) but do not correlate with the dependent variable (i.e., dedication) (Clougherty et al., 2016). Table 5 shows the chosen exclusion restrictions. We used *Specific Sector* and *Public Administration* as exclusion restrictions, given that Microsoft had a strong focus on platforms addressing the needs of particular industries, such as Microsoft Dynamics for the public sector. Hence, complementors specialised in the needs of particular sectors were expected to be more likely to choose Microsoft as opposed to other platforms. At the same time, we were not aware of arguments leading us to expect that specialisation in the needs of a

particular industry should correlate with dedication. We also empirically verified this ($p>.1$ for bi-variate correlations). In a similar vein, we used *Enterprise Content Management* as an exclusion restriction because of the strong position of Microsoft Sharepoint in the Swiss Market. We verified that Enterprise Content Management did not correlate significantly with dedication ($p>.1$).

Table 5: Exclusion restrictions

Variable	Measurement
Industry: Specific Sector	1 if the complementor addresses the requirements of a particular sector; 0 otherwise
Industry: Public Administration	1 if the complementor addresses the needs of public sector organisations; 0 otherwise
Product: Enterprise Content Management	1 if the complementor develops or implements enterprise content management solutions; 0 otherwise

Our regression approach also relied on cluster-robust standard errors, given the possibility that observations related to the same platform owner (i.e., the same cluster) could correlate. Such correlations would violate the regression assumption of independent error terms. Cluster-robust standard errors account for these correlations by adjusting the confidence intervals of the regression coefficients. We performed our analysis using the etregress command in Stata version 15 with maximum likelihood estimation, which allowed the use of cluster-robust standard errors.

To test our hypotheses, we built upon a four-step hierarchical regression strategy (see Table 8). In the first step, we included all control variables (Model 1). In the second step, we added all the main effects of the hypothesised predictors (Model 2). In the third step, we added all two-way interactions (Model 3), and in the fourth step, the hypothesised three-way interaction effect (Model 4). We verified that the residuals of all models followed normal distributions. Moreover, we verified that VIF were below 10 (highest value: 1.61), indicating thus no concerns with multicollinearity.

To explore the role that the high fraction of Microsoft complementors played in our results, we performed a post-hoc analysis in which we removed the Microsoft complementors from the sample. We used a Heckman selection model (Stata command *Heckman*) to estimate this regression model.

Results

Regression Results

Table 6 provides descriptive statistics (additional descriptive statistics are provided in Appendix B), Table 7 shows the correlation matrix, and the regression results are presented in Table 8. The first column of Table 8 shows the results related to the control variables (Model 1). In our treatment model, software integrator (ß=0.30, $p<0.01$), partner manager (ß=0.61, $p<0.001$), and dependence (ß=0.24, $p<0.001$) were significant positive predictors of complementor dedication. Moreover, Microsoft was a significant, negative predictor (ß=-.70, $p<0.01$). The other control variables were statistically insignificant. The selection model shows that all exclusion restrictions (specific sector, public administration, enterprise cloud management) were significant, supporting their suitability for identifying platform selection. The Wald test of independent equations was significant ($p<.05$), suggesting that self-selection of Microsoft does indeed produce endogeneity (which the model corrects for).

The second column (Model 2) shows the main effects of the three predictors of our theoretical model. H1 predicted a positive relationship between perceived rule adequacy and complementor dedication. In support of H1, the results show a significant positive association (ß=0.26, $p<0.01$). The main effect of perceived flexibility was negative and not significant (ß=-.06, $p>0.05$). The main effect of perceived benevolence was positive and not significant (ß=0.24, $p>0.05$). Thus, H2a and H2b are not

supported. The log likelihood ratio test shows that model 2 is preferable over model 1 ($p<.001$), showing that our independent variables explain significant variance in complementor dedication beyond of what is explained by control variables such as dependence and partner manager.

The third column (Model 3) includes the two-way interaction effects, which allowed testing H3a and H3b. H3a and H3b predicted that the relationship between rule adequacy and complementor dedication is stronger when rules are practised with a higher degree of benevolence (H3a) and flexibility (H3b), respectively. Model 3 shows insignificant two-way interactions between rule adequacy and benevolence (ß=.05, $p>0.05$) and between rule adequacy and flexibility (ß=-.05, $p>0.05$)—providing no support for H3a and H3b.

The fourth column (Model 4) includes the three-way interaction effect, which allowed testing H3c. H3c predicted that the relationship between perceived rule adequacy and complementor dedication is strongest when both perceived benevolence and perceived flexibility in practising rules are high. Model 4 shows a significant positive three-way interaction (ß=0.09, $p<0.001$). Moreover, the log likelihood ratio test shows that model 4 is preferable over model 3 ($p<.01$). Overall, this provides support for the three-way interaction hypothesised in H3c.

Table 6: Descriptive Statistics

		Min.	Max.	Mean	Std. Dev.
1	Complementor Dedication	1	5	3.4	0.91
2	Perceived Rule Adequacy	1	5	3.37	0.89
3	Perceived Flexibility in Practising Rules	1	5	2.99	0.91
4	Perceived Benevolence in Practising Rules	1	5	3.28	0.78
5	No. of Employees (Full Time Equivalents)	0.15	400	25.08	56.06
6	Multi-homing	0	1	0.51	0.5
7	Software Integrator	0	1	0.45	0.5
8	Partner Manager	0	1	0.55	0.5
9	Relationship Age	0	40	11.12	7.79
10	Same Layer	0	1	0.53	0.5
11	Perceived Dependence	1	5	3.07	1.06
12	Microsoft	0	1	0.42	0.49

Table 7: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12
1	Complementor Dedication	1.00	.37**	.18*	.36**	.10	.07	.17*	.39**	-.10	.21**	.13	-.07
2	Perceived Rule Adequacy	.37**	1.00	.20**	.49**	-.02	.06	.10	.23**	-.07	-.01	-.15*	.03
3	Perceived Flexibility in Practising Rules	.18*	.20**	1.00	.35**	.07	.01	.13	.21**	-.06	.16*	-.12	-.17*
4	Perceived Benevolence in Practising Rules	.36**	.49**	.35**	1.00	.00	.07	.16*	.19*	-.12	-.05	-.12	.04
5	No. of Employees	.10	-.02	.07	.00	1.00	.09	.03	.29**	.13	.18*	-.12	-.03
6	Multi-homing	.07	.06	.01	.07	.09	1.00	.11	.07	.02	.01	-.29**	-.29**
7	Software Integrator	.17*	.10	.13	.16*	.03	.11	1.00	.05	.04	.14	.00	.01
8	Partner Manager	.39**	.23**	.21**	.19*	.29**	.07	.05	1.00	-.11	.12	-.05	-.17*
9	Relationship Age	-.10	-.07	-.06	-.12	.13	.02	.04	-.11	1.00	.02	.15*	.06
10	Same Layer	.21**	-.01	.16*	-.05	.18*	.01	.14	.12	.02	1.00	.00	-.05
11	Perceived Dependence	.13	-.15*	-.12	-.12	-.12	-.29**	.00	-.05	.15*	.00	1.00	.24**
12	Microsoft	-.07	.03	-.17*	.04	-.03	-.29**	.01	-.17*	.06	-.05	.24**	1.00

n = 181 *p <.05, **p <.01

Table 8: Regression Results

	Model 1 Controls Only	Model 2 + Main Effects	Model 3 + Two-way Interaction Effects	Model 4 +Three-way Interaction Effects
Treatment Model				
Intercept	-.31 (.20)	-.23 (.17)	-.31 (.20)	-.28 (.18)
No. of Employees	.01 (.06)	.05 (.06)	.05 (.06)	.06 (.06)
Multi-homing	.01 (.08)	.00 (.11)	.02 (.11)	.02 (.12)
Softw. Integrator	**.30** (.10)**	**.18* (.07)**	.16 (.09)	**.17* (.08)**
Partner Manager	**.61*** (.13)**	**.42*** (.10)**	**.43*** (.10)**	**.44*** (.09)**
Relationship age	-.09 (.10)	-.06 (.09)	-.06 (.08)	-.04 (.08)
Same Layer	.26 (.16)	**.34*** (.08)**	**.34*** (.08)**	**.29*** (.08)**
Dependence	**.24*** (.05)**	**.29*** (.04)**	**.28*** (.05)**	**.31*** (.05)**
Microsoft	**-.70** (.33)**	**-.63* (.27)**	-.52 (.32)	-.58 (.33)
Rule Adequacy	-	**.26** (.09)**	**.26** (.08)**	**.22** (.07)**
Flexibility	-	-.06 (.07)	-.05 (.07)	-.10 (.08)
Benevolence	-	.24 (.13)	.23 (.13)	.19 (.11)
Rule Adequacy × Flexibility	-	-	.05 (.05)	.00 (.04)
Rule Adequacy × Benevolence	-	-	.05 (.04)	**.06* (.03)**
Flexibility × Benevolence	-	-	-.04 (.07)	.00 (.07)
Rule Adequacy × Flexibility × Benevolence	-	-		**.09*** (.02)**
Selection Model				
Intercept	-.03 (.71)	-.03 (.68)	.05 (.70)	.04 (.69)
Specific Sector	**.49*** (.09)**	**.53*** (.10)**	**.53*** (.12)**	**.54*** (.12)**
Public Administration	**.38*** (.09)**	**.40*** (.11)**	**.43*** (.12)**	**.42*** (.12)**
Enterprise Content Management	**.35* (.17)**	**.35* (.16)**	.28 (.16)	.29 (.16)
No. of Employees	.02 (.08)	.04 (.09)	.04 (.07)	.04 (.07)
Multi-homing	**-.72*** (.16)**	**-.79*** (.14)**	**-.74*** (.13)**	**-.74*** (.13)**
Softw. Integrator	.12 (.16)	.12 (.15)	.12 (.13)	.11 (.14)
Partner Manager	**-.47*** (.12)**	**-.55*** (.15)**	**-.57*** (.15)**	**-.57*** (.14)**
Relationship age	.00 (.15)	.00 (.14)	-.02 (.15)	.00 (.14)
Same Layer	-.06 (.11)	.05 (.12)	.01 (.12)	.00 (.13)
Dependence	**.24** (.09)**	**.25** (.09)**	**.25** (.09)**	**.26* (.10)**
Rule Adequacy	-	**.15* (.06)**	**.14* (.06)**	**.13* (.05)**
Flexibility	-	**-.27* (.10)**	**-.29* (12)**	**-.30* (.12)**
Benevolence	-	.18 (.09)	**.20** (.07)**	**.19** (.07)**
Rule Adequacy × Flexibility	-	-	**-.15** (.05)**	**-.15* (.06)**
Rule Adequacy × Benevolence	-	-	-.02 (.04)	-.02 (.03)
Flexibility × Benevolence	-	-	-.06 (.08)	-.05 (.08)
Rule Adequacy × Flexibility × Benevolence	-	-	-	.02 (.05)
Log likelihood	-337.21	-316.08	-311.96	-.308.21
2 * Log likelihood difference (df)	-	**42.26*** (3)**	**8.24* (1)**	**7.48** (1)**
Wald test of independent equations: Chi-squared	**4.87***	**5.54***	2.34	2.47

*p <.05, **p <.01, ***p <.001, n = 181, Heckman regression with cluster-robust standard errors (cluster: platform owner), all non-binary variables standardised

Model Robustness

We assessed the robustness of our findings by examining alternative model specifications. To assess the potential threat that interaction effects can be artefacts of quadratic effects (Carte and Russell, 2003), we added the quadratic effects of our hypothesised predictors. None of the quadratic effects was significant, and their inclusion did not change the statistical significance level of any relationship (not tabulated). We also examined the alternative explanation that our results on interaction effects could be due to spurious effects caused by an interaction between dependence and perceived rule adequacy. When we added the interaction between dependence and perceived rule adequacy to Model 2, 3, or 4, this interaction was not significant. Moreover, the statistical significance level of our hypothesised interactions remained unchanged (not tabulated).

Post-hoc Analysis: Non-Microsoft Subsample

Given the high share of complementors stating Microsoft as their most important platform owner, we performed a post-hoc analysis to explore how the results change if Microsoft complementors are removed from the analysis. To this end, we estimated a Heckman selection model, wherein the treatment model relied on data only from those complementors that did not state Microsoft as their most important platform owner. The results are shown in Appendix C. Unlike in the full sample, perceived benevolence had a significant positive association with dedication in this sample (see Model 5 in Appendix C, ß=0.48, $p<0.001$). All other findings related to our hypotheses were unchanged in terms of statistical significance. In particular, perceived rule adequacy had a significant positive, although slightly weaker, association with dedication (ß=0.14, $p<0.05$). Moreover, as in the full sample, the three-way interaction between perceived

rule adequacy, perceived flexibility, and perceived benevolence was positive and significant (ß=0.09, p<0.001).

Discussion

Figure 3 presents plots of our interaction effect to facilitate their in-depth analysis and to illustrate the importance of the interaction effects[3]. The plot illustrates the interaction effects, with low (high) values referring to values that are 1.5 standard deviations below (above) the sample mean. Regarding these interaction effects, two observations are noteworthy: the slopes of the lines and the absolute values of complementor dedication. The steeper a positive slope, the stronger perceived rule adequacy contributes to complementor dedication. In this regard, the line referring to high benevolence and high flexibility in practising rules (see the black line with triangles in Figure 3) shows the steepest slope. This illustrates that high perceived rule adequacy contributes the strongest to complementor dedication when complementors perceived the rule practices to be both flexible and benevolent (predicted in H3c). Interestingly, the line referring to low benevolence and low flexibility also shows a positive slope (see the grey line with squares). This indicates that high rule adequacy can translate into higher dedication when both perceived flexibility and perceived benevolence of practising rules are low, although the relationship is not as strong as when both are high.

Conversely, high rule adequacy hardly contributes to dedication when benevolence is high and flexibility is low, as indicated by the relatively flat slopes (see the grey line with triangles). Moreover, high rule adequacy does not contribute to

[3] Although the effect size of interaction effects is commonly indicated by R^2 values (Carte and Russell, 2003), our use of maximum-likelihood estimation prevents us for using R^2 as an indicator of effect size (Greene, 2012, pp. 524-536). We therefore rely on interaction plots to illustrate the importance of interaction effects.

dedication when benevolence is low and flexibility is high, as shown by the relatively flat and even negative slope of the black line with squares.

Overall, the stark contrast between the four slopes (ranging from steep positive to slightly negative slopes) underlines the importance of the three-way interaction. Thus the benefits perceived rule adequacy vary strongly depending on the extent to which rules are perceived to be practised with flexibility and benevolence.

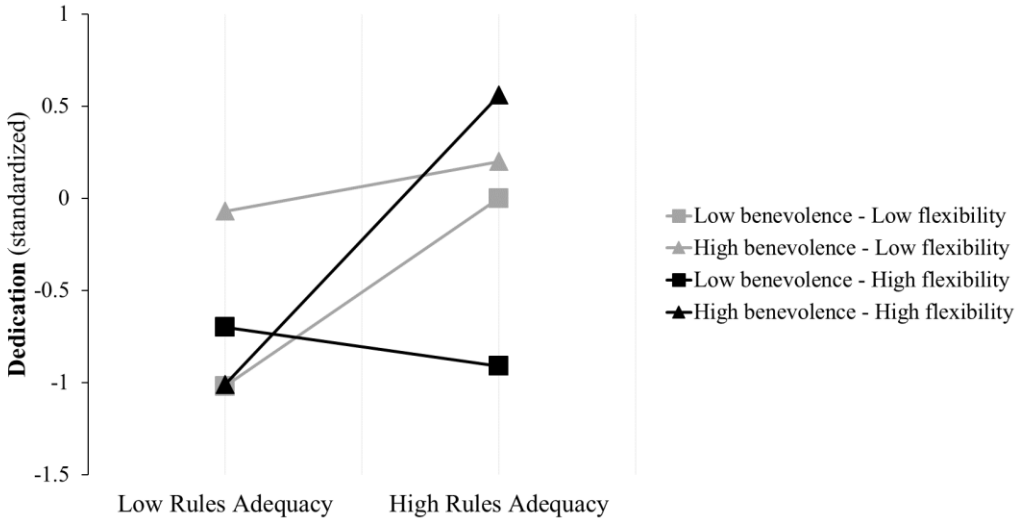

Figure 3: Interaction Plots

With regards to absolute values, the interaction plot shows that complementor dedication is highest when the complementors perceive the rules as highly adequate and the rule practices as both highly flexible and highly benevolent (predicted standardised complementor dedication value of 0.56; see the black triangle in the upper right-hand area of the interaction plot). Importantly, this value is higher than the values predicted when either of the three governance dimensions is low (as predicted in H3a and H3b). It is also insightful to note that complementor dedication is always below the sample mean (i.e., standardised values below 0) when perceived rule adequacy is low (see the values in the left-hand part of the plot). For instance, complementors are substantially less dedicated when they perceive the rule practices as being both highly flexible and highly benevolent but perceive the rules themselves as barely adequate (predicted

complementor dedication value of -1.01; see the black triangle in the lower left-hand area of the interaction plot). This emphasises the critical role of perceived rule adequacy, as argued in H1. The absolute values depicted in Figure 3 also show that our three predictors, and their interaction, explain important variance of dedication beyond of what is explained by control variables, with predicted standardised values for dedication ranging from -1.01 to 0.56 for high versus low levels of our three predictors.

In sum, our analysis of interaction effects generally supports the idea of complementary interactions between rule adequacy and benevolent and flexible rule practices. However, this interplay is more complicated than expected: We find no support for main effects of flexible practices (H2a) or benevolent practices (H2b) and no support for their two-way interactions (i.e., H3a and H3b). Moreover, we find that the benefits from an increase in rule adequacy are indeed strongest when rules are practised with high benevolence and high flexibility—confirming H3c. However, another feasible strategy for leveraging adequate rules is to practice them with high rigidity, i.e., neither with flexibility nor with benevolence.

Our post-hoc analysis using the subsample of Non-Microsoft complementors adds two insights to this discussion. First, perceived rule adequacy and its three-way interaction with perceived flexibility and perceived benevolence predict dedication even if Microsoft complementors are removed from the sample. This indicates that key findings are not an artefact of the dominant role of Microsoft in our sample. Second, while the effect of perceived rule adequacy was somewhat weaker in the Non-Microsoft sample than in the full sample, the effect of perceived benevolence in practising rules was stronger and statistically significant in the Non-Microsoft sample. This suggests that the dedication may depend on a different degree on perceived rule adequacy and perceived benevolence depending on characteristics of the platform.

Contributions and Implications

This study theorised and tested how rule adequacy and the way in which these rules are practised independently and jointly explain the dedication of complementors to a platform owner. As part of our theorising, we adapted established concepts from the governance literature to the context of platform ecosystems and therefore extended the applicability of traditional dyadic governance concepts to contemporary inter-organisational arrangements with a one-to-many structure (Hong, et al., 2014). Our theory contextualisation provided the stage to develop six hypotheses on the independent and symbiotic effects of rule adequacy and rule practices on complementor dedication, which we tested using survey data from 181 platform partnerships. We find that rule adequacy independently strengthens complementor dedication and that this relationship is strongest when rule practices are simultaneously benevolent and flexible in contrast to being either benevolent or flexible. We also find that another effective strategy for leveraging adequate rules is to be highly rigid, i.e., to practice rules with low flexibility and low benevolence. These findings have important implications for qualitative and quantitative research on platform governance and the broader governance literature.

Theoretical Contributions

The overarching contribution of this study is the provision of a fine-grained understanding of governance-based *complementor dedication*. More specifically, our study explains variation in complementor dedication by analysing the independent and joint effects of governance design (captured as rule adequacy) and practices (captured as flexible and benevolent rule practices). This fine-grained understanding extends prior research on platform governance in three respects.

First, by introducing *complementor dedication* as a governance objective, we extend prior platform governance research that primarily sought to explain the sheer numbers of complementors or complements (McIntyre and Srinivasan, 2017). While we do not contest the importance of understanding why complementors join platforms (Economides and Katsamakas, 2006; Huang, et al., 2013; Kude, et al., 2012), introduce new software complements (Boudreau, 2012; Boudreau and Jeppesen, 2015; Cennamo and Santalo, 2013; Song et al., 2017), or abandon platforms (Tiwana, 2015; Zhu and Liu, 2018), we also note that prior platform governance research has been criticised for black-boxing other vital attributes of platform owner-complementor relationships (McIntyre and Srinivasan, 2017). Our dependent variable, complementor dedication, addresses this issue by capturing variation in what the highly autonomous complementors *do* once they have joined a platform by focusing on their devotion and faithfulness to this platform as well as their willingness to invest in it.

Second, by identifying a significant positive association between rule adequacy and complementor dedication, our study is the first quantitative-confirmative study to integrate a central finding of recent qualitative-exploratory research on platform governance: in designing standardised rules, influential international platform owners should not only strive for standardisation but also be sensitive to the needs of the comparatively small complementors (Foerderer, et al., 2019; Huber, et al., 2017; Sarker, Xiao, et al., 2012; Wareham, et al., 2014). This extends prior quantitative research on platform governance by incorporating the, with few exceptions (e.g., Altman, 2016; Rickmann et al., 2014; Schreieck et al., 2019), overlooked perspective of complementors in the design calculus of effective platform governance (McIntyre and Srinivasan, 2017). Beyond that, our concept of rule adequacy extends prior qualitative-exploratory work by elaborating the exact properties of complementor-sensitive rules

through a comprehensive content analysis of the rules in eight major platform ecosystems. This content analysis revealed that complementor-sensitive rules have the following properties: They have mechanisms that serve the three functions of protection, prevention, and promise. This also contributes to prior research that has investigated an alternative governance strategy to be sensitive to the needs of complementors: To grant complementors with high degrees of freedom, sometimes to the extent that platform owners open the core platform resources allowing them to adapt the platform itself (Karhu et al., 2018). This, however, bears the danger of promoting forking, which can be seen as an extreme form of undedicated complementor behaviour (Karhu, et al., 2018). Our findings suggest that an effective governance strategy that circumvents such undesirable behaviours but is still complementor-sensitive is to design rules with strong protections and safeguards for complementors and then show flexibility situationally—rather than to grant unlimited freedom.

Third, the significant positive three-way interaction quantitatively underscores what qualitative research has previously hinted at: platform owners need to show flexibility and goodwill towards their complementors by engaging in dyadic-level variations in rule performances (Foerderer, et al., 2019; Huber, et al., 2017; Sarker, Xiao, et al., 2012; Wareham, et al., 2014). Our findings extend the idea of variation in rule performances with an understanding of the exact and complex relationship between such practice variation and rule design. More specifically, we found that neither flexibility nor benevolence does have significant main effects on complementor dedication (H2a and H2b not supported); they only affect dedication *in conjunction with* rule adequacy (H3c confirmed). In doing so, our findings oppose the idea of flexibility and benevolence as alternatives to adequate rules and favour instead of the idea of rule design and practices as a system of interlocked choices: Flexible and benevolent rule

practices cannot compensate for the adverse effects of inadequate rules. Instead, such practices are only useful in promoting dedication if they build on adequate rules. Moreover, our findings on flexible and benevolent rule practices resonate with the idea of rewarding successful complementors through selective promotion (Rietveld et al., 2019). This research has investigated the antecedents of selectively promoting individual complementors. Hence, our analysis of the consequences of flexible and benevolent rule practices fruitfully complements this research.

As a second contribution, our findings on the symbiotic interplay of rule design and rule practices bear important implications for the broader governance literature outside the context of platform ecosystems. In other contexts, such as IS outsourcing, mechanisms aimed at benevolence and flexibility were shown to have both positive main and two-way interaction effects (Gopal and Koka, 2012; Poppo and Zenger, 2002; Tiwana, 2009). This suggests that in contexts other than platform ecosystem flexibility and benevolence are beneficial irrespective of the characteristics of the situations, i.e., in situations in which other types of governance mechanisms such as contracts are weak (due to the main effects of flexibility or benevolence), in situations in which those mechanisms are strong (due to the two-way interaction effects), and irrespective of whether benevolence and flexibility are combined or occur in isolation. Our findings unveil that this differs considerably in the context of platform ecosystems: In our full sample, flexibility and benevolence did neither exert positive main effects nor did they interact with other types of governance in simple two-way interactions. Instead, our findings suggest that flexibility and benevolence are only valuable strategies if the other type of governance mechanism is of high quality (i.e., when rule adequacy is high). Thus, while in other inter-organisational contexts, higher levels of either flexibility or benevolence are effective governance strategies, such middle-ground solutions may not

suffice in platform ecosystems. Even highly rigid governance practices—i.e. when both flexibility and benevolence are absent—are preferable over governance practices that are either one or the other (but not both). A potential explanation for this three-way interaction could be that only platform owners that are both flexible and benevolent can simultaneously respond to unforeseen circumstances *and* demonstrate their commitment to the broader relational values that govern these relationships (Gulati, et al., 2012; Tiwana, et al., 2010).

As a final contribution, our findings add to the longstanding complements versus substitutes debate in the governance literature (Carson, et al., 2003; Goo, et al., 2009; Huber, et al., 2013; Poppo, 1995; Tiwana, 2010). In the context of platform ecosystems, prior research implicitly took a substitutional view by arguing that sophisticated standards enable platform owners to orchestrate large ecosystems while keeping complementors at arm's length (Parker and van Alstyne, 2008; Wareham, et al., 2014), which obviates the need for flexible and benevolent relational practices. Our finding, that one surprisingly effective strategy is to design highly adequate rules and to practice these rules with high rigidity lends support to this perspective. However, our findings on the positive three-way interaction even more strongly support the competing complementarity perspective, i.e., that the effects of standards can be strengthened through flexible and benevolent relational practices. Thus, we show that in the context of platform ecosystems, different governance mechanism can be both complements and substitutes.

Endogeneity Threats

A validity threat in any cross-sectional correlation research such as ours is endogeneity. In our context, endogeneity may result from self-selection of the complementors into platform ecosystems. Although it is difficult to dispel this potential threat entirely, three

aspects of our study substantially attenuate endogeneity concerns. First, we included several, in part highly significant, control variables (e.g. dependence, partnership age, partner manager, and complementor size) to account for the fact that different complementors could tolerate different values of perceived rule adequacy before they switch platforms. Since self-selection bias can be conceived as an omitted variables problem (Heckman, 1979), controlling for the variables that affect self-selection is an effective strategy for reducing endogeneity. Second, given the difficulties of controlling for all factors that could potentially affect platform selection, we used Heckman regression to address the selection bias that is due to factors not included in our list of control variables. The highly significant exclusion restrictions and the significant Wald test indicate that our Heckman correction is working. Third, although self-selection may operate to some extent in platform ecosystems, it operates at relatively low speed. The average partnership age in our sample was 11 years, indicating that complementors do not frequently revert their platform choices in response to their perceptions of governance (which would present an endogeneity problem). The tendency to stick to a platform for a long time might be explained by the substantial investments that are typically required to enter and benefit from a partnership with a platform owner.

In light of these three aspects of our study, it is unlikely that our key findings are artefacts of endogeneity problems.

Future Research and Limitations

Our study opens up several avenues for future research, some of which result from the limitations of our study. First, although we are using an extensive list of control variables and Heckman correction to address endogeneity, we cannot entirely dispel endogeneity concerns. Future research could rely on longitudinal or quasi-experimental

methods to ascertain the causal effects indicated by our data.

Second, although our sample includes a variety of platform ecosystems with differing characteristics, we do not theorise or examine how platform characteristics affect the relationships investigated in our study. Indeed, some governance mechanisms might be more critical on some platforms than on others, as indicated by our finding that the effect of perceived rule adequacy was somewhat weaker in the Non-Microsoft sample while the effect of perceived benevolence in practising rules was stronger and statistically significant in the Non-Microsoft sample. As with Constantinides et al. (2018) we, therefore, recommend that future research investigate how the relationship between governance and dedication differs depending on the characteristics of the platforms.

Third, closely related to this is the unanswered question about the causes of different perceptions of rules by complementors. Future research may examine how different properties of rules interplay with other factors (e.g. the platform architecture, technological change) affecting the perceptions of these rules. Such research may consider how dynamic changes in platforms (e.g. in terms of its architecture or feature set) may require follow-up governance adaptations. For example, it was shown that platforms that undergo generational transitions might harm the ability of complementors to sustain their superior performances (Kapoor and Agarwal, 2017). Consequently, one may ask how platform governance should be adapted so that complementors can see a generational transition as an opportunity rather than a threat.

Fourth, although our results suggest that platform owners could maximise value co-creation by situationally practising rules with flexibility and benevolence, we still know little about when and how exactly they should do so. In this regard, future qualitative research should provide more fine-grained insights.

Fifth, our study assumes that governing towards higher dyadic-level complementor dedication is per se desirable. However, we do not look at potentially adverse effects of dyadic-level flexibility and benevolence for the ecosystem as a whole. As an example, flexibility and benevolence in favour of one individual complementor may lead to envy and resentment among other complementors that do not receive similar preferential treatment. Therefore, future research should take a closer look at the possible "dark side" of flexible and benevolent rule practices for entire ecosystems.

Managerial Implications

Dedicated complementors are a critical factor in differentiating the ecosystem from those of its competitors. Our study provides two pieces of advice for nurturing complementor dedication. First, platform owners should heavily invest in designing adequate rules by stipulating sophisticated mechanisms that serve three distinct functions (i.e., protect, prevent, promise). For example, platform owners should design rules that ensure valuable benefits with high legal certainty to their complementors. Due to the strong positive main effect of rule adequacy, such investments are likely to always pay off in the form of complementor dedication. Our second piece of advice pertains to the flexibility and benevolence with which platform owners should practice rules. Here, our advice is that platform owners should only adapt governance practices to the needs of individual complementors if they strive for particularly high levels of complementor dedication and are confident that their rules are perceived to be adequate. If this is the case, practice variations will allow platform owners to elevate complementor dedication to the highest level. If this is not the case, platform owners should play it safe and practice the rules with high rigidity.

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Appendix A: Construct Measures

The constructs used were embedded in an industry-wide survey with a particular focus on partnerships in the software industry. First, the respondents were asked to complete questions about the nature of their company (e.g., standard software manufacturer, custom software manufacturer, software integrator, etc.) and operating numbers (e.g., revenue, R&D expenditures, number of employees, etc.). Second, software partnerships were defined. Third, the respondents were asked to identify all the platform owners they maintain partnerships. Fourth, the respondents were asked to identify the most important platform owner among the previously listed. The name of the most important platform owner subsequently replaced the term *platform owner* in the measurements. All independent and dependent constructs used multi-item five-point Likert measures, from 'strongly disagree' to 'strongly agree'.

Independent Variables

Table 9: Perceived Rule Adequacy

Definition:	The extent to which complementors perceive the ecosystem-wide rules to secure their own interests as opposed to only securing the interests of the platform owner.	
Measures	Measured through three items based on a 5-point Likert scale: The rules of conduct in the partner network (e.g., standard partnership agreement, guidelines, code of conduct) …	
	...protect the interests of our company vis-à-vis platform owner.	Based on Child, et al. (2003); Gefen and Pavlou (2012) Contextualised with Huber, et al. (2017); Tiwana, et al. (2010); Wareham, et al. (2014)
	...prevent inappropriate behaviour on the part of the platform owner.	Based on Child, et al. (2003); Gefen and Pavlou (2012) Contextualised with Huber, et al. (2017); Tiwana, et al. (2010); Wareham, et al. (2014)
	...ensure that our company will receive the promised partnership benefits from the platform owner.	Based on Child, et al. (2003); Gefen and Pavlou (2012) Contextualised with Huber, et al. (2017); Tiwana, et al. (2010); Wareham, et al. (2014)
Cronbach's α:		0.850
CR:		0.910
AVE:		0.771

Table 10: Perceived Flexibility in Practising Rules

Definition:	The extent to which complementors perceive the enactment of ecosystem-wide rules (e.g., rules, codes of conduct, or partnership charters) by the platform owner as responsive.	
Measures:	Measured through three items based on a 5-point Likert scale: The rules of conduct of the partner network (e.g., standard partnership agreement, guidelines, code of conduct)...	
	…are interpreted flexibly.	Based on Boyle, et al. (1992); Heide and John (1992) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
	…are handled as needed in a given situation.	Based on Boyle, et al. (1992); Heide and John (1992) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
	…allow room for interpretation.	Based on Boyle, et al. (1992); Heide and John (1992) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
Cronbach's α:	0.886	
CR:	0.929	
AVE:	0.814	

Table 11: Perceived Benevolence in Practising Rules

Definition:	The extent to which complementors perceive the enactment of ecosystem-wide rules (e.g., rules, codes of conduct, or partnership charters) by the platform owner as kind and generous.	
Measures:	Measured through three items based on a 5-point Likert scale: The interpretation of the rules of conduct in the partner network (e.g., standard partnership agreement, guidelines, code of conduct) is always …	
	…in the interest of our partnership.	Based on McKnight, et al. (2002) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
	…in favour of our partnership.	Based on McKnight, et al. (2002) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
	…beneficial to our partnership.	Based on McKnight, et al. (2002) Contextualised with Huber, et al. (2017); Wareham, et al. (2014)
Cronbach's α:	0.897	
CR:	0.935	
AVE:	0.829	

Dependent Variable

Table 12: Complementor Dedication

Definition:	The degree to which a complementor is devoted, faithful, and willing to invest in the partnership with a platform owner.	
Measures:	Measured through four items based on a 5-point Likert scale: Our company intends to…	
	...intensify its partnership with platform owner.	Based on Anderson (1985); Heide and John (1992) Contextualised with Tiwana (2015)
	...intensify existing personal contacts with employees of the platform owner.	Based on Anderson (1985); Heide and John (1992) Contextualised with Tiwana (2015)
	...establish new personal contacts with employees of the platform owner.	Based on Anderson (1985); Heide and John (1992) Contextualised with Tiwana (2015)
	...acquire additional certificates from platform owner.	Based on Anderson (1985); Heide and John (1992) Contextualised with Tiwana (2015)
Cronbach's α:		0.886
CR:		0.922
AVE:		0.749

Control Variables

Table 13: Control Variables

Variable:	Measures:	Relevance:	References:
Partnership Age:	The number of years the complementor was in a partnership with the platform owner.	Complementors might be mainly dedicated in the first few years of a partnership, when they establish personal contacts and invest in resources, suggesting a negative relationship between relationship age and dedication. Relationship age might also explain platform choice (i.e., self-selection into a platform) given that complementors may find it more difficult to switch their platform after they have made significant investments into the platform over a more extended period.	Based on Lee and Kim (1999), Tiwana (2015), and Ring and van de Ven (1994), contextualised to reflect our particular context.
Partner Manager:	1 if the complementor was assigned a partner manager; 0 otherwise	Complementors might be more dedicated when they are assigned a dedicated partner manager (in contrast to being randomly assigned members of a partner management organisation). Moreover, having a partner manager may also explain platform choice because complementors having a partner manager might be more inclined to stay in a platform with unfavourable governance (e.g. low perceived rule adequacy) than complementors without a partner manager.	Based on Huber, et al. (2017), contextualised to reflect our particular context.
Complementor Size:	The count of full time employed equivalents in Switzerland (logarithmic transformation)	Larger complementors are more likely to create significant co-creation opportunities that make platform owners willing to vary rule practices. Moreover, complementors size might affect platform choice given that some platforms (e.g. mobile app platforms) might be more amenable for small complementors than others (e.g. enterprise software platforms).	Based on Roberts and Grover (2012), contextualised to reflect our particular context.
Multi-homing (seller-level):	1 if the complementor complements platforms of more than one platform owner; 0 otherwise	Multi-homing complementors might be less dedicated to a focal platform because they spread their efforts across platforms. Moreover, multi-homing may explain platform choice given that multi-homing might be easier to implement on some platforms (e.g. mobile app platforms) than on others (e.g. enterprise software platforms, where apps might be specific to the platform owner's enterprise software). Mover, complementors relying on multi-homing might be more inclined to stay at a platform despite unfavourable governance (e.g. low perceived rule adequacy).	Based on Bakos and Katsamakas (2008); Choi (2010); Landsman and Stremersch (2011); Mantena and Saha (2012); Tiwana (2015), contextualised to reflect our particular context.
Software Integrator:	1 if the primary business purpose of a complementor is software integration; 0 otherwise	Being a software integrator might explain platform selection because software integrators might find it easier than software product companies to switch platforms given that software integrators will typically not face the same sunk costs for giving up or migrating existing software solutions.	Based on Brusoni and Prencipe (2001), contextualised to reflect our particular context.
Same Layer:	1 if the complement and the platform reside on the same layer (application software layer, middleware layer, systems software layer); 0 otherwise	Complementors that reside on the same layers in the software stack as the platform may generate higher value, thus fostering complementor dedication.	Based on Gao and Iyer (2009); Kude, et al. (2012), contextualised to reflect our particular context.
Dependence:	Our company…	More dependent complementors may be more dedicated. Moreover, dependence may explain platform selection given that more dependent complementors are more likely to stay in an ecosystem when they perceive governance to be unfavourable (e.g. low perceived rule adequacy).	Based on Ganesan (1994), Lee and Kim (1999) Lusch and Brown (1996), Noordewier et al. (1990), and Rao et al. (2007), contextualised to reflect our particular context.
	...is dependent on platform owner.		
	...has no good alternative to the platform owner.		
	...would have difficulty in replacing platform owner.		
	...would have difficulty achieving its own goals in the event of the dissolution of the partnership with platform owner.		
	Cronbach's α: 0.846		
	CR: 0.894		
	AVE: 0.678		

Appendix B: Descriptive Statistics

Table 14: Platform owners[4] that our respondents named as most important for them

	Microsoft	Oracle	Apple	IBM	SAP	Google	Adobe	Other
Number of mentions:	76	14	11	11	10	5	4	50

Table 15: Number of complemented platform owners (≠ platforms)

	1	2	3	4	more than 4
Number of mentions:	88	40	29	14	10

Table 16: Industry focus of complementors

	Industry Specific	Industry Unspecific	Both Industry Specific and Unspecific
Number of Mentions:	48	58	75

[4] Platform owners may provide multiple platforms. For example, Microsoft not only provides an operating system (e.g., Windows 10) and an office suite (e.g., Microsoft Office 365), but also server and development platforms (e.g., Sharepoint,.NET, Exchange Server) or cloud platforms (e.g., Azure).

Appendix C: Supplementary Regression Results

Table 17: Regression Result in the Sample without Microsoft Complementors

	Model 5 Controls and Main Effects, Excluding Microsoft Complementors	**Model 6 +Two-way and Three-way Interaction Effects, Excluding Microsoft Complementors**
Treatment Model		
Intercept	.32 (40)	.30 (.47)
No. of Employees	-.01 (.08)	.02 (.09)
Multi-homing	**-.30* (.14)**	-.28 (.14)
Softw. Integrator	.17 (.16)	.19 (.17)
Partner Manager	**.34* (.15)**	**.35** (.12)**
Relationship age	.05 (.08)	.05 (.07)
Same Layer	**.31* (.15)**	.27 (.15)
Dependence	**.35*** (.07)**	**.36*** (.10)**
Rule Adequacy	**.14* (.06)**	**.14** (.04)**
Flexibility	-.21 (.13)	**-.25* (.11)**
Benevolence	**.48*** (.07)**	**.38*** (.07)**
Rule Adequacy × Flexibility	-	.00 (.06)
Rule Adequacy × Benevolence	-	.02 (.05)
Flexibility × Benevolence	-	-.04 (.08)
Rule Adequacy × Flexibility × Benevolence	-	**.09*** (.02)**
Selection Model		
Intercept	.00 (.67)	-.05 (.74)
Specific Sector	**-.52*** (.14)**	**-.56*** (.13)**
Public Administration	**-.44*** (.10)**	**-.42*** (.11)**
Enterprise Content Management	**-.40*** (.10)**	**-.39*** (.11)**
No. of Employees	-.09 (.12)	-.08 (.09)
Multi-homing	**.77*** (.12)**	**.70*** (.11)**
Softw. Integrator	-.03 (.14)	.01 (.14)
Partner Manager	**.51** (.17)**	**.53*** (.15)**
Relationship age	.00 (.14)	.00 (.14)
Same Layer	.02 (.13)	.04 (.10)
Dependence	**-.25** (.10)**	**-.27** (.10)**
Rule Adequacy	**-.12* (.06)**	**-.10* (.05)**
Flexibility	**.21* (.11)**	.23 (.12)
Benevolence	-.17 (.07)	**-.20** (.06)**
Rule Adequacy × Flexibility	-	**.13* (.05)**
Rule Adequacy × Benevolence	-	-.01 (.06)
Flexibility × Benevolence	-	.06 (.06)
Rule Adequacy × Flexibility × Benevolence	-	.00 (.04)
Log likelihood	-218.19	-212.73
Wald test of independent equations: Chi-squared	**7.86*** **	**24.81*** **

*p <.05, **p <.01, ***p <.001, n = 181, thereof 105 selected and 76 nonselected (Microsoft complementors) Heckman selection regression with cluster-robust standard errors (cluster: platform owner), all non-binary variables standardised

Appendix D: Coding Examples

Table 18: Identified rule mechanisms

Function	Mechanisms	Sample Text Passages From Analysed Documents
Protection of complementor resources	Intellectual property protection	*"It is against Oracle policy to use, copy, display, or distribute third party copyrighted software, documentation, or other materials without permission or approval from Oracle's Legal Department." (Oracle Code of Ethics and Business Conduct)* *"[…] [We] respect the intellectual property rights of others. Inappropriate use of others' intellectual property may expose Google… to criminal and civil fines and penalties." (Google Code of Conduct)*
	Confidentiality protection	*"We [Microsoft] respect the confidentiality […] rights of others, and do not use others' confidential information without authorisation." (Microsoft Standards of Business Conduct)* *"Confidential Information must not be used or reproduced in any form except as required to accomplish the intent of this agreement." (SAP PartnerEdge GTCs)*
	Privacy protection	*"If you provide Oracle with personal information concerning your customers, prospects or employees, Oracle will only use the information in manners consistent with those specified in this agreement […]." (Oracle Partner Network Agreement)* *"Without limiting the previous, each party will not use or share Personal Data received from the other party (or its customers) for a purpose for which it has not obtained consent […]" (Microsoft Partner Network Agreement)*
Prevention of inappropriate platform owner behaviour	Interference prevention	*"Nothing in this agreement restricts a party from (1) working with and using third party technologies; or (2) independently developing or acquiring new products or services, improving existing products or services, or marketing any new, improved, or existing products or services." (Microsoft Partner Network Agreement)* *"Partner acts in its name, at its own risk and for its account for the performance of any activities arising under any part of this agreement. The parties are therefore independent contractors and do not act as agents or representatives of each other." (SAP PartnerEdge GTCs)*
Prevention of inappropriate platform owner behaviour	Liability prevention	*"If a third party asserts a claim against you that an IBM Product IBM provides to you under this agreement infringes that party's patent or copyright, IBM will defend you against that claim at IBM's expense […]" (IBM Business Partner agreement)* *"If a third party claims that any programme [platform] infringes its intellectual property rights based on your authorised use of the programmes in accordance with the terms of this agreement, Oracle will indemnify you against the claim […] " (Oracle Partner Network Agreement)*
Promise of partnership benefits	Promise of commercial resources	*"SAP provides sales tools, services, and activities designed to accelerate the sales cycle." (SAP PartnerEdge Programme Guide)* *"The Microsoft Partner Network (the "MPN") gives you access to (1) Microsoft content, information, sales tools, documentation, branding materials such as logos, and resources (the "Microsoft Materials") […]" (Microsoft Partner Network Agreement)*
	Promise of technical resources	*"The community-level guides companies establishing a technology relationship with Adobe. Partners at this level have access to SDKs via our Developer Portal so they can learn about our products and APIs" (Adobe Partner Programme Guide)* *"SAP currently offers a variety of training classes, consulting packages, and development tools to help you navigate the technical requirements of developing solutions that seamlessly integrate with SAP solutions." (SAP PartnerEdge Programme Guide)*