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# Embedded Patterns of International Alliance Formation

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## Abstract

Using a combination of institutional, systems contingency and ecological theory, this paper argues and empirically demonstrates that key founding characteristics of international alliances are embedded (interactively related) in one another. Specifically, the technical area of the alliance activity, the intended direction of product/knowledge flows among sponsors, and the administrative form of the alliances are shown to be interactively related. Further, the concept of embeddedness was combined with Transaction Cost Economics (TCE) and technological views to show two founding patterns. One pattern called Hybridization was consistent with technological explanations while the second called Dominance was suggested by TCE approaches. The new interactive relationships were identified in two large samples involving US, Japanese and European firms during a period from 1970 to 1989.

**Descriptors:** strategic alliances, institutional theory

## Introduction

International alliances are an increasingly numerous, diverse, and important social and economic mechanism for international interfirm adaptation and cooperation (see reviews by Grandori and Soda 1995 and Hagedoorn 1993a). Prior work provides an array of partially contradictory recommendations on how managers should form international alliances (cf. discussions by Culpan 1993; Mowery 1988; Osborn and Hagedoorn 1997; Ring and Van de Ven 1992 and Williamson 1991, 1996). One common theme across many studies of international alliances is that of embeddedness — the fit among environmental and organizational characteristics (see Auster 1992; Dunning 1993; Williamson 1991). Our review suggested that there was little agreement about whether international alliances were or should be embedded in their sponsors (e.g. Kogut 1988), their industries (e.g. Auster 1992), their nations (e.g. Whitley 1994) or some international social and economic structure (e.g. Osborn and Baughn 1993). There is also considerable confusion regarding how to operationalize embeddedness when international alliances typically involve at least two social, economic and corporate systems (cf. Granovetter 1986).

The purpose of this manuscript is to introduce a more integrative perspective

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Organization Studies  
1998, 19/4  
617-638  
© 1998 EGOS  
0170-8406/98  
0019-0024 \$3.00

of international alliance formation. It melds key elements from institutional theory, systems contingency theory, transaction cost economics and technological perspectives to examine the issue of embeddedness. An institutional view is introduced to suggest that alliance formation characteristics may conform to a type of industry embeddedness based on collective learning and informed imitation. This notion of embeddedness leads to specific empirical expectations which incorporate the interactive logic of systems contingency theory. This integration yields testable hypotheses concerning very specific types of alliances (two institutionalized subpopulations of alliances). These hypotheses are tested using two quite different large-scale samples. One sample focuses on U.S./Japanese alliance formations, while the other incorporates formations between Western Europe, Japan and the United States.

## **Literature Review**

### **What is An International Corporate Alliance?**

Part of the confusion in the literature stems from the wide variety of names and meanings attached to international cooperations among corporations (cf. Burgers et al. 1993; Culpan 1993; Hagedoorn 1993a; Kogut 1988; Parkhe 1993 and Williamson 1991). Here, an international corporate alliance may be defined as a publicly recognized exchange and/or joint value creation arrangement between two or more firms (sponsors) that are headquartered in separate nations where (a) the area for exchange and/or joint value creation is specified and (b) the arrangement is expected to cover several distinct transaction periods.

While this appears to be a fairly standard definition (e.g. Contractor and Lorange 1988) it differs from many others in three important ways. One, it explicitly separates publicly announced long-term associations from simple spot contracts and short-term projects (cf. Park and Ungson 1997). Two, it includes provisions for both exchange and potential joint value creation (following Toyne's 1989 suggestion to emphasize the exchange as the unit of analysis rather than a sponsor). Three, the specific expectations of one sponsor are not explicitly incorporated into the definition. We presume that the sponsors may or may not want similar strategic benefits from the alliance. In other terms, the definition offered here separates the issues of what an international alliance is and might provide from how, or the degree to which, one or more sponsors might appropriate specific potential benefits from an alliance. Thus, our focus is on alliances as an organizational mode.

### **An Institutional View of International Alliances**

The recent dramatic increase in the number and longevity of international alliances suggests that they may be emerging as, 'orderly, stable, socially

integrating patterns out of unstable, loosely organized or narrowly technical activities' (Selznick 1992: 232). The quote, of course, is a definition for institutionalization. Denekamp et al. (1997) provide preliminary evidence that certain forms of international alliances which are believed to be institutionalized are indeed shown to be more stable and appear to influence their immediate environment.

A popular theme in the institutional literature which appears relevant to the study of international alliances is the study of why organizational practices and structures emerge, become generally copied and, over time, become established as institutionalized or taken-for-granted activities (e.g. Baum and Oliver 1991; DiMaggio and Powell 1983; Haveman 1993; Holm 1995; Leblebici et al. 1991; Oliver 1992). Here, the notion of the embeddedness of the entity in its context, which is based on imitation and conformity, is seen as the key to understanding institutionalization (see a review by Baum and Dutton 1996). Institutional processes are typically discussed at the organizational field level within a particular socioeconomic setting (Galaskiewicz and Wasserman 1989). By definition, however, many international alliances cut across existing organizational fields and socioeconomic settings.

Most importantly, the dominant rule of relationship linking an entity to its setting is an interesting mix of determinism and choice. Some institutional theorists stress that the conformity of the entity to its setting should be from the individual to the firm, the firm to its immediate environment or firms to their socioeconomic settings (see Baum and Dutton 1996). Some of the arguments here are often consistent with those found in contingency theory (e.g. Donaldson 1985) or population ecology (Freeman and Hannan 1989). For instance, firms may conform in order to boost their legitimacy because legitimacy may increase their chances of survival. Of course, the trigger for change in most contingency analyses is a firm's performance that threatens its survival (e.g. Bluedorn 1993), while institutional theorists are more likely to stress responses to broader factors potentially influencing a whole series of firms (see Powell 1996).

A counter theme in many institutional analyses stresses choice, particularly when the forces facing the entity are either ambiguous or conflicting (see Miller 1996; Powell 1996). Consistent with Simon's model of bounded rationality, these choices do not occur in either a vacuum of information or with complete rationality. Thus, individuals may imitate to conform to broad institutional forces and still negotiate their social construction of reality within the framework of their existing knowledge. Thus, firms are not expected to be identical to one another, even though many may share many similar characteristics.

### **Imitation and Embeddedness**

Whitley (1994), among others, has noted that when organizations attempt to expand beyond their national boundaries they implicitly take with them their nation's history of socioeconomic choices. On the international scene,

they become representatives of their home nation. When firms form an international alliance, of course, each may represent its own host socio-economic system. Without a commonly shared socioeconomic history, one firm may attempt to impose its system on the other. Such was apparently the case for many alliances involving large multinationals from developed countries and smaller firms from less developed nations (see Franko 1971). However, recent reports suggest that alliances among comparable firms from economically developed nations are increasingly popular (see Hagedoorn 1993a). Here, sponsors may be generally blocked from merely replicating the nationally preferred cooperative structures they may have used in their home country. To form an international alliance, sponsors from developed nations often need to overcome these historic contextual differences.

All sponsors do, however, share one larger institutional setting, that being the industry of the alliance itself. To the degree institutionalization processes hold, sponsors may copy popular formation features for new alliances from within the alliances' industry, as the industry represents the common institutional environment (cf. DiMaggio and Powell 1983). This general emphasis on the industrial setting as a focus for imitation is consistent with numerous institutional studies (e.g. Leblebici et al. 1991; Baum and Oliver 1991). To the degree that institutionalization holds, the internal characteristics of the alliance should be embedded in this larger industrial mass.

### **The Basis for Imitation**

Simple imitation involves copying the historically most popular practices, as these may reflect collective learning. Here, it is proposed that new international alliance formation characteristics stem from 'informed imitation', which is merely the process of copying key visible features of the apparently viable experiments of others that are involved in exchanging and/or developing highly similar products and services. The term 'informed imitation' is used to differentiate the proposed treatment of imitation from the more common coercive, mimetic and normative categories suggested by DiMaggio and Powell (1983). Informed imitation is narrower in scope than DiMaggio and Powell's (1983) more generalized mimetic mechanism because the sponsors lack a common cultural base for joint understanding. Further, the sponsors' knowledge of international alliance practices is likely to be more limited than their knowledge of domestic managerial practices. Thus, imitation may be restricted to visible alliance characteristics.

When first announced, international alliances are typically ascribed in the popular press with important specific characteristics and expected relational outcomes (see Duysters and Hagedoorn 1993; Osborn and Baughn 1990). For instance, popular press announcements routinely describe the area of alliance activity, the intended flows of products and knowledge through the alliance, its general administrative form and its expected outcomes. These visible characteristics of alliances have also been studied extensively in the literature (see Osborn and Hagedoorn 1997 for a review).

Other firms hoping for similar outcomes are expected to imitate specific visible alliance characteristics even though they may subsequently modify these during operations. Unlike new organizations, sponsors of international alliances are not assumed to desire additional legitimacy by merely copying forms popular within a given area (DiMaggio and Powell 1983). Instead, sponsors are expected to imitate apparently viable alliances under the presumption that they would prefer successful relations. However, to isolate the viability of the visible characteristics it is necessary to go beyond traditional institutional theory.

### **Incorporation of Contingency and Ecological Views**

Both structural contingency perspectives (see Bluedorn 1993 and Donaldson 1996 for reviews) and population ecology views (see Baum 1996 for a review) suggest that there may be a limited number of viable patterns or combinations of environmental conditions and organizational forms at any one time. There is considerable disagreement among institutional, contingency and ecological scholars over which external variables should be considered, the number of potentially viable patterns and the importance of choice. Yet, all suggest that the fit or combination among environmental and organizational characteristics is important for viability.

Many institutional analyses attempt to separate institutional, economic and technological factors into separate forces (see Powell 1996 for a discussion). Powell (1996), among others, has suggested that these factors may be co-mingled rather than being inconsistent or orthogonal. Some of the institutional literature explicitly incorporates economic and technical rationality into the more general analyses of mimetic isomorphism. For instance, Haveman (1993) suggests that mimetic isomorphism can result from efficient responses to uncertainty. Further, Haveman's (1993) study of market entry is also consistent with Auster's (1992) analyses of new U.S./Japanese alliance formations across several industries with different degrees of development. Both reiterate a theme often heard in population ecology that organizations subjected to the same environmental conditions acquire a similar form (Freeman and Hannan 1989; Hawley 1968).

If the survival of the alliance is a necessary condition for its viability as an entity, systems contingency theory (e.g. Donaldson 1985) and population ecology studies (e.g. Freeman and Hannan 1989) suggest that there should be an interactive association among the environment and the form of the alliance. Note here that the form of embeddedness is a very specific 'if-then' statement. This has generally been interpreted in empirical studies as a statistical interaction over and above simple additive effects (see Bluedorn 1993).

So far, we have suggested that the alliance's industry is a common environment for the sponsors and a focal point for imitation. It seems reasonable to propose that international alliances may be embedded in their industrial settings. As discussed in more detail below, the administrative form of the alliance and the product/knowledge flows through the alliance

are two theoretically important and visible alliance-formation characteristics. If the sponsors utilize informed imitation and the rule of relationship among the environment, and internal characteristics is interactive, the following may be stated:

*H1: The industry of the international alliance, the alliance's administrative form and the product/knowledge flows through the alliance will be embedded into one another such that statistically the industrial setting and the alliance characteristics will be interactively associated.*

### **International Alliances as Action Takers**

So far, we have suggested that industrial practices are a locus for imitation. The formation pattern is expected to be consistent with the viability of the alliance as a framework for the sponsors' collective interests. This view emphasizes both the socially constructed aspects of international alliances and recognizes that the alliance's viability serves as a restraint on unbridled executive choice.

An institutional view also suggests that international alliances are not just a framework for the sponsors' actions (adaptation and cooperation) but also action takers (cf. Holm 1995). That is, the alliance may have a function that is separable from those of any one sponsor, even if this function can be related to the sponsor's interests (cf. Holm 1995). Further, new international alliances are, by definition, experiments in institution building. They are unique, relational institutions. As relational entities, the internal configuration of the alliance may reflect its needs as an action taker as well as the interests of the sponsors.

### **The Administrative Forms of International Alliances**

If the international alliance is an action-taking entity that is expected to be viable, it is again useful to consider the very large body of research on contingency theory. Studies dating back to the work of Burns and Stalker (1961) and Thompson (1967) generally suggest the potential importance of a specific fit between or among (a) an entity's environment, (b) its administrative structure, and/or (c) its internal throughput (technology), if it is to be successful (see Bluedorn 1993, Donaldson 1996). Many studies of alliances describe the administrative form on a singular continuum ranging from contracts to partial equity forms (Gulati 1995). Institutional and contingency perspectives suggest that distinct types of administrative form may be salient. Consistent with Holm (1995), there may be distinctly different administrative logics underlying different administrative forms. Selznick, for instance, suggests an 'intrinsic conflict between the premises of contract and those of association (1996: 270)'.

One central contrast is the contractual emphasis on the value of ownership versus an association emphasis on the attentiveness to long-term interests and the structure of authority. Contracts for supply involve discrete negotiation over specific provisions (duration, price, quantity, quality, and the

like) and expected adjustments to recognized, foreseeable contingencies. In contrast, so-called technical agreements to share, exchange and/or develop knowledge or technology rest on an association logic (cf. Hagedoorn 1993a). Technical agreements represent an understanding of a cooperative relationship between parties for their long-term interests. Consistent with Holm (1995), this is a logic of association more than a specific promise to deliver, for consideration, according to a contract. Thus, while individually based values such as compliance, trust and forbearance may underlie contracts (cf. Parkhe 1993), the associative framework for action is supported by the expectation of reciprocity in order to sustain the relational entity.

The contract and association logics also appear quite different from an administrative logic, such as found in joint ventures. In a joint venture, the sponsors have specified an administrative mechanism to conduct operations within a separate hierarchy (Williamson 1991). Here, the logic of administration rather than contract would seem to dictate. Thus, it is little wonder that analyses of joint ventures often emphasize the more standard administrative issues of control (Geringer and Hebert 1989), the selection and actions of the general manager of the joint venture (e.g. Geringer 1991) as well as the division of ownership shares (e.g. Killing 1982).

### **Product/Knowledge Flows and Interdependence**

Part of Thompson's (1967), now classic, contingency analyses stressed the importance of different forms of interdependence in the flow of work among the parties to an administrative entity. For successful operations, sequential and pooled interdependence called for less elaborate, expensive and responsive forms of integration than reciprocal interdependence. It called for mutual adjustment. Mutual adjustment called for more flexible, responsive and idiosyncratic forms of integration.

Descriptions of the product/knowledge flows in most alliance studies have implicitly emphasized sequential interdependence. Whether based on the early trade theories of comparative advantage (see Deardorff 1979 for a review), the eclectic theory (Dunning 1979), the internalization approach (Rugman and Verbeke 1992), or the literature on entry mode choice (e.g. Agarwal and Ramaswami 1992; Hennart 1988; Hill et al. 1990), international alliances have been seen as mechanisms for the unidirectional outward expansion of products and knowledge or as (e.g. Smith and Zietahl 1993) exploiting some comparative national or firm advantage (e.g. Hennart 1988).

However, more recent work suggests that alliances are expected to be popular in technologically intensive industries because they are flexible mechanisms that firms can use simultaneously and cooperatively to develop new products and processes and jointly build reciprocal value-added networks (e.g. Auster 1992; Contractor and Lorange 1988; Hagedoorn 1993a). The work flow patterns in these alliances appear to emphasize mutual adjustment through reciprocal exchanges of products and knowledge. Here, the implicit assumption is that both sponsors have important and necessary

competencies to contribute to a synergistic effort. Thus, the interdependence should be reciprocal, not unidirectional.

Even though much of the current alliance literature seems to use product/knowledge flows to characterize the nature of alliance's reciprocal interdependence, there appears to be a split opinion on how to deal with different types of product/knowledge flows. On the one hand, there are those who emphasize transaction-cost minimization (e.g. Williamson 1991). Here, the joint-venture form, with its administrative logic and emphasis on control, would be preferred over less hierarchical administrative forms for coping with the uncertainty stemming from reciprocal flows and for monitoring compliance with the initial agreement (e.g. Burgers et al. 1993; Hennart 1988). On the other hand, Hagedoorn and his colleagues (Duysters and Hagedoorn 1993; Hagedoorn 1993b) suggest that the associative logic found in the agreement form might be more appropriate for stimulating exchange and development. Osborn and his colleagues (see Osborn and Baughn 1993; Baughn et al. 1997) have a similar argument. They suggest that mutual control in an agreement form with reciprocal interdependence may be accomplished by the potential threat of one party to withhold the knowledge needed to proceed to the next stage of commercialization.

### **International Alliance Sub-populations as Specific Patterns of Embeddedness**

So far, the analysis has attempted to recognize the duality and complexity of international alliances (see Osborn and Hagedoorn 1997). They are co-operations (frameworks for action) between self-interested corporations, where these sponsors are located in separate nations and cultures. Executives are expected to imitate other apparently viable alliances in the alliance's industry. Yet, we also suggested that to form an alliance the executives need to agree to a logic of association, contract or administration and to establish a pattern of product/knowledge exchanges. Sponsors are expected to socially construct an alliance consistent with their own interests and bargaining power as well as the alliance's function. We explicitly noted some of the inconsistent recommendations from the current literature concerning the choice of administrative forms and product/knowledge flows.

Holding other factors constant (such as nationality, corporate size and differences in bargaining power), we now contend that some specific embedded combinations are more likely than others. That is, consistent with industry-specific conditions and opportunities for economic and/or technical adaptation, some combinations of administrative form and product/knowledge flow might be favoured over others. While there are potentially many combinations, two are suggested by the more traditional alliance analyses. One is based on transaction cost economics. The second relies more on the technology literature.



### **Dominance**

Even in technically stable industries, there may still be considerable uncertainty in forming an alliance across national boundaries. Sponsors should be prepared, for instance, to react to a host of shifting national, firm-specific, and transaction-specific advantages as they struggle in a continuing battle for global competitive dominance (cf. Dunning 1993). The shifting setting may provide ample opportunities for opportunism (Williamson 1991, 1996). Thus, firms may seek the protection of a hierarchical administrative form (e.g. joint venture). The product/knowledge flows are likely to stem from national or firm comparative advantages and favour unidirectional rather than reciprocal exchanges. In Thompson's (1967) terms, sponsors will opt for pooled and sequential interdependence. The pattern of more stable industrial conditions with unidirectional product/knowledge flows through equity alliance forms to minimize opportunism may be called a dominance pattern. The pattern reflects the underlying rationale presented by many transaction cost and internalization theorists (e.g. Burgers et al. 1993; Dunning 1993; Gulati 1995; Williamson 1996). In sum:

*H2: In more stable, mature industries, international alliances with unidirectional product/knowledge flows through hierarchical administrative forms (joint ventures and partial equity purchases) will be proportionately more numerous than any other combination of form and flow direction.*

### **Hybridization**

Several scholars suggest that international alliances are an effective mechanism for coping with specific technological conditions. Different authors stress somewhat different industrial challenges, such as change and complexity (cf. Auster 1992; Osborn and Baughn 1990; Hagedoorn 1993a), technological discontinuities (Anderson and Tushman 1990), commercial complementarities and commercial inseparabilities (Teece 1986). In many of these analyses, the formation characteristics of international alliances are expected to match the technological requirements.

The favoured administrative form in response to discontinuities, uncertainty, commercial complementarity, commercial inseparabilities and/or technological change may not be simple supply contracts or joint ventures, but agreements (also known as incomplete or relational contracts, see Acs and Gerlowski's 1996 review). With rapid technological development, potentially coupled with technological discontinuities, sponsors may be unwilling and/or unable to fix the character of the contributions in sufficient detail either to consummate a simple supply contract or specify a joint venture.

For example, new commercial inseparabilities often emerge across once separate technical regimes (e.g. hardware and software, design and service in computers or chemistry and biology in biotechnology). Inter-organizational alliances may emerge to link once separate areas as a form of mutualism (cf. Barnett 1990). Thus, instead of unidirectional flows of

products or knowledge through the alliance, sponsors may opt for reciprocal product/knowledge exchanges to develop new combinations of production processes, products and services.

A technological view discards the presumption that firms should select an administrative form that minimizes transaction costs. Instead, firms are required to select product/knowledge flows and combinations of administrative forms that increase the chances of successful commercialization and/or adjustment. The issue is more: How can it be done?; rather than: How efficiently can it be accomplished? In hybridization, it is the role of the alliance as an action taker that is emphasized. Thus:

*H3: Within technology-intensive industries, characterized by commercial inseparability, alliances with reciprocal product/knowledge flows, coupled with agreements as the administrative form, will be proportionately more numerous than any other combination of form and flow direction.*

Both *dominance* and *hybridization* appear to be viable combinations. They are combinations of industry, administrative form and product/knowledge flows subject to informed imitation. If such is the case, at least two quite different 'institutionalized sub-populations' of alliances may be found. While there is a choice of which combination of industry, administrative form and product/knowledge flow is selected, some choices are more popular and potentially more effective than others.

### **Sample Selection and Measures**

All the empirical literature reviewed relied upon a single sample. Some were restricted to joint ventures or explicitly excluded some types of alliances (e.g. Geringer 1991), others concentrated only on within-industry alliances by very large corporations (e.g. Gulati 1995), while many were restricted to one specific industry (e.g. Burgers et al. 1993; Powell et al. 1996) or to two countries (e.g. Auster 1992; Osborn and Baughn 1990). Here, the hypotheses were tested in two distinct large data sets covering a wide variety of nations, industries, alliance types and sponsor sizes.

#### **Samples**

The first sample is a detailed collection of 625 alliances formed by U.S. and Japanese firms during 1988 and 1989 described by the Japanese External Trade Organization (see JETRO). The second sample concerns 762 alliance formations between firms headquartered in the United States, Japan and Western Europe between 1970–1989, drawn from the Cooperative Agreements and Technology Indicators (CATI) information system (see Duysters and Hagedoorn 1993).

While 762 new alliances in the CATI data for Japan, United States and Western Europe from 1970 to 1989 appears small compared to the 625 alliances found in the JETRO sample for 1988–1989, it is important to

recognize that the JETRO data contain information on alliances with relatively small Japanese firms which may have been missed by the announcements methodology. Furthermore, the JETRO database contains a greater number of long-term supply agreements, which may be under-represented in the CATI database due to its sole reliance upon public announcements. The JETRO data allows for a test of the hypotheses across industries with widely varied firm sizes for alliances formed between firms in two nations during one time period. In comparison, the CATI data allows for a test of the hypotheses across the same industries over a longer time period with a wider variety of nation states being represented.

The United States, Japan, and Western European nations together represent a diverse collection of technically and economically advanced countries where (a) there is extensive trade, (b) there has been a pronounced shift in the international division of labour since the end of World War II, and (c) there has been intense competition in the industries selected for study.

### **Variables**

The testing of Hypotheses 1 to 3 required consistency in measuring the variables across the two unique samples. Measures of the industry of the alliance, the administrative form of the alliance, and the intended product/knowledge flow through the alliance are described below.

### **Industry**

JETRO classifies new alliances (not their sponsors) into a standardized technical area code. The codes selected were (1) autos (automobiles and auto parts), (2) computers, (3) information and communication systems, and (4) semiconductors (both chips and equipment). Formations from the CATI data base were also recorded for these same industrial categories. Prior studies suggest that these industries contain the vast majority of international alliances formed among firms headquartered in developed nations (see Hagedoorn 1993a).

Autos and auto parts represent a mature area (see Auster 1992) of intense international competition. Between U.S. and Japanese firms, some consider the Japanese to have had a competitive advantage during the 1988–1989 study period (e.g. Burgers et al. 1993). The European auto industry is, and was during the study period of the CATI data, a very complex mix of national champions (e.g. France, Germany, Italy) and foreign-owned subsidiaries by such multinationals as GM and Ford.

Prior analyses of the remaining industries suggest that they were relatively early in the technological development cycle during the two study periods. Commercial inseparabilities have been considered very important in the rapidly growing computer and information/communication systems industries (see Auster 1992; Pisano and Teece 1989; Yoffie 1994). Semiconductors were also included because they appeared to be an unstable, high growth area with moderate commercial inseparabilities (see Borrus 1988 and Yoffie 1994).

**Administrative Forms**

Both data sets include all types of alliance forms. They were coded as supply agreements (long-term contracts for the sale of components, products or services from one sponsor to another or reciprocal exchanges thereof), technical agreements (single or joint R&D agreements, licensing or cross/licensing agreements, marketing or production agreements as well as combinations of these), joint ventures, (the creation of a separate legal entity) and partial equity purchases.

**Product/Knowledge Flows**

Both the JETRO and the CATI data sets describe the nature of the flows of products and knowledge exchanged via the alliance. In order to capture the degree of reciprocal interdependence, these flows were coded as either unidirectional or reciprocal, based on the descriptions of the individual alliances. For example, in simple customer–supplier agreements there is a unidirectional flow of products from one partner to another. Similarly, in licensing and cross-licensing agreements there are distinctive patterns of single or mutual technology transfer which would have been characterized, respectively, as unidirectional and reciprocal.

**Methodology and Findings**

For both samples, there were sufficient numbers of alliances with all possible combinations to test the interactive hypotheses for all industries, with one exception. There were but 13 U.S./Japanese alliances in communications. Since analyses dropping communications still showed a significant triple-order interaction, the tables report comparable data for all four industries for both samples.

Complete data on alliance characteristics were available for 625 U.S./Japanese alliances. Of the 625 U.S./Japanese alliances included in the JETRO sample, 177 were supply contracts, 264 were technical agreements and 184 were joint ventures and partial equity purchases. 431 of the alliances in the JETRO sample had announced unidirectional product/knowledge flows while 194 had announced reciprocal flows. There were 131 alliances in semiconductors in the JETRO sample while 243 were in computers, 13 in communications/information systems and 238 in autos/auto parts.

The CATI data provided 762 alliances involving Japan, Western Europe and/or the United States. Here, there were 129 supply contracts, 344 technical agreements and 289 joint ventures; 305 of 762 alliances announced unidirectional product/knowledge flows and 457 announced reciprocal flows. Similarly, for the CATI data, there were 229 in semiconductors, 169 in computers, 227 in communications/information systems and 137 in autos/auto parts.

The interactive hypotheses which predicted embeddedness (H1) was tested using hierarchical log linear analysis. This procedure is ideally suited to

examining interactive associations among categorical variables (see Dillon and Goldstein 1984 for a discussion). These results are contained in Tables 1 and 2 for the JETRO and CATI samples, respectively. The findings for the interactive results were completely consistent with H1. There were significant triple-order interactions for both samples. Specifically, industry, product/knowledge flow direction and administrative form were interactively related over and above the additive and second-order effects, as suggested by the institutional embeddedness hypothesis (H1).

An inspection of the data (complete data available from the senior author) indicated mixed evidence for the hybridized and dominance patterns predicted in Hypotheses 2 and 3 when viewed across both samples. Consider first Hypothesis 3, which predicted a hybridized pattern involving reciprocal

Table 1  
Results of Log  
Linear Analysis  
for Alliance  
Formation Using  
the JETRO Data  
US-Japanese  
Firms, 1988-1989

Variable/Effects	Degrees of Freedom	Pearson Chi-Square	Partial Chi-Square
<b>All one-way effects</b>	6	450.102 ***	
Industry (I)	3		304.097 ***
Governance form (G)	2		21.630 ***
Flow (F)	1		92.159 ***
<b>All two-way effects</b>	11	238.734 ***	
I × G	6		62.976 ***
I × F	3		78.698 ***
G × F	2		80.398 ***
<b>Three-way effect</b>			
I × F × G	6	14.612 **	
<b>One-way and higher</b>	23	703.448 ***	
<b>Two-way and higher</b>	17	253.346 ***	

*n* = 625; \*\*\* significant *p* < 1%; \*\* significant *p* < 5%; \* significant *p* < 10%

Table 2  
Results of Log  
Linear Analysis  
for Alliance  
Formation Using  
The CATI Data  
US-Japanese-  
European,  
1970-1989

Variable/Effects	Degrees of Freedom	Pearson Chi-Square	Partial Chi-Square
<b>All one-way effects</b>	6	460.929 ***	
Industry (I)	3		30.525 ***
Governance Form (G)	2		108.491 ***
Flow (F)	1		33.082 ***
<b>All two-way effects</b>	11	287.402 ***	
I × G	6		131.130 ***
I × F	3		34.118 ***
G × F	2		148.800 ***
<b>Three-way effect</b>			
I × F × G	6	23.811 ***	
<b>One-way and higher</b>	23	149.716 ***	
<b>Two-way and higher</b>	17	297.040 ***	

*n* = 762; \*\*\* significant *p* < 1%; \*\* significant *p* < 5%; \* significant *p* < 10%

flows administered via technical agreements within technology-intensive industries with potential commercial inseparabilities. In semiconductors and computers, reciprocal technical agreements were, in fact, disproportionately more popular than any other combination for both samples. Specifically, with an even distribution of forms and flows in semiconductors one would expect 22 reciprocal technical agreements in the JETRO sample while the actual number was 40 ( $p < .01$ ); in the CATI sample the expected value for semiconductors was 38 and the actual was 85 ( $p < .01$ ). For computers, the relevant data were 40 expected reciprocal technical agreements with 75 actual ( $p < .01$ ) in JETRO and 28 expected with 46 actual ( $p < .05$ ) in CATI. There were too few alliances in communications for the JETRO sample but in the CATI data 25 reciprocal technical agreements were expected while 98 were found ( $p < .01$ ).

Similarly, Hypothesis 2 predicted that unidirectional flows administered via equity arrangements should be more numerous than any other form in stable mature industries. This result was clearly supported for autos and auto parts in the JETRO sample. Thirty-eight unidirectional joint ventures were expected, but 71 were found ( $p < .01$ ). Hypothesis 2 was not supported by the CATI sample as there was not a significantly disproportionate number of one-way joint ventures (23 were expected and 32 were found with a  $p > .05$ ). Furthermore, the number of equity-based alliances with reciprocal flows (51) exceeded the number of joint ventures with unidirectional flows.

## Discussion

For both samples, H1, concerning embeddedness, was supported with significant triple-order interaction. The administrative forms of international alliances, the flows of products/knowledge through the alliances and their area of operation (industry) were embedded in one another at formation. These results were consistent with the proposed institutional approach that included ecological and contingency views, suggesting embeddedness as higher order interactive relationship. Within the context of the triple-order interaction suggesting embeddedness, these results were also generally consistent with the theoretical expectation of at least one of the two distinct institutionalized sub-populations of alliances labelled hybridization and dominance.

### Identifiable Sub-populations

Alliance formation in technology-intensive industries characterized by discontinuities and commercial inseparabilities disproportionately favoured reciprocal product/knowledge flows in technical agreements. This hybridized pattern was most clearly evident in the computer and semiconductor technical areas in both the JETRO and CATI data sets. This pattern appears quite consistent with the theoretical expectations of informed imitation to cope with technological conditions. Here, international alliance formation

was consistent with mutualism and an associative logic stressing reciprocal adjustment and development (cf. Auster 1992; Barnett 1990; Hagedoorn 1993b; Osborn and Baughn 1993). The alliance appears to be configured as an action taker.

In autos and auto parts, the analyses of the JETRO formation data revealed a preference for equity arrangements with unidirectional intended product/knowledge flows from Japan to the United States. This dominance pattern at formation appeared quite consistent with that expected from an economics perspective to reduce transaction costs (cf. Williamson 1991). For instance, internalization theory would suggest that if Japanese firms were moving to capture nation-specific advantages in the United States to complement their firm-specific advantages (cf. Buckley and Casson 1988; Dunning 1988) they would prefer to form unidirectional joint ventures over simple contracts or loose agreements.

The CATI database failed to show the dominance pattern involving unidirectional flows in autos/auto parts. Equity arrangements were predominant overall (83 equity linkages versus 54 technical and supply linkages), as would be expected from a transaction cost logic (Burgers et al. 1993; Williamson 1996). However, reciprocal product/knowledge flows outnumbered unidirectional flows and the preferred combination was reciprocal flows using joint ventures.

Across Europe, the United States and Japan over a twenty-year time span, simple unilateral internalization did not appear to operate (Buckley and Casson 1988). Rather than a simple continuous replication of a once preferred combination of the joint venture with a unidirectional flow (see Burgers et al. 1993), or a simple extension of one firm's competencies (cf. Dunning 1993), sponsors made a variety of choices regarding product/knowledge flow. Perhaps the traditional expected dominance pattern has been de-institutionalized by continued substantial changes in the global auto industry (see Oliver 1992).

### **Limitations**

Several specific external factors not measured in this study might account for the variations around the dominance theme. In the developed nations studied here, there is a history of very substantial direct (as with the Japanese and many European nations) or indirect (as with the U.S.) government involvement in the automotive industry. Thus, in addition to Whitley's (1994) notion of exporting some socioeconomic choices, we suspect the attempt by globalizing firms in a developed industry to merely expand their dominance is explicitly muted by governmental influence or the threat of governmental action.

It is also possible that parts of this industry are undergoing technological change even though (a) auto design and assembly remain within the major manufacturers and (b) volume operations remain important due to heavy fixed investments. For the more volume-sensitive areas undergoing change, perhaps the reciprocal joint venture is a compromise that balances inconsistent

demands for joint commercialization and cost control. A reciprocal joint venture may provide sufficient mutualism needed for technical development and adjustment while providing the control necessary to protect heavy fixed investments as well as the bureaucratic standardization necessary to integrate new technologies into mature facilities and operations.

The economic view may still be accurate over time. The inability to clearly measure the viability and survival of the various patterns is both a serious limitation and a challenge for future research. It is possible, for instance, that the proposed government intervention in the auto industry did make a difference in formation patterns, but that the dominance pattern with unidirectional flows will be more clearly seen among the longer surviving and more successful alliances.

This study shows a clear trade-off between breadth and depth. Although the data underlying this study are much more comprehensive than prior studies, this breadth prevented detailed measurement of a host of variables. Relation-specific (e.g. trust; see Park and Ungson 1993), firm-specific (e.g. characteristics of the executive teams and the strategic intent of the sponsors; Harrigan 1985), industry-specific (e.g. R&D intensity across a broader range of industries; Osborn and Baughn 1990) and nation specific (e.g. governance preferences by national governments; Franko 1971) variables were not measured. Yet, controls for firm size and similarity in the analyses of the JETRO data were not significant, nor did national differences influence the significant findings in the CATI data. It is possible more specific national differences (e.g. government policies, wage rates and industrial competency, as noted by Whitley 1994) or regional differences (Europe, North America and Asia) may still be important in charting the success or failure of alliances (e.g. Mundell 1994).

### **Future Research**

The concept of informed imitation yielding the expectation of generalized industry embeddedness as an interactive relationship among setting and alliance characteristics as well as specific institutionalized sub-populations helps the analyst to link the different units of analysis. The concept of informed imitation involves joint executive choice by individuals within sponsoring firms from two separate nations concerning combinations of industry and alliance characteristics. Thus, it moves traditional institutional theory well beyond its typical field and socioeconomic boundaries. There is no expectation that executives share a common culture, values, or history. They are not collectively captured by a common socioeconomic setting. Yet, in spite of all of these differences, they choose to cooperate in similar ways when faced with similar industrial conditions.

In far too many institutional perspectives economic, technical and institutional (social) factors are artificially separated from one another into distinct forces (see Powell 1996 for a discussion). In far too many economic views, the emphasis on the details of the transaction ignores important 'exogenous factors'. If the goal is to explain and predict rather than sup-



port or reject a line of inquiry, this paper suggests that institutional, economic, technological and contingency perspectives collectively provide valuable insights into alliance formation.

Yet, to utilize these insights calls on the researcher to violate some apparently sacred traditions — traditions that may not be central to the causal mechanisms that are the focus of the underlying theory (see Dubin 1969). This work is replete with such 'sins'. Institutional theory is utilized for international alliance formation where there is no common socioeconomic or cultural setting — it is being created. Yet, the notion of imitation that is central to this view was supported (see Selznick 1996). A typical population view emphasizes evolution through the differential birth and death rates of organizational forms (see Astley 1985) under the presumption of substantial bureaucratic intransigence (see Freeman and Hannan 1989). Yet, via informed imitation, the paper does show that entities subject to the same environment are similar (see Freeman and Hannan 1989). While contingency theory suggests that entities without an appropriate fit will die (see Donaldson 1996), this study suggests that alliances with an apparent fit would more likely be viable for imitation.

Many analyses follow the tradition established by Harrigan (1985) suggesting that alliances are the children of their sponsoring parents. Our work suggests that international alliances can be action takers and pursue a variety of goals. While they are created by sponsors and sponsor interest is obviously important, they may not be the captive of a single sponsor (see Harrigan 1985). The traditional continuum of administrative forms so common in transaction cost analyses (e.g. Gulati 1995) was abandoned in favour of examining discrete types (see Williamson 1996). Yet, the concept that firms are interested in reducing the threats from opportunism and reducing transaction costs was heavily utilized. Rather than focus on a single specific technological feature (see Anderson and Tushman 1990), broader industrial categories were emphasized here as a focal point for imitation. Yet, the characterizations of the industries rested heavily upon prior technology studies (see Hagedoorn 1993b).

Beyond modifying existing views and linking them, future studies should also identify the dynamics of informed imitation over time. At what point does a new institutionalized sub-population emerge? Do all institutionalized sub-populations automatically involve the same measured variables identified in this study? For instance, perhaps the next institutionalized sub-population will involve networks of international alliances (see Osborn and Hagedoorn 1997). How quickly do new, apparently viable, combinations spread across the globe? Do the costs and benefits of various forms themselves shift over time? And, of course, when and how is an institutionalized pattern deinstitutionalized (Oliver 1992)?

If executives are boundedly rational, what are these bounds when they are engaged in international alliance formation? How do they change over time (e.g. Gulati 1995)? Which organizational characteristics appear to tighten or loosen these bounds? This work suggests that a strategic choice for executives involves selection of an institutionalized pattern. However, it is

equally obvious that many did not choose hybridization or either variation of dominance. Were they less informed than those who selected an institutionalized pattern, or were they collectively attempting to create a viable alliance that would work for them to pursue specific aims beyond simple transaction cost reduction or commercialization? Clearly much more theoretical and empirical work is also needed to estimate the boundaries on informed imitation and embeddedness, as well as the types of success yielded by specific embedded patterns (see Dubin 1969). For instance, the subsequent viability and relative success of different embedded combinations needs to be empirically examined, not automatically assumed.

## Conclusions

In line with other papers in this volume, researchers are beginning to see the issue of inter-firm cooperation in a much more complex manner. No singular theoretical perspective appears sufficiently robust to fully explain and predict international alliance formation patterns. Here, the analysis centred on the whole industry as the focal point for informed imitation to isolate both generalized embeddedness and specific patterns.

Any research study focuses on certain elements, ignoring others. The vast bulk of the literature on international alliances focuses almost exclusively on these entities as frameworks for the actions of their sponsors. This study also recognizes the potential for action taking by alliances. With the incorporation of institutional theory, this paper also recognizes the socially constructed aspects of international alliances as experiments in cooperation. It suggests that the administrative form of the alliance and its product knowledge flows are embedded in its industrial setting. This work views some types of alliances as emerging institutionalized sub-populations.

By balancing determinism and choice in the analysis of international alliance formation and linking an institutional view to more classic perspectives from population ecology and systems contingency theory, this paper emphasized informed imitation as an underlying causal mechanism. Informed imitation based on the apparently viable alliances of others suggested a very specific form of industry embeddedness. The successfully tested interpretation of embeddedness was an interaction among setting and alliance characteristics. The expectation that industry, administrative form and product/knowledge flows would be interactively related at formation was confirmed in two very large and quite different samples.

A more detailed expectation for specific patterns of embeddedness incorporated work on transaction costs and technological development to isolate two potentially important sub-populations of international alliances. The hybridized pattern (technically intense industry coupled with reciprocal product/knowledge flows administered in technical agreements) was confirmed in both samples, and appears to be one institutionalized sub-population of alliances. Future research may identify additional sub-populations consistent with evolving industry dynamics.

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