Governance mode vs. governance fit?

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RESEARCH NOTES AND COMMENTARIES

GOVERNANCE MODE VS. GOVERNANCE FIT: PERFORMANCE IMPLICATIONS OF *MAKE-OR-ALLY* CHOICES FOR PRODUCT INNOVATION IN THE WORLDWIDE AIRCRAFT INDUSTRY, 1942–2000

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We examine the impact of governance mode and governance fit on performance in make-or-ally decisions. We argue that while horizontal collaboration and autonomous governance have direct and countervailing performance implications, the alignment of make-or-ally choices with the focal firm's resource endowment and the activity's resource requirements leads to better performance. Data on the aircraft industry show that relative to aircraft developed autonomously, collaborative aircraft exhibit greater sales but require longer time-to-market. However, governance fit increases unit sales and reduces time-to-market. We contribute to the alliance and economic organization literatures. Copyright © 2013 John Wiley & Sons, Ltd.

This study examines the impact of governance mode and governance fit on performance in *make-or-ally* decisions. More precisely, we investigate whether it is only governance fit that has performance implications or whether governance mode also impacts performance directly. We examine this question when firms choose between autonomous and collaborative governance. In autonomous governance, firms undertake a business venture by incurring all costs and risks and concentrate all decision making authority; in collaborative governance, firms share costs, risks, and decision making authority with another firm or set of firms. We focus on horizontal collaboration, that is collaboration between two or more incumbents of the same industry (Kogut, 1988) and on a key organizational activity, product innovation, which we define as the design, manufacturing, and marketing of a product that is new to the firm (Eisenhardt and Tabrizi, 1995). Governance fit refers to the extent to which the chosen governance mode is appropriate, given the focal firm's resource endowment and the venture's resource requirements, and accounting for exchange hazards. Drawing upon the alliance and governance literatures, our primary thesis is that both mode and fit have performance consequences.

Keywords: product innovation; horizontal collaboration; autonomous governance; discriminating alignment; endogeneity; aircraft industry
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We adopt a production and exchange approach to the economic organization of activities (Winter, 1988), which leads us to consider both combination benefits and governance efficiency as performance dimensions of activity governance choices (see Mitchell, Dussauge, and Garrette, 2002; Zajac and Olsen, 1993). While extant economic organization research claims that governance mode should have no direct effect on performance once contingency is considered (e.g., Leiblein, Reuer, and Dalsace, 2002; Williamson, 1991), we follow extant alliance research to argue that relative to autonomous governance, collaborative governance entails a direct combination advantage and a direct governance disadvantage for an activity such as product innovation. We examine unit sales as the outcome of the combination facet and time-to-market as the performance consequence of the governance facet of economic organization. Collaboration can increase unit sales through synergistic gains that do not exist in autonomous governance (Hennart, 1988; Kogut, 1988; Mitchell *et al*., 2002; Shan, 1990) while it extends time-to-market because interfirm coordination creates delays that are absent in intrafirm coordination (Williamson, 1991). These delays associated with interfirm coordination are exacerbated in the case of horizontal collaboration because of potential or actual rivalry (e.g. Kogut, 1989). We next deduce from extant economic organization research that governance fit improves activity-level performance in all of its dimensions. We thus argue that unit sales are enhanced and time-to-market is reduced when the firm opts for the mode that best fits its resource endowment and the product's resource requirements, accounting for exchange hazards.

We found support for our hypotheses by examining the performance of 291 new aircraft launched as either autonomous or collaborative projects by 129 aircraft manufacturers worldwide between 1942 and 2000. Our study extends the alliance literature by showing that any performance analysis of collaborative ventures needs to assess both the advantages and disadvantages of collaboration *relative to the autonomous alternative*, something that has often been overlooked since Shan (1990). We also contribute to the economic organization literature by focusing on activities—i.e., bundles of transactions, rather than discrete transactions—and by examining the performance implications of governance fit at the activity level rather than at the transaction level. Further, following Garrette, Castañer, and Dussauge (2009), we extend the production dimension of Winter's (1988) exchange and production approach to the performance effects of economic organization of activities by taking into account the firm's resource endowment and the activity's resource requirements. Third, in contrast to extant research, which claims that governance mode should have no direct effect on performance once contingency is considered (e.g., Leiblein *et al*., 2002; Williamson, 1991), we show that, even accounting for endogeneity (Shaver, 1998), governance choices still have direct effects on specific activity-level performance outcomes, despite the overall performance enhancing effect of governance fit.

THE EFFECT OF *MAKE-OR-ALLY* CHOICES ON ACTIVITY PERFORMANCE

Governance research in particular—and strategy research in general—has in recent years emphasized that governance choices may not impact performance directly, once endogeneity is taken into account (Shaver, 1998). However, the alliance literature suggests that relative to autonomous governance, collaboration entails direct advantages and direct disadvantages. According to this literature, while collaboration can produce a synergistic combination advantage by pooling resources held by different firms (Kogut, 1988; Mitchell *et al*., 2002; Zajac and Olsen, 1993), it also has a governance disadvantage, in that partners bear transaction and coordination costs (Gulati and Singh, 1998; White and Lui, 2005), as well as the risk of losing proprietary knowledge and the subsequent risk of creating or strengthening a competitor (Hamel, 1991). Interfirm coordination is also more complicated than intrafirm coordination, because the allied firms lack a common language (Conner, 1991; Foss, 1996) and it is not possible to use *fiat* to resolve interfirm conflicts (Williamson, 1975, 1991). Further, collaborating firms cannot enjoy the combination advantage of collaboration without incurring its governance disadvantage (Madhok, 1996; Wang and Zajac, 2007; Zajac and Olsen, 1993). This would suggest that governance decisions—such as the *make–or-ally* choice—might have direct effects on distinct dimensions of activity performance.

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However, the Transaction Cost Economics (TCE) notion of discriminating alignment (Williamson, 1991) also claims that, at the transaction level, it is not governance mode that should impact performance but governance fit (Leiblein *et al*., 2002). In particular, TCE claims that performance effects should only be observed when the mode was chosen appropriately on the basis of the exchange attributes of the potential transaction; i.e., the optimal mode is contingent on exchange attributes (Williamson, 1991). Some studies have extended this view of the discriminating alignment to activities rather than simple transactions, empirically showing that making the appropriate governance mode choices on the basis of exchange hazards enhances activity-level technological performance (Leiblein *et al*., 2002) and satisfaction (Brouthers, Brouthers, and Werner, 2003) as well as firm profitability (Nickerson and Silverman, 2003) and survival (Silverman, Nickerson, and Freeman, 1997). However, this research has generally assumed that, at the activity level, governance choices cannot have direct and countervailing effects on specific performance outcomes. Further, extant research has focused on the performance implications of *make-or-buy* decisions (Leiblein *et al*., 2002; Nickerson and Silverman, 2003), often ignoring those of *make-or-ally* decisions—see Brouthers *et al*. (2003) for a notable exception on entry mode choices—although the very nature of collaboration is likely to generate specific performance implications that are absent from the 'buy' option.

In this study, we try to fill these research gaps by examining the impact of governance mode and governance fit on different indicators of activity-level performance in *make-or-ally* decisions, accounting for governance endogeneity (Masten, 1993; Shaver, 1998). Winter (1988) argued that examining the economic organization of activities only on the basis of exchange considerations is incomplete. He claimed that a fuller understanding of economic organization must also account for production issues; that is, the relatedness between targeted activities and existing firm knowledge. Recent research (Garrette *et al*., 2009) has broadened Winter's (1988) production side by suggesting that governance choices are driven by the firm's resource endowment and the product's resource requirements (see also Lee and Lieberman, 2010 for market-entry decisions) and has provided evidence of their role in examining *make-or-ally* choices for product innovation.

Surprisingly, extant research on the performance implications of governance choices has, for the most part, disregarded Winter's broader approach to the economic organization of activities, primarily drawing upon the discriminating alignment notion of TCE instead (Brouthers *et al*., 2003; Masten, 1993).[1] Thus, we frame the performance implications of *make-or-ally* decisions as resulting from an expanded alignment that, in addition to exchange hazards, takes into account the firm's resource endowment and the activity's resource requirements. Our core argument is that, while horizontal collaboration and autonomous governance have direct and countervailing performance implications on a combination facet and a governance facet, the alignment of *make-or-ally* choices with the firm's resource endowment and the activity's resource requirements increases performance in both dimensions. However, the advantages and disadvantages of *make-or-ally* choices might vary according to the type of alliance and the activity in which such choices are made. We thus develop hereafter specific hypotheses on some performance implications of the choice between horizontal collaboration and autonomous governance for product innovation.

HYPOTHESES: COLLABORATIVE VERSUS AUTONOMOUS PRODUCT INNOVATION

First, we predict that, in the context of product innovation, the combination facet of *make-or-ally* choices particularly affects a new product's sales. Horizontal collaboration can result in a combination advantage by creating synergistic gains that do not exist in autonomous governance. First, the pooling of resources from different partner firms will generally result in higher levels of diversity than equally large resource endowments accumulated over time by a single firm. Such diversity has been shown to enhance innovation (Baum, Calabrese, and Silverman, 2000; Kogut, 1988;

[1] To the TCE transaction considerations emanating from asset specificity and uncertainty, Leiblein *et al*. (2002) add other exchange considerations from the Resource-based view of the firm, i.e., the risk of exposing strategic assets in contractual relations (Argyres, 1996; Hamel, 1991; Rumelt, 1984).

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Mitchell *et al*., 2002; Singh and Mitchell, 2005; Stuart, 2000). Collaboration may also limit inertia and help avoid competency traps by forcing all partners to overcome the Not-Invented-Here syndrome (e.g., Rosenkopf and Nerkar, 2001). Also, horizontal collaboration requires rival firms to deal with potentially conflicting views on technological options and, through this confrontation, partner-firms can arrive at superior solutions. In the end, products launched through horizontal collaboration often have a higher quality-to-price ratio than autonomous products. Further, horizontal collaboration reduces the number of potential competitive products, thereby enhancing market power on both suppliers and customers and increasing potential sales for each product. It follows that, holding firm(s)' resource endowment and product resource requirements constant, collaborative products tend to achieve greater unit sales than products undertaken through autonomous governance.

We also claim that, in the context of product innovation, the governance facet of *make-or-ally* choices particularly affects the time-to-market of new products. Collaborating firms incur transaction costs that are absent from autonomous governance. They must also undertake laborious coordination tasks in that they have to work out complex task-sharing arrangements both to leverage effectively their resources and to protect them from undesired leakage (Gulati and Singh, 1998; White and Lui, 2005). This is especially the case in horizontal collaboration where potential or actual rivalry between partners is an issue (Hamel, 1991; Kogut, 1989). Working out a mutually acceptable organization of collaboration is likely to extend time-to-market in the context of product innovation because partners must agree on the design and on the sharing of tasks through potentially time-consuming negotiations. Indeed, conflicts cannot be resolved through *fiat* as in autonomous governance (Williamson, 1991).

Hypothesis H1: Product innovations undertaken through horizontal collaboration (H1a) achieve greater unit sales and (H1b) incur longer time-to-market than product innovations undertaken through autonomous governance.

We next predict that sales are greater and time-to-market is shorter when firms opt for the product innovation mode that best fits the resource requirements of the new product and their own resource endowment, that is, when firms with insufficient resources for a given product opt for collaboration or when firms with sufficient resources for a given product opt for autonomous governance (Garrette *et al*., 2009; Lee and Lieberman, 2010; Winter, 1988).

We first argue that when firms have insufficient resources for a given product, collaboration (fit) leads to better performance than autonomous governance (misfit). Thanks to collaboration, firms can access the required resources from their partner or partners (Ahuja, 2000; Hennart, 1988; Kogut, 1988). Moreover, the resource combination can be synergistic in terms of generating superior technological and commercial solutions which they could not have come up with alone, thanks to complementarities (Hennart, 1988; Rothaermel and Boeker, 2008; Teece, 1986). Further, partners may engage in swift decision making thanks to an accommodating approach to collaborative coordination given that each partner knows it needs the resources of the other/s (Gerwin, 2004). They are thus likely to launch products with a higher quality-to-price ratio, ultimately reaching greater sales, as well as to achieve shorter time-to-market than if they had opted for autonomous governance. In contrast, in these circumstances, autonomous governance is likely to cause problems because of insufficient resources, which will eventually harm the products' quality-to-price ratio and associated sales and increase the time-to-market of the first production unit, particularly if the firm attempts to develop the required resources internally (Dierickx and Cool, 1989).

We also argue that when firms have sufficient resources for a given product, autonomous governance (fit) leads to better performance than collaboration (misfit). Firms that opted for autonomous governance may efficiently leverage unused productive resources for product expansion (Penrose, 1959); they are thus likely to launch products with a better quality-to-price ratio, achieve greater sales, and do so with shorter time-to-market than if they had collaborated. Collaboration always creates transaction and coordination costs (Gulati and Singh, 1998; Oxley, 1997; White and Lui, 2005) but under such circumstances, it is particularly likely to generate conflicts between partners because of their efforts to protect their resources from undesired leakage (e.g., Hamel, 1991). It

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may also foster sterile confrontation, resulting in time-consuming negotiations about task allocation (e.g., Zaheer, McEvily, and Perrone, 1998) and in poor consensus about alternative technological and commercial options. This will ultimately result in low quality-to-price ratios and limited sales, as well as in greater time-to-market.

Hypothesis H2: The better the fit between the governance mode chosen and the resource endowment of the firm, as well as the resource requirements of a new product, (H2a) the greater the new product's unit sales and (H2b) the shorter its time-to-market.

EMPIRICAL ANALYSIS

The empirical setting for our study is the aircraft industry. We considered the entire population of new fighters, turboprops, helicopters, and passenger/cargo jets brought to market by Western firms from 1942 up to 2000 through autonomous governance (i.e., one firm taking on the full prime-contractor responsibility) or horizontal collaboration (i.e., two or more firms sharing prime-contractorship). Our main data source is the Aerospace Systems Group Library database (FI/DMS, 2000), which consists of individual reports on each aircraft project sold since WWII. The reports provide technical data, sales information, and the product innovation mode for 291 different aircraft projects: 262 were brought to market through autonomous governance and 29 through horizontal collaboration (which resulted in 72 project-firm observations). Overall, we analyzed 334 product innovation decisions made by 129 firms. Among the 129 sample firms, 86 carried out only autonomous innovations, 16 only collaborative innovations, and 28 both autonomous and collaborative innovations.

We accounted for the endogeneity of *make-or-ally* choices with two-stage treatment effect models (Shaver, 1998). In the first stage, a probit regression examined factors driving the product innovation mode choice. In the second stage, OLS regressions linked the new aircraft's unit sales and time-to-market to (1) the product innovation mode and (2) its alignment with the focal firm's resource endowment and the product's resource requirements, as well as with potential exchange hazards. The second-stage models account for governance endogeneity with the Inverse Mills Ratio of the first-stage model. We clustered our data by firm (129 clusters in all) and aircraft (291 clusters in all) to control for nonindependence.

Governance choice model

The first-stage dependent variable (governance mode) captures whether the focal product innovation is carried through autonomous governance (coded 0) or horizontal collaboration (coded 1). We estimated all independent variables at the time of project launch which we assume is one year prior to prototype first flight. We estimated the focal firm's resource endowment with two variables: *Business Size* records the firm's revenues in the focal aircraft's product category (fighter, turboprop, helicopter, or passenger/cargo jet), and *Product-Related Experience* is the logarithm of the number of aircraft of the same category that the firm has brought to market since WWII. We captured *Product Resource Requirements* with the aircraft's technical complexity, which we measured with the log-transformed product of the aircraft's speed, range, and takeoff weight (Garrette *et al*., 2009).

Two variables assessed potential exchange hazards. *Product Specificity* is the difference between the technical complexity of the aircraft and that of the firm's prior aircraft in the same product category: the greater the complexity of the new project relative to that of the most recent prior project, the greater the learning to be made, and thus the greater the hold-up risk associated with potential collaboration. *Demand Uncertainty* is the standard deviation of the firm's home country GDP over the five years prior to aircraft launch. It captures past demand volatility (Leiblein and Miller, 2003; Walker and Weber, 1984).

Several other variables (measured at the time of project launch) controlled for alternative explanations. *Alliance Experience* is the logarithm of the firm's number of past collaborative aircraft in the same product category (Sampson, 2005). *Product Category* captures the area of business (fighter, passenger/cargo jet, turboprop, or helicopter). *Number of Incumbents* is the number of firms in the relevant product category. *Domestic Market Size* is the GDP of the firm's home country. *Military Design* distinguished military aircraft from those with a commercial use. *State-owned Firm* identified firms controlled by a state

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(50% or more of state ownership). Finally, *Year* is the year of the first flight of the aircraft's prototype.

Second-stage performance models

Our performance models used two dependent variables, corresponding to the combination and governance facets of *make-or-ally* choices in product innovation. *Unit Sales* is the cumulative number of units produced over the life cycle of the aircraft. For the 64 aircraft still in production by the end of the study period (2000), we extrapolated Unit Sales based on the average sales schedule of all terminated aircraft projects. *Time-to-Market* is the number of years between the prototype first flight and the first delivery of a production aircraft.

The covariates included *Governance Mode*, *Governance Fit*, and λ (Brouthers *et al*., 2003). *Governance Fit* captures the extent to which firms made the choice predicted by the first-stage model. For firms that chose to collaborate, *Governance Fit* is the first-stage predicted probability $p_{alliance}$. For firms that opted for autonomous governance, we computed *Governance Fit* as 1- $p_{alliance}$ (see Leiblein *et al*., 2002). The λ variable is the Inverse Mills Ratio of the first-stage model. It accounts for the unobservable factors driving *make-or-ally* choices and thus controls for governance endogeneity (Shaver, 1998).

We also included the first-stage controls *Business Size*, *Product-Related Experience*, *Product Resource Requirements*, *Product Category*, *Military Design, Number of Incumbents, Product Specificity, Year*, and *State-owned Firm*. We captured the contribution of the focal firm's partners with *Partner Business Size* and *Partner Product-Related Experience*. *Partner Business Size* is the sum of the size of the focal firm's partners and Partner Product-Related Experience is the sum of the product related experience of the focal firm's partners, both in the considered business domain. In the Unit Sales models, we also included *Domestic Market Size*, *Partner Domestic Market Size*, and *Prior Unit Sales. Partner Domestic Market Size* is the sum of the home country GDP of the focal firm's partners. *Prior Unit Sales* is the cumulative unit sales of the focal firm's most recent aircraft of the same product category. In the Time-to-Market models, *Prior Time-to-Market* assesses the time-to-market of the focal firm's most recent prior aircraft in the same product category. Prior commercial success (respectively, prior time-to-market) is likely to impact the unit sales (respectively, time-to-market) of later aircraft projects. We included *Demand Uncertainty* and *Alliance Experience* as instruments in the Unit Sales and Time-to-Market models. *Domestic Market Size* is a third instrument in the Time-to-Market models. We verified that the instruments affect governance decisions while having no significant impact on performance outcomes.

RESULTS

Table 1 provides the descriptive statistics and the pair-wise correlations. While several variables exhibit substantial correlation, individual VIF measures are lower than the generally accepted threshold of 10, with a mean of 1.95.

Table 2 displays the results. Model 1 analyzes the drivers of *make-or-ally* choices in product innovation. Larger businesses and businesses with greater product-related experience favor autonomous governance while firms launching projects with greater resource requirements favor horizontal collaboration (see Garrette *et al*., 2009). Further, firms with greater collaborative experience and state-owned firms favor horizontal collaboration while firms with privileged access to a larger domestic market and firms introducing military designs favor autonomous governance. Firms rely more on autonomous governance than on collaboration for passenger/cargo jets and turboprops than for helicopters. *Demand Uncertainty* and *Number of Incumbents* reduce the likelihood of collaborating, whereas *Year* increases it.

Model 2a examines unit sales of the new aircraft and Model 2b examines the time-to-market of the first production unit. Both models include *Governance Mode*, *Governance Fit* and λ. Our results support both sets of hypotheses. Collaborative aircraft achieve greater Unit Sales (Model 2a: $\beta = 0.933$, $p < 0.05$) and longer Time-to-Market (Model 2b: $\beta = 1.935$, $p < 0.05$) than autonomous aircraft, which provides support for H1a and H1b. *Governance Fit* increases Unit Sales (Model 2a: $\beta = 0.857$, $p < 0.01$) and reduces Time-to-Market,

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Table 1. Descriptive statistics and pair-wise correlations (N = 334)

ID	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	Business size	1											
2	Product-related experience	−0.02	1										
3	Product specificity	−0.29*	−0.01	1									
4	Product resource requirements	0.16*	−0.13*	0.10	1								
5	Product year	−0.08	−0.07	−0.26*	−0.08	1							
6	Military design	0.13*	0.16*	−0.06	−0.04	−0.31*	1						
7	Number of incumbents	0.21*	0.00	−0.32*	−0.07	0.56*	0.08	1					
8	Fighter	0.29*	0.05	−0.09	0.21*	−0.35*	0.60*	0.20*	1				
9	Jet	−0.07	−0.16*	0.09	0.49*	0.15*	−0.51*	−0.25*	−0.37*	1			
10	Prop	−0.23*	−0.01	0.14*	−0.18*	0.13*	−0.21*	0.06	−0.48*	−0.31*	1		
11	Helicopter	−0.02	0.12*	−0.15*	−0.58*	0.15*	0.01	−0.07	−0.32*	−0.21*	−0.27*	1	
12	State-owned firm	−0.09	0.04	−0.13*	−0.17*	0.28*	0.01	0.19*	−0.13*	−0.07	0.06	0.18*	1
13	Domestic market size	0.21*	−0.01	−0.15*	0.00	0.35*	−0.19*	0.13*	−0.16*	0.11	−0.03	0.14*	−0.26*
14	Demand uncertainty	0.02	0.00	0.17*	−0.02	−0.43*	0.20*	−0.34*	0.31*	−0.15*	−0.11*	−0.12*	−0.10
15	Horizontal alliance experience	0.03	0.43*	−0.05	−0.13*	0.09	0.03	0.06	0.00	−0.15*	0.04	0.12*	0.11*
16	Unit sales	0.04	−0.07	0.03	−0.05	−0.18*	0.03	−0.22*	0.06	0.00	−0.17*	0.14*	−0.06
17	Prior unit sales	0.44*	−0.07	−0.26*	−0.01	−0.01	−0.06	0.00	0.03	−0.01	−0.15*	0.16*	0.04
18	Time-to-market	−0.07	0.02	0.02	−0.11*	0.14*	0.31*	0.23*	0.12*	−0.23*	−0.14*	0.27*	0.23*
19	Prior time-to-market	0.12*	0.00	−0.57*	0.05	0.27*	0.10	0.25*	0.12*	−0.09	−0.18*	0.16*	0.16*
20	Partner business size	−0.03	0.03	−0.07	0.11*	0.30*	0.00	0.13*	0.02	0.05	−0.15*	0.11	0.18*
21	Partner product-related experience	−0.09	−0.12*	−0.01	0.16*	0.28*	−0.13*	0.06	−0.10	0.09	0.00	0.04	0.17*
22	Partner domestic market size	−0.05	−0.01	−0.01	0.13*	0.40*	−0.12*	0.15*	−0.09	0.06	0.00	0.05	0.26*
23	Governance mode (alliance =1)	−0.10	−0.03	−0.05	0.12*	0.36*	−0.14*	0.12*	−0.13*	0.08	0.00	0.08	0.23*
24	Mills ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Governance fit	0.15*	0.08	0.05	−0.02	−0.44*	0.25*	−0.18*	0.25*	−0.03	−0.13*	−0.14*	−0.10
–	Mean	0.33	1.07	1.42	4.32	1969	0.62	26.90	0.37	0.19	0.29	0.15	0.22
–	Min	0.00	0	−2.20	2.03	1942	0	0	0	0	0	0	0
–	Max	4.83	3.26	6.09	6.60	1998	1	56	1	1	1	1	1
–	VIF (mean VIF = 1.95)	1.68	1.36	1.95	1.32	4.52	1.56	2.05	—	—	—	—	1.43

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Table 1. *(Continued)*

ID	Variable	13	14	15	16	17	18	19	20	21	22	23	24	25
13	Domestic market size	1												
14	Demand uncertainty	−0.06	1											
15	Horizontal alliance experience	0.13*	−0.05	1										
16	Unit sales	0.08	0.15*	−0.02	1									
17	Prior unit sales	0.18*	0.01	0.00	0.21*	1								
18	Time-to-market	−0.15*	−0.12*	0.09	−0.18*	−0.10	1							
19	Prior time-to-market	−0.01	−0.19*	0.13*	−0.07	0.09	0.19*	1						
20	Partner business size	0.02	−0.10	0.14*	−0.03	0.01	0.20*	0.21*	1					
21	Partner product-related experience	−0.09	−0.13*	0.08	−0.03	−0.04	0.10	0.18*	0.48*	1				
22	Partner domestic market size	−0.04	−0.15*	0.12*	−0.06	−0.04	0.12*	0.23*	0.67*	0.59*	1			
23	Governance mode (Alliance = 1)	−0.07	−0.19*	0.11*	−0.07	−0.05	0.19*	0.25*	0.55*	0.80*	0.73*	1		
24	Mills ratio	0.00	0.00	0.00	0.02	0.02	−0.07	−0.07	−0.36*	−0.61*	−0.46*	−0.82*	1	
25	Governance fit	−0.03	0.29*	−0.12*	0.17*	0.05	−0.18*	−0.15*	−0.23*	−0.45*	−0.30*	−0.64*	0.48*	1
–	Mean	1.43	0.03	0.14	0.73	0.58	3.13	1.78	0.06	0.36	0.38	0.22	0.00	0.77
–	Min	0.02	0.01	0	0.01	0	0.08	0	0	0	0	0	−2.35	0.02
–	Max	7.05	0.26	1.79	14.90	14.90	12.26	9.42	2.15	4.36	7.05	1	1.44	1.00
–	VIF (mean VIF = 1.95)	1.91	1.33	1.46	1.18	1.43	1.45	1.77	1.98	2.46	2.83	—	3.01	2.30

*$p < 0.05$.

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Table 2. Two-stage treatment effect models

	1		2a			2b		
	Governance mode		Unit sales			Time-to-market		
	Coef.	s.e.	Coef.	s.e.	Hyp.	Coef.	s.e.	Hyp.
Business size	−0.563*	0.303	−0.152	0.115		−0.226	0.226	
Product-related experience	−0.179*	0.104	−0.164	0.124		−0.161	0.142	
Product specificity	−0.003	0.052	0.023	0.029		0.204***	0.065	
Product resource requirements	0.627***	0.186	−0.133	0.109		−0.020	0.230	
Product year	0.062***	0.014	−0.016**	0.007		−0.023	0.017	
Military design	−0.529*	0.305	−0.024	0.197		1.417***	0.283	
Number of incumbents	−0.027*	0.015	−0.013*	0.007		0.041***	0.013	
Fighter (vs. helicopter)	−0.597	0.577	−0.002	0.385		−1.424**	0.693	
Jet (vs. helicopter)	−1.845***	0.670	−0.224	0.390		−1.210	0.750	
Prop (vs. helicopter)	−0.885**	0.409	−0.459	0.296		−1.591***	0.554	
State-owned firm	0.333*	0.202	−0.010	0.133		0.369	0.279	
Domestic market size	−0.178**	0.077	0.156***	0.048				
Demand uncertainty	−22.301**	9.301						
Horizontal alliance experience	0.644***	0.239						
Prior unit sales			0.187**	0.088				
Prior time-to-market						0.103	0.080	
Partner business size			−0.168	0.180		0.625	0.756	
Partner product-related experience			0.032	0.074		−0.295	0.258	
Partner domestic market size			−0.033	0.050				
Inverse Mills Ratio (λ)			0.375**	0.207		0.977***	0.394	
Governance mode (alliance = 1)			0.933**	0.410	H1a: +	1.935**	1.159	H1b: +
Governance fit			0.857***	0.251	H2a: +	−1.283*	0.849	H2b:−
Constant	−123.086***	26.543	31.925**	14.584		47.824	32.916	
Observations	334			334			334	
R-squared	0.309			0.16			0.353	
F	—			6.49***			8.19***	
Wald-Chi2	83.55***			—			—	

*Significant at 10%; **significant at 5%; ***significant at 1% (one tail tests for Mills Ratio, Alliance, and Governance Fit, two-tail tests otherwise). Robust standard errors are clustered on business (129 clusters) and aircraft project (291 clusters).
Model 1: Governance Mode is coded 1 for collaboration and 0 for autonomous governance. A positive coefficient indicates that the firm is more likely to choose collaboration.
Model 2: Results are robust to nested models. The time-to-market results are sensitive to including the Inverse Mills Ratio.

albeit at lower significance levels (Model 2b: $\beta = -1.283$, $p < 0.10$). The λ variable is significant in both performance models ($p < 0.05$), showing the importance of controlling for endogeneity (Shaver, 1998), which furnishes evidence for H2a and H2b.

As for the controls, *Domestic Market Size* and *Prior Unit Sales* logically increase Unit Sales while *Number of Incumbents* and *Year* decrease them. *Product Specificity*, *Military Design*, *Number of Incumbents*, and *Helicopter* increase Time-to-Market. *Business Size*, *Product-Related Experience*, *Product Resource Requirements*, *State-owned Firm*, *Partner Business Size*, *Partner Market Size*, and *Partner Product-Related Experience* do not affect performance.

DISCUSSION

This study examined the impact of governance mode and governance fit on performance in *make-or-ally* decisions. We first argued that, relative to autonomous governance, collaborative governance entails a direct combination advantage and a direct governance disadvantage. We also claimed that, making the appropriate *make-or-ally* choice, given the activity's resource requirements and the firm's resource endowment, enhances

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activity-level success, in that such an alignment increases the firm's performance in both the combination and governance facets. Specifically, we examined the choice between autonomous governance and horizontal collaboration for product innovation. Data on the aircraft industry since WWII showed that collaborative aircraft systematically exhibit greater unit sales but require longer time-to-market than autonomous aircraft. However, firms whose product innovation modes are aligned with surrounding exchange and production considerations achieve greater sales and shorter time-to-market than other firms.

We contribute to the alliance and economic organization literatures. For the alliance literature, our analysis shows that, relative to autonomous governance, collaboration involves a direct combination advantage and a direct governance disadvantage, which cannot be traded off against each other (Madhok, 1996; Mitchell *et al*., 2002; Zajac and Olsen, 1993). Thus, our study suggests that any performance analysis of collaborative ventures needs to assess both the advantages and disadvantages of collaboration relative to the autonomous alternative, something that has often been overlooked since Shan (1990). Next, we posit and show that, regardless of the governance mode chosen, the alignment of the choice between horizontal collaboration and autonomous governance with surrounding exchange and production conditions improves activity-level performance, in that such an alignment increases performance in both the combination and the governance implications of *make-or-ally* choices.

Regarding the economic organization literature (Leiblein *et al*., 2002; Winter, 1988), we first put forth and show the performance implications of a broader conceptualization of governance fit, which specifies two production considerations in addition to exchange considerations: the focal firm's resource endowment and the activity's resource requirements. More distinctively, we underline that, in addition to firm resource heterogeneity (Argyres, 1996; Williamson, 1999), it is important to consider activity heterogeneity in terms of resource requirements at the project level (see Poppo and Zenger, 1998). To a large extent, past economic organization research has ignored the resource requirements of the task at hand. We show that, along with the focal firm's resource endowment, the activity's resource requirements are an important determinant of governance choice and thus an important component of governance fit. Second, we show that the governance contingency principle applies not only to transaction-level organization costs (discriminating alignment) but also to activity-level performance dimensions (governance fit), notably unit sales and time-to-market in the context of product innovation. Third, our analysis suggests that, contrary to extant research (Leiblein *et al*., 2002; Shaver, 1998), even when controlling for governance endogeneity and despite the performance enhancing effect of governance fit, *make-or-ally* choices can have direct but countervailing effects on specific activity-level performance outcomes. The fact that collaborative governance leads to higher unit sales than autonomous governance when controlling also for partners' resources suggests that, as we argued, the advantage of collaborative governance lies in the resource diversity brought by partners rather than in their sheer collective volume.

While we focused on product innovation as the focal activity and horizontal collaboration as the alliance type, we believe that our theory is generalizable to other activities and alliance types. Past research has pointed out the upsides and downsides of vertical collaboration: while vertically-integrated firms often exhibit faster time-to-market for new products than nonintegrated firms, which collaborated with suppliers (Kapoor and Adner, 2012), vertical collaboration might effectively foster innovation (Baum *et al*., 2000). This is consistent with our view, which would suggest that *make-or-ally* choices about vertically-related activities are also likely to have direct and countervailing performance implications. However, the alignment of *make-or-ally* choices about vertically-related activities with surrounding exchange and production conditions should still enhance the activities' performance, regardless of the mode chosen.

The study has limitations that suggest future research avenues. First, even though our analysis accounted for several industry controls (state-owned firm and military product), generalizability to other industries remains a possible concern. Second, we did not have a synthetic measure of overall activity-level performance although we examined two performance measures crucial to product innovation (i.e., unit sales and time-to-market), especially in our empirical setting. Third, we could not empirically disentangle the complementarity and similarity dimensions of the

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potential for resource combination in collaboration (e.g., Chung, Singh, and Lee, 2000; Harrison *et al*., 2001; Rothaermel and Boeker, 2008; Wang and Zajac, 2007; Zaheer, Castañer, and Souder, 2013); nor did we consider the organizational and cultural distances between partners as other drivers of alliance performance (Hamel, 1991). Fourth, we did not have direct measures for asset specificity and uncertainty, and we did not account for mutual hostage situations (Williamson, 1983). Thus, we cannot rule out that exchange considerations might have a greater role than our results suggest. Finally, research should test our view on vertical alliances as well as on horizontal alliances that do not cover all stages of the value chain.

The managerial implications of our work are twofold. First, managers must be aware that they cannot enjoy the combination advantage of collaboration without incurring its governance disadvantage. Second, making the governance choice that best fits surrounding exchange and production conditions increases activity-level performance. Thus, managers in firms with insufficient resources for a given activity are better off engaging in collaboration rather than in internal growth. Conversely, they should look to expand autonomously when they have sufficient resources to do so. Overall, our study highlights the idea that *make-or-ally* decisions have systematic and countervailing effects on specific activity-level performance outcomes, even though governance fit improves activity-level performance.

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