Contributions to Management Science

Collaborative Value Creation

An Empirical Analysis of the European Biotechnology Industry

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2 Foundations of Collaborative Value Creation

**"No organization – no matter how big or how smart –
knows as much as two organizations
(or as much as an alliance network)."**

(Conlon and Giovagnoli 1998), p. 183-4

2.1 Introduction

As (Gulati and Zajac 2000) summarize, "it is hard to think of any issue that has been the subject of greater research in the last decade than that of strategic alliances" (p. 365). This extensive interest is manifested in a broad range of prior research. In their meta-analytical study, (Oliver and Ebers 1998) identify 17 different theories which have been applied in research on strategic alliances and corporate networks.[42] This plethora of different approaches also reflects the lack of a coherent theoretical basis. Consequently, the scope of existing research needs to be clarified before moving onto further research. More specifically, value-related alliance research can only be assessed (let alone extended), once the basic mechanisms of collaboration have been settled. With this objective in mind, the present chapter reviews existing literature on the topic and derives a set of propositions, i.e., potential mechanisms of collaborative value creation. In doing so, it addresses both alliance formation and performance as mediating constructs

[42] The specific findinds may not be applicable to the present context due to (Oliver and Ebers 1998) focus on strategic networks (rather than alliances more broadly), time horizon (ending in 1996), and sources (limited to the four leading journals in organizational research, excluding e.g., the Strategic Management Journal, Organization Science, the Journal of Management). However, the diversity in this comparably limited arena suggest that the wealth of theoretical foundations may not be comprehensively addressed by any one study.

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for the ultimate prize, collaborative value creation.[43] Consequently, all propositions follow the following general logic:

Alliance Motivation/Formation
→ Alliance/Firm Performance
→ Collaborative/Firm Value

Several review articles, among others by (Kogut 1988b), (Oliver 1990), (Parkhe 1993a), (Osborn and Hagedoorn 1997), (Spekman et al. 1998), (Barringer and Harrison 2000), and (Gulati et al. 2000), have provided both structure and direction to the research of strategic alliances. Many of these reviews and much of scholarly research in general have addressed a similar selection of fundamental theories, which may thus be considered as the core aspects of strategic alliance research.[44] These include the internal and external sources of collaborative benefits, the costs of ensuring cooperative behavior, and institutional aspects of alliance activity. Building on these precedents, this chapter is structured around five main streams of research: The market- and resource-based views of corporate strategy, transaction and agency cost theories, and a dynamic perspective on collaborative benefits. The first two purely address the strategic effectiveness of strategic alliances (subchapter 2.2); the subsequent two focus on the efficiency of transaction structures (subchapter 2.3). Finally, both effectiveness and efficiency dimensions are subject to changes over time (subchapter 2.4). Figure 11 provides an overview.

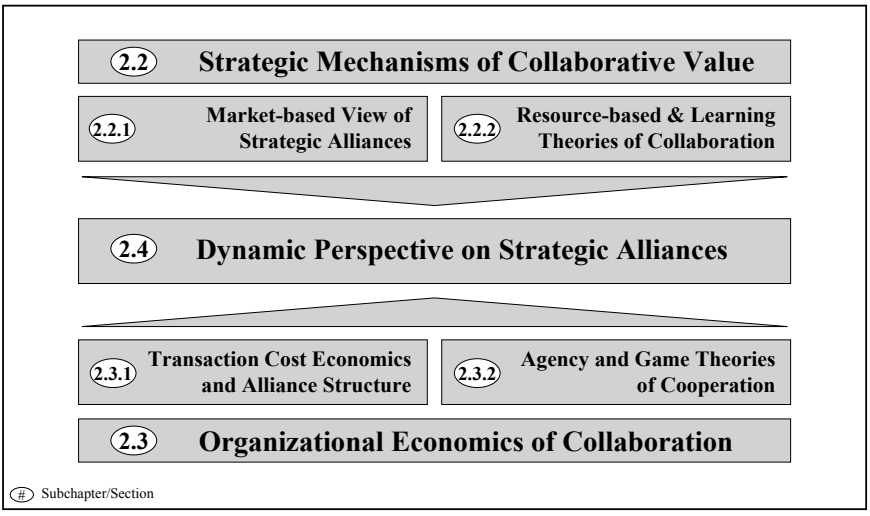
While prior literature reviews represent the reflections by highly prominent alliance-scholars, they differ from the overall perspective of the present work: On the other hand, they do not directly aim at explaining collaborative benefits, but rather give a high-level account of the overall state of research. On the other hand, since most influential reviews date back several years, they do not sufficiently capture recent advances in alliance research. For instance, contractual alliance structures and option-characteristics were previously referred to as gaps in the existing literature

[43] Note that this section explicitly does not consider value-related evidence, which will be assessed in greater detail in chapter 3. Naturally, operating and financial performance benefits of strategic alliances should translate into increased firm value. Similarly, alliance formation provides access to such benefits.

[44] See Table 36 of the appendix for an overview. Difference exist with regard to the terminology used, but less so in terms of actual content. Alternatively, some reviews, e.g., (Spekman et al. 1998), use a process-oriented approach distinguishing alliance formation, management etc..

[e.g., (Spekman et al. 1998) and (Gulati et al. 2000), respectively]. This encourages or even necessitates a further review of existing research.

Figure 11: Overview of Theoretical Foundations



Source: Own Illustration

While the present work by no means claims to be comprehensive, it provides an overview of the most important theoretical arguments. More importantly, it adds to the existing body of literature reviews in two ways: First, it takes an integrative approach by stressing the complementary nature of these theories. Second, by considering both theoretical concepts and the empirical evidence, it derives a number of generally validated propositions with regard to collaborative value creation.

2.2 Strategic Mechanisms of Collaborative Value Creation

2.2.1 Market-Based View of Strategic Alliances

2.2.1.1 Industrial Economics and the Strategy Logic of Collaboration

The first corporate strategy framework developed the general notion of strategy being about matching a firm's goals and competencies with its environment [(Learned et al. 1969)]. The latter encompasses external oppor-

tunities and threats as well as broader societal expectations facing the company. The resulting 'strategic fit' has become one of the most fundamental concepts in corporate strategy [cf. (Grant 1998)]. As all corporate strategy, the general benefits of strategic alliances may thus be associated with two distinct perspectives. On one hand, they may aid in navigating the competitive challenges inherent in a firm's environment. This is the view taken by the market-based approach. On the other hand, alliances may build on and foster firm resources, i.e., the firm-specific sources of competitive advantages. The two approaches thus represent complementary 'outside-in' and 'inside-out' perspectives.

Industrial economics research has focused on the important role the industry environment plays in explaining firm performance. Building on (Bain 1964) and (Mason 1939), the traditional structure-conduct-performance (SCP) paradigm has dominated this line of reasoning. Following standard microeconomic logic, the SCP paradigm argues that firm conduct (i.e., strategy) and, as a result, firm performance are largely determined by industry structure.[45] Specifically, monopolistic and oligopolistic settings allow firms to reap greater profits than conditions of perfect competition. In such cases, firms will choose output levels below market clearing, while maintaining artificially high price levels.[46] In this context, strategic alliances may serve as a mechanism to coordinate firm interests, either explicitly (cartels) or by reducing the hostility of competition.

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[45] At the same time, the SCP paradigm has been expanded to include a feedback loop accounting for the effects of corporate strategies and performance on industry structure. Within the scope of the present study, such feedback effects are of limited importance. While some collaborative ventures may indeed affect industry structure (e.g., the recently postponed JV of Siemens and Nokia with regard to telecommunication networks), prior research focussed on the primary effects of industry structure on the choice and performance of alliances (see the following subsection). Furthermore, biotechnology collaboration generally does not affect industry structure, given the generally small size of companies and the predominance of alliances focussing on individual drug discovery projects (i.e., not affecting companies as a whole).

[46] Various empirical studies have attempted to quantify the impact of industry factors on corporate performance in general. As summarized by (Bowman and Helfat 2001) and (Ruefli and Wiggins 2003), among others, industry conditions are highly statistically significant in explaining firm profitability. Findings mostly diverge regarding the relative importance of industry, corporate and business-unit variables. Early work, e.g., by (Harrigan 1988c), suggested that industry traits may be more important in explaining the occurrence of alliances and their potential for value creation than firm or transaction characteristics.

Industrial economics arguments have also formed the backbone of corporate strategy [cf. (Porter 1981)]. In traditional, market-oriented strategy, the objective of the firm is to generate economic rents similar to those under conditions of non-perfect competition. Identifying and competing in markets that allow such excess profits thus is one of the foremost concerns of any corporate venture. Similarly, improving competitiveness within these markets (i.e., vis-à-vis existing or potential market rivals) allows earning above-average profits.

Reasoning 1:	Alliances create firm value by reducing competitive price pressure on a firm together with or at the expense of its competitors.

In support of the market-based perspective, survey-based empirical research has underscored the relevance of industry structure and market access as motives for cooperative arrangements [e.g., (Contractor and Lorange 1988a)]. In particular, (Glaister/Buckley 1996) identify market power and market development (i.e., entering a new and attractive markets or industries) as two distinct reasons for allying. Furthermore, they document improving competitiveness and strategic positioning as alliance motives.[47]

This section proceeds to address the specific mechanisms for firms to gain protection from competitive price pressure through collaboration: Market power (as well as alternative) rationales proposed by industrial economics and corporate strategy arguments, such as market entry and gaining competitive advantages.

2.2.1.2 Industrial Economics: Market Power Versus R&D Efficiency

Industrial economists have suggested two primary ways of how cooperative arrangements may affect industry competition, which imply diametrically different effects on overall welfare[48]. On one hand, alliances may

[47] Another rationale raised by (Glaister/Buckley 1996) is technology development. However, this is akin to entering technologically new markets and will thus be treated as part of the market entry motive. Furthermore, the authors' factor analysis identifies resource specialization and large projects, both of which refer to 'positioning alliances' discussed below. (Boateng and Glaister 2003) provide similar evidence for international JVs.

[48] Note that, in accordance with section 1.3.3, welfare is here used in its original sense, i.e., to indicate the overall benefit of a transaction scheme regardless of

generate market power. Specifically, they may reduce competition among incumbents and/or with regard to potential market entrants. On the other hand, cooperative agreements may improve efficiency in R&D by preventing inefficient investment behavior. In particular, they may compensate for insufficient incentives or help avoiding duplication of expenditures.

Market Power

Prior research has linked horizontal alliances to collusion and market power. For instance, collaboration in research and development (R&D) or production between horizontally related partners may result in reduced inter-firm rivalry and thus above market-clearing prices at the expense of customers.[49] In this case, the efficient upstream collaboration may serve as means to maintaining the downstream collusion, since the mutual benefits arising from joint R&D or production reduce the incentive for firms to defect, i.e., to compete by lowering prices in the downstream market.[50] While this would imply that R&D and production alliances may be flawed from a welfare point-of-view, newer theoretical work suggests otherwise. (Cabral 2000) shows that even when cooperating firms could collude in the short term, they may have an incentive not to, if the returns from successful innovations are sufficiently high. Similarly, (Morasch 2000) argues that alliances may in fact strengthen market competition as long as the number of alliance members remains small relative to the overall market.[51] These theoretical arguments provide reason to believe that alliances may be used as an instrument to create market power in relatively concentrated industries, but do not have to be universally anticompetitive.

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the particular recipient. More formally, it comprises the sum of producer and consumer rents [see (Tirole 1988), among others].

49 For general arguments relating to the anticompetitive effects of upstream collaboration, cf. (Katz 1986), and (D'Aspremont and Jacquemin 1988), among others.

50 Cf. Martin (1995), building upon the general argument by (Bernheim and Whinston 1990) of firms encountering each other in multiple markets. Also, any collusion represents a reduction in strategic (in this case competitive) uncertainty from an individual firm perspective [cf. (Burgers et al. 1993)].

51 Specifically, (Morasch 2000) and argues that cartel-like alliances will only persist if the number of firms in the industry is limited to 3 to 5 firms (depending on the type of market competition). Otherwise, subgroups of firms may have sufficient incentive to defect. Prior work [e.g., (Salant et al. 1983) and (Shaffer 1995)] also suggested price-setting cartels may only be stable and anticompetitive, if a fairly large share of market participants is involved. However, the size of stable cartels may vary [e.g., (D'Aspremont et al. 1983)].

In support of the market power argument, (Hagedoorn 1993) points to market restructuring as being a dominant motive of alliance formation, especially in mature and oligopolized industries. Similarly, (Glaister/Buckley 1996) identify market power as an alliance motivation pursued mostly by larger firms. (Sakakibara 2002) concurs, showing that the number of firms in a given industry negatively is related to the formation of R&D consortia. More generally, horizontal alliance activity has been empirically linked to industry concentration [(Pfeffer and Nowak 1976); (Hernán et al. 2003)], firm size [(Berg and Friedman 1981)], and market share [(Hernán et al. 2003)].[52] These findings indicate that firms controlling a reasonably large share of the product market tend to collaborate more frequently, possibly with the intention to cooperate rather than compete with direct rivals.

Early work regarding the performance impact of horizontal alliances studied the effect of joint venture activity on average industry rates of return. (Duncan 1982) documents significantly higher profitability in industries, where horizontal joint ventures are prevalent. This supports the evidence presented by (Berg and Friedman 1981) and (Berg et al. 1982) of non-knowledge acquiring joint ventures being associated with higher industry rates of return.[53] Since these studies focus on overall industry performance, they reflect collective gains due to either collusion or joint efficiency gains.

As a bottom line, anticompetitive behavior may be an explanation for the use and benefits of collaborative ventures:

Proposition 1.1:	Alliances create firm value by increasing market power, especially in quite concentrated industries.

[52] These findings are also consistent with (Link and Bauer 1987) but contradictory to (Eisenhardt and Schoonhoven 1996). See (Kogut 1988b) for a review of earlier findings on horizontal alliance formation. (Pfeffer and Nowak 1976) and (Burgers et al. 1993) found the deviation of industry concentration (firm size) from the median across various industries (industry mean) negatively related to collaboration among competitors. Anticompetitive alliance benefits thus may not be monotonically related to industry concentration and firm size. The latter is also consistent with (Röller et al. 1998), who find that size symmetry among partners enhances the probability of two firms forming a research joint venture.

[53] Contrarily, non-horizontal JVs [(Duncan 1982)] and knowledge-related JVs [(Berg and Friedman 1981), (Berg et al. 1982)] are associated with lower industry profitability. This reflects the short-term effects of adapting to technological change (knowledge acquisition hypothesis). (Duncan 1982) highlights the fact that the large firms composing his and the (Berg and Friedman 1981) sample mostly are knowledge acquirers rather than providers.

R&D Efficiency

While collusion and entry deterrence may increase firm value at the expense of consumers or other market participants, IO literature also suggests some efficiency-enhancing alliance effects. Specifically, collaboration may help firms overcome inefficiency arising from suboptimal incentives for research and development (R&D). Depending on the given competitive context, firms may tend to over- or underinvest in R&D, both of which reduce welfare.

Overinvestment occurs, when firms in a highly competitive setting stand to gain from proprietary innovations, such as patents or market standards. This generates incentives for firms to heavily invest in competitive R&D projects (patent races).[54] While advantageous for the eventual 'winner', this duplication of investments is inefficient from a welfare perspective. Strategic alliances may help overcome this inefficiency inherent in competitive standard setting by homogenizing investment incentives [cf. (MacMillan and Farmer 1979), (Doz and Hamel 1988), (David and Greenstein 1990)]. While the formation and stability of standard-setting alliances are hindered by the competitive rivalry among alliance participants,[55] collaborative R&D may help avoid at least some duplicate R&D spending.

Underinvestment problems may arise, when R&D has at least some public goods properties, i.e., the use of R&D results by one firm does not exclude other firms [cf. (Grossman and Shapiro 1986)]. If R&D output is not fully appropriable by the researching firm, others (including its rivals) may profit from knowledge spillovers. While such externalities are efficient from a welfare perspective, they reduce the incentives for conducting R&D and firms will choose lower levels of R&D expenditures than would be socially desirable. Collaborative R&D can restrain these incentive problems by internalizing these externalities, provided that it involves firms otherwise profiting from the spillovers [cf. (Katz 1986); (D'Aspremont and Jacquemin 1988), among others].[56] In support of the spillover internalization hypothe-

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54 For instance, (Anderson and Tushman 1990) provide a model of discontinuous technological change, in which firms compete to establish a "dominant design", which will later undergo only incremental changes until another discontinuity arises. They show the selection process leading to the establishment of a dominant design standard to be highly competitive. The general concept of dominant designs goes back to (Abernathy and Utterback 1978).

55 In this context, (Axelrod et al. 1995) show multiple coalitions forming based on firm size and intensity of competition among firms, i.e., incompatible, substitutive technologies and overlapping target groups.

56 Katz (1986) argues that internalization through collaboration may even be more efficient than patent protection. Extensive patent and copyright protec-

sis, (Hernán et al. 2003) find the time lag of involuntary knowledge dissemination and the effectiveness of patent protection to reduce the rate of research joint venture formation. Both factors reflect the appropriability of research outcomes. Similarly, (Sakakibara 2002)documents higher frequency of R&D consortia formation for firms in industries with low appropriability of research findings (patent-based measure). [57]

All in all, collaborative R&D may contribute to welfare-maximization by realigning R&D incentives, when individual R&D decisions would lead to over-/underinvestment problems. These benefits also translate to the individual firm level:

Proposition 1.2:	Alliances create firm value by rectifying R&D incentives in situations of competitive R&D (patent races) or limited appropriability of R&D results (spillovers).

The industrial economics literature has focused on market power and efficient investment rationales of collaboration. Both aspects are associated with value creation at the individual firm level, although collusion and entry deterrence merely represent a transfer of wealth from consumers and other market participants. Furthermore, the vast majority of these arguments relate to collaboration among actual or would-be competitors, i.e., to horizontal alliances.

2.2.1.3 Corporate Strategy: Industry Attractiveness and Competitive Advantage

While firmly rooted in industrial economics, corporate strategy has expanded its narrow focus on industry structure to include other aspects of industry attractiveness.[58] Essentially, firms may create value by competing

tion – while providing similar R&D incentives – would have two adverse effects on public welfare: On the one hand, firms will compete for innovations, i.e., incur duplicate R&D investments. On the other hand, the product market (following successful R&D) will be monopolized for the duration of patent protection. As a third alternative, government subsidies for R&D activities would also induce additional incentives, but are subject to extensive information asymmetries [cf. (Cassiman 2000)].

57 (Lazzarini 2003) shows that alliances may also be used to internalize other types of externalities, e.g., traffic flow (i.e., connection flights) in the global airline industry, and documents a positive influence of spillover internalization (i.e., traffic flow among cooperation partners) on firm performance.

58 The best known concept for assessing the profit potential of a given industry is the Five-Forces-Model proposed by (Porter 1980). In brief, it argues that profit generation is based on intra-industry competition, the threats of new

in favorable markets, i.e., industries in which competitors, substitutes, and powerful transaction partners are unable to keep firms from appropriating quasi-rents. Additionally, firms may realize excess profits by developing distinct advantages vis-à-vis their competitors.[59] Alliances may target the sources of such competitive advantages and allow collaborators to outperforming other firms. The present section addresses both strategic benefits of collaborative ventures.

Market-Entry Alliances

Market entry is an important alliance motive in both domestic and international settings. For instance, (Glaister/Buckley 1996) demonstrate that firms collaboratively pursue the establishment of a new market presence, faster market entry, and the internationalization of market scope. In particular, alliances may help partners overcome barriers to entry and gain access to otherwise protected markets.[60] Market-entry alliances allow firms to realize economic rents as long as potential competitors remain obstructed by these hurdles. In the following, technological and commercial entry barriers as well as specific barriers to international market entry will be discussed.

- Firms may cooperate to enter into technologically new markets or markets that would be outside of their individual technological competency.

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market entrants and substitute products as well as the relative bargaining power of buyers and suppliers. All these factors are potentially capable of forcing profit levels down to the perfect competition level. The individual forces are briefly described in Table 37 of the appendix.
These competitive forces may be regarded as deterministic in the sense that management would be restricted to selecting the industries in which to compete and conduct day-to-day operations according to by standard practices. More realistically, they provide the background, against which firms compete. Consequently, market attractiveness itself will not be further addressed in favor of focusing on its strategic implications.

59 (Schendel and Hofer 1979) distinguish between 'where to compete' and 'how to compete' as the two main dimensions of corporate strategic positioning, referring to (selective) market entry and the subsequent choice of strategic posture.

60 See (Caves and Porter 1977) for a general comment on the concept of barriers to entry. Similarly, incumbents may collaborate to erect entry barriers and remain protected from further entry. Along those lines, (Kogut 1988a) argues that alliances may deprive competitors of access to rare resources or established distribution channels (i.e., erect barriers to further entry) in addition to reducing the competitive pressure exerted by suppliers and customers.

Empirical evidence generally supports this notion.[61] For instance, (Hagedoorn 1993) shows that technological complementarity is the single most important alliance motive. With regard to performance, (Stuart 2000) observes a significant impact of technology-related alliances on sales growth. (Rothaermel 2001) documents a positive, but marginally decreasing (inverse u-shaped) relationship between alliance activity and new product development. This may reflect limitations to leveraging internal capabilities through collaboration.[62] Similarly technological product complexity may affect the benefits of alliance activity. In particular, (Singh 1997) shows technology alliances concerning medium-complexity products associated with increased firm survival whereas the effect is insignificant for highly or less complex products. Alliances may thus be best suited to situations, where the need for technological innovation exceeds internal capabilities but remains manageable by the alliance partners.

- Alliances may help firms compile the commercial capabilities necessary to successfully compete in new markets.[63] Empirically, (Baum et al. 2000) observe a significantly positive impact of marketing alliances on the growth of biotechnology start-ups. (George et al. 2001) also show that vertical alliances improve the market performance of biotechnology firms.[64] More specifically, (Mosakowski 1991) documents a significant

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61 See (Schmitz Whipple and Gentry 2000) for a more comprehensive review of prior work addressing (among others) complementary partner competencies and market access.

62 Additionally, (Nicholls-Nixon and Woo 2003) point out that combinations of different types of alliances may be required for overcoming barriers to entry. In particular, they identify the number of different alliance types used as the best predictor of biotechnology products (i.e., successful new product development).
Corporate acquisitions may also be used for this purpose. Contrarily, R&D contracts and licenses are related to reputation, but not tangible research output. Joint ventures and equity alliances are not significantly related to any output measure and may thus be used for purposes of basic research or monitoring technological developments [cf. (Arora and Gambarella 1990)].

63 Early research has stressed standard barriers to entry, such as economies of scale/scope, capital requirements, and high fixed costs [e.g., (Contractor and Lorange 1988a)]. For instance, (Sharma 1998) shows the selling and distribution intensity (as share of total cost) of an industry negatively related to the persistence of independent (de novo) entrants.

64 Conversely, horizontal alliances do not exhibits such a positive influence and alliances generating or attracting technological competencies even are associated with negative market performance effects.

positive effect of sales-oriented alliance contracts on the performance of IT firms, if they concurrently pursue internal R&D.[65] This suggests that the main benefit of such alliances may arise from translating technological know-how into commercial products.

- Alliances may facilitate international market entry and help firms overcome a lack of market knowledge, cultural dissimilarities, or legal restrictions. In the survey studies by (Glaister/Buckley 1996) and (Boateng and Glaister 2003), market entry and international expansion are leading motive in the formation of international alliances and joint ventures. (Shan 1990) finds high-technology firms more likely to choose cooperative commercialization strategies in international than domestic market entries. Various studies, including (Moon 1999) and (Desai et al. 2002), demonstrate a strong positive relationship between ownership restrictive host-country regulation on foreign equity ownership and collaborative market entry.

The preceding evidence points towards alliances helping firms overcome technological, commercial, and international barriers to entry.

Proposition 1.3:	Alliances create firm value by allowing entry into markets protected from full-scale competition, which would not be accessible in isolation.

The above arguments for market-entry alliances have focused on markets already being protected from full-scale competition. Additionally, market entry itself may allow entrants to gain competitive advantage and thus reduce price pressure at least for some period of time. Collaboration may lead to first-mover advantages, if it allows entering and penetrating markets more quickly than in isolation.[66] In addition, the time required for setting up operations in a (geographically or technologically) new market reduces the benefits of market entry. In particular, ongoing competitive and technological advances render it imperative to quickly market a product of-

[65] This finding is particularly noteworthy since the author documents significantly negative effects of R&D and service contracts on firm performance (measured by sales and net income). Moreover, both of these alliance types have negative interaction effects with internal R&D spending.

[66] Specifically, early entrants may profit from a continuing technological leadership, preferential access to required assets (e.g., distribution channels), and switching costs incurred by customers. Conversely, possible first-mover disadvantages include freeriding on pioneer investments, the resolution of technological uncertainty, shifting customer preferences and incumbent inertia. For a more detailed treatment of first mover advantages, see (Lieberman and Montgomery 1988).

fering not only to gain first-mover advantages but also to avoid newly won capabilities becoming obsolete before they have yielded a sufficiently high return on investment. (Ohmae 1989) conceptualizes both issues for international cooperative arrangements; (Shan 1990) highlights the relevance of shortening technology life-cycles.

In support of collaborative first mover advantages, (Sarkar et al. 2001) observe alliance proactiveness having a positive effect on market performance.[67] Similarly, (Hagedoorn 1993) and (Glaister/Buckley 1996) find that a reduction in innovation time span and time-to-market is one of the most important alliance motives of both technology and internationalization alliances, respectively. Together these findings suggest that the speed of collaborative market entry may be a competitive advantage in itself.

Proposition 1.4:	Alliances create firm value by enabling first mover advantages through accelerated market entry.

Competitive Advantage Alliances

While the above arguments relate to market entry, alliances may also serve an important role as a strategic measure for intra-industry competition. In this regard, (Porter 1985) proposes three generic strategies for outperforming competitors: Cost leadership, product differentiation, and niche positioning:[68]

- Prior research has outlines a number of potential cost-reduction mechanisms: (A) Production cost rationalization may be achieved by producing at the (ex ante) lowest cost location or purchasing from the (ex ante) lowest cost source available to any one alliance partner [(Contractor and Lorange 1988a)]. (B) The chosen production regime may allow to further reduce costs by more narrowly specializing on certain products and thus quickly realizing experience curve effects [(Eccles 1981)]. Similar

[67] While proactive alliance formation increases corporate performance, this is quite distinct from entrepreneurial proactiveness in general. In fact, (Dickinson and Weaver 1997) find entrepreneurial management orientation reducing firms' allying propensity in otherwise conductive settings (i.e., uncertain environments). Entrepreneurial orientation thus may reflect individualist predispositions, whereas collectivist management culture increases the preference for cooperation for given levels of external inducements and entrepreneurial orientation.

[68] Table 38 of the appendix provides a summary of the three competitive strategies. Note that cost reduction, product differentiation, and niche positioning may be achieved through both horizontal and vertical alliances. Consequently, such these benefits may be additive to to market power and entry considerations.

cost reduction effects based on economies of scale may be realized through pooling of production [(Contractor and Lorange 1988a)]. (C) Economies of scope may reduce overall cost (Teece 1980)], e.g., by spreading fixed costs across a greater number of different products. The latter may be particularly relevant for fixed-cost intensive functions such as distribution networks [(Ohmae 1989), (Contractor and Lorange 1988a)]. (D) Quality improvements achieved through close buyer-supplier collaboration may reduce scrap rates, i.e., items having to be replaced [(Schmitz Whipple and Gentry 2000)], and lower total value-chain costs [(Dyer and Singh 1998)]. Empirically, cost reduction is an important alliance motive [cf. (Contractor and Lorange 1988a), (Schmitz Whipple and Gentry 2000)].

- Many of the above arguments on market entry also extend to product differentiation. Other examples of collaborative product differentiation strategies include co-advertising/co-branding, which aims at transferring reputation effects among partners [e.g., (Washburn et al. 2000)]. In this context, (Harrigan 1988c) shows that joint ventures between vertically related parents are rated as more successful than those between unrelated parents.[69] Vertical alliances may secure access to distribution channels (downstream) or essential resources (upstream), setting a firm apart from its competition. As (Schmitz Whipple and Gentry 2000) point out differences in alliance motivation between upstream and downstream alliances. While upstream alliances are entered mostly for reducing inventories and stabilizing supply (i.e., cost reduction), downstream alliances focus on gaining customer loyalty and involvement [e.g., (Magrath and Hardy 1994)].
- Alliances may provide firms with cost or differentiation advantages in niche markets. More specifically, collaboration may be required to develop a product offering specifically adjusted for the target segment or adapting existing (mass-market) products may be more cost-efficient than developing niche product from scratch. In this context, (Harrigan 1988a) argues that firms may enter into a multitude of different alliances (spider-web approach) in order to accommodate settings not allowing for product standardization across sub-markets. Alliances may thus be a core strategic tool for firms pursuing positioning in multiple niche markets.

In all, alliances thus may allow firms to successfully compete based on relative cost advantages, product differentiation, and/or niche positioning.

[69] The positive effect of relatedness shown by (Harrigan 1988c) appears to be even stronger for horizontal constellations. At the same time, this effect may be attributable primarily to collusion or cost reduction as pointed out earlier.

Proposition 1.5:	Alliances create firm value by generating strategic cost and/or differentiation advantages vis-à-vis competitors in existing markets.

2.2.2 Resource-Based and Learning Theories of Collaboration

The resource-based view of the firm (RBV) takes an inside-out perspective as opposed to the outside-in view of traditional market-based strategy. While the latter implicitly assumed firms to be homogeneous, the RBV explicitly addresses the firm-specific sources of performance variation [cf. (Barney 1991); (Das and Teng 2000b)].[70]

2.2.2.1 The Resource-Based View of Corporate Cooperation

On a general level, the RBV argues that competitive advantages arise out of the individual firms' resource endowments [see e.g., (Wernerfelt 1984), (Barney 1991)]. Since no two firms possess identical resource bases, they employ different strategies and experience different levels of performance. As (Barney 1991) argues, neither first mover advantages nor entry barriers can exist without these two prerequisites.

For resources to yield sustainable competitive advantages and above-average performance, they need to be persistently heterogeneous and relevant from a competitive perspective. In particular, strategic resources are required to possess five key attributes: (1) value, (2) rarity, (3) imperfect mobility, (4) imperfect imitability, and (5) imperfect substitutability. [cf. (Barney 1991), (Peteraf 1993)].[71] Resources must be valuable and rare but neither (perfectly) mobile, (perfectly) imitable nor (perfectly) substitutable

[70] In spite of these fundamental differences, the RBV builds on some industrial organization concepts. In particular, (Conner 1991) observes congruence ranging from merely agreeing on the firm being an input-combiner (neoclassical IO) to shared concepts of asset specificity and small numbers bargaining (transaction cost economics). While these different approaches thus draw on similar conceptual foundations, the present thesis focuses on their substantially different applications in collaborative contexts.

[71] The former two aspects determine the relevance of resources for competition. However, competitive advantages resulting from rare, valuable resources cannot be appropriated and sustained if firms not initially possessing such resources find other ways of duplicating strategies. See Table 39 of the appendix for further descriptions of the five conditions.

in order to be considered sources of competitive advantage.[72] Such valuable resources may be the focus of collaborative ventures. In particular, they (a) directly affect alliance formation and (b) themselves are affected by alliance activity and (c) may influence the performance implications of strategic alliances.

- With regard to alliance formation (a), the involved firms' ex ante resource endowments and needs affect their propensity to collaborate. In this context, (Eisenhardt and Schoonhoven 1996) and (Ahuja 2000b) raise the distinction of inducements and opportunities for cooperating. Plainly stated, a company allies in order to compensate for own shortcomings, whereas its counterpart requires it to already possess resources making it an attractive partner. Thus, the possession of certain resources and the lack of other resources are prerequisites for cooperation. As (Eisenhardt and Schoonhoven 1996) put it, "firms must have resources to get resources" (p. 137).
- In addition, strategic resources may both result from inter-firm collaboration (b) and affect alliance performance (c). (Kogut 1988b) and (Das and Teng 2000b) identify two resource-based objectives for corporate collaboration: obtaining or accessing other firms' resources and maximizing the value of one's own resources. Similarly, (Dyer and Singh 1998) point out that the combination of two firms' resources only increases firm value if the resources themselves become more valuable or if the cooperation leads to the creation of new valuable resources. Both partners' resource endowments thus are relevant sources of collaborative benefits.

Consequently, resource complementarity plays an essential role in alliance formation, further resource creation, and alliance performance:

Reasoning 2:	Collaborative value creation is based on complementary strategic resources, which foster alliance formation, joint development of additional resources, and alliance performance.

[72] Additionally, limited mobility of strategic resources, social complexity, and causal ambiguity may prevent standard arm's-length market transactions, such as the sale of valuable resources [cf. (Eisenhardt and Schoonhoven 1996)]. Therefore, the resource-based rationale provides a first indication why alliances are may be superior to other transaction mechanisms. This issue will be further elaborated in the following subchapter (2.3) relying on the transaction-cost approach (section 2.3.1).

2.2.2.2 Technological and Commercial Resources

Distinct types of corporate resources may differently affect the likelihood of collaborative ventures and their performance impact. In this context, various typologies of corporate resources exist [see (Das and Teng 2000b) for an overview], including the distinctions between tangible and intangible resources [(Grant 1991)], between property-based and knowledge-based resources [(Miller and Shamsie 1996)], as well as between physical capital, human capital, and organizational resources [(Barney 1991)]. In empirical research, a threefold resource classification has gained greatest prominence, distinguishing technical, commercial, and social capital [e.g., (Shan et al. 1994), (Ahuja 2000b)]. The present study follows this precedent.[73]

Technological Resources

Technical[74] capital primarily reflects a firm's ability to innovate.[75] Prior research has addressed the influence of technological capital on alliance formation, the collaborative creation of technological resources, and their performance effects.

A firm's technological resources are fundamental to alliance formation decisions, with regard to both collaborative opportunities and inducements. On the most basic level, (Sakakibara 2002) detects a significantly positive influence of firms' R&D capabilities on their participation in R&D consortia. Similarly, (Ahuja 2000b) and (Kelley and Rice 2002) find technical

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73 Note that the terms firm resources and capital are used interchangably in the present study. Specifically, capital refers to a firm's entire (i.e., tangible and intagible) resources of a given type. For instance, technological resources include both tangible technologies (e.g., patents) and intangible technological knowledge.

74 In the present work, the terms technical capital and technological resources are used synonymously. Technically, however, the terms diverge in that technological not only applies to concrete (i.e., technical) knowledge regarding one particular problem, but represents a broader class of (technological) knowledge applicable to an entire class of problems [cf. (Teece 1977), (Von Hippel 1988)]. As (Brockhoff and Chakrabarti 1988) point out, technological knowledge also extends to the knowledge of applying technical resources.

75 Given the difficulty of empirically measuring intangible resources, prior research has predominantly used tangible proxies, such as patents, financial means, or prior alliances. This caveat of empirical evidence may be less of a concern in event-study research, since it appropriately reflects the market's factual knowledge of firm resources. Table 40 of the appendix provides an overview of measures used to approximate techological (as well as commercial and social) resources.

capital to significantly increase the number of technical alliances formed. This evidence is consistent across various patent-based indicators of technological capabilities, including the mere existence of patent portfolios, the total number of patents held, and citation-based measures of patent quality. (Ahuja 2000b) particularly highlights the relevance of important innovations and key patents, which may represent particularly valuable technological breakthroughs. Such 'drastic' innovations have an additional significantly positive impact on alliance formation. Similarly, (Eisenhardt and Schoonhoven 1996) show technological leaders pursuing innovative technology strategies having higher rates of alliance formation. All these findings point towards technological capital creating opportunities for collaboration.

Conversely, the inducements to collaborate are lower for technologically advanced firms. Along those lines, (Shan 1990) observes a reduced propensity to choose alliances over proprietary commercialization for firms in technological leadership positions. Similarly, (Park et al. 2002) and (Oliver 2001) find a significantly negative effect of technological resource diversity on alliance formation indicating that firms endowed with sufficiently diverse internal resource do not have sufficient incentive for entering into technology-related alliances.[76] On the opposite side of the spectrum, (Oxley and Sampson 2004) complementary find that followers cooperate on a broader scale than technological leaders, in particular more likely including joint manufacturing and/or marketing activities.[77] As a whole, this evidence suggests that the prior technological capabilities reduce the incentive to collaborate.

Once alliances are operational, they may improve firm innovativeness, i.e., further technological resources creation. For instance, (Baum et al. 2000)] and (George et al. 2002) show that biotechnology firms may expand their patent portfolios through collaborative links.[78] Among others,

[76] Complementarily, (Oliver 2001) observes the breadth of firms' product portfolios to significantly increase their alliance formation rates.

[77] In an international context, (Hitt et al. 2000) find that firms from emerging markets consider technical capabilities (as well as intangible assets and quality capability) significantly more strongly in choosing an alliance partner than established-market firms. This finding is in contrast to complementary capabilities in general, which are similarly important in established and in emerging markets.

[78] While these findings apply to all types of collaboration, specific benefits may differ with partner and transaction characteristics. For instance, (George et al. 2002) observe that alliances with university (but not other firms) reduce the level of R&D spending required for achieving given technological advances. Similarly, (Nicholls-Nixon and Woo 2003), find contract-based alliances and

(Stuart 2000) and (Sampson 2002), stress the importance of resource complementarity and find that both partnering firms' patent bases combine to significantly increase biotechnology firms' innovation output. More generally, (Mothe and Quelin 2001) find that complementary assets between alliance partners lead to increased new product development (NPD) and intangible knowledge accumulation.

Finally, the generally positive effect of technology-related alliance activity on firm performance (see subsection 2.2.1.3 above) varies with the partner firms' technological resource endowments. For instance, Stuart (2000) demonstrates a significantly positive impact of alliance partners' innovativeness (i.e., number of patents) on the sales growth experienced by cooperating firms. Access to partner firms' technological resources thus may be a substantial performance driver. (Hagedoorn and Schakenraad 1994) show alliances attracting other firms' resources as yielding higher profits than alliances targeting joint resource development. Furthermore, the quality of a resource base increases the collaborative benefits for alliance partners. Along those lines, (Coombs and Deeds 2000) show that the compensation biotechnology firms receive as part of alliance agreements is related to their technical capital.[79]

As bottom-line, focal firms' technological resources appear to determine alliance formation decisions, whereas partner resources form the basis for collaborative performance effects. The creation of additional technological capabilities is most strongly related to resource complementarity.

Proposition 2.1:	Collaborative value creation is linked to the extent and complementarity of technological resources.

Commercial Resources

The second type of resources, commercial capital, encompasses financial means, production and marketing capabilities, all of which are necessary to

licensing agreements positively associated with technological reputation, although they find no effect on actual patents.

[79] Among various potential indicators, however, only the number of patents owned and the number of development projects in advances (phase III) clinical trials were found to be significant. The latter suggests that the value of technical capital is specifically assessed by the alliance partner, especially if cooperative agreements entail substantial financial commitments. While earlier stage R&D projects may be similarly promising, their uncertainty reduces the expected value for an external 'investor'. Also see subsection 2.3.2.1 on this notion from an organizational economics perspective.

generate revenue from technological innovations.[80] The ownership of such complementary assets may allow companies to enter into alliances and thereby appropriate a share of the innovations' value [cf. (Teece 1986)]. Similar to the case of technological resources, commercial capital may exert an influence on the formation of collaborative arrangements as well as on firm performance, while at the same time being affected by alliance activity.

Internal commercial capabilities are related to the formation of strategic alliances. In fact, (Ahuja 2000b) identifies commercial capital considerations as having the most direct impact relative to both technical and social capital. Specifically, he shows that firms' commercial capital (proxied by their book value of assets) significantly positively influences the number of technical linkages formed. (Park et al. 2002) also find that financial resources (measured as the total capital funding acquired by the start-up firms studied) increase alliance formation. (Eisenhardt and Schoonhoven 1996) document a significant positive effect of firm age on alliance formation rates. Similarly, (Shan et al. 1994) and (Oliver 2001) show that publicly traded firms have a significantly larger number of inter-firm ties.[81] All of these findings indicate that the possession of commercial capital may be a necessary condition for alliance formation.

While firms rich in commercial capital thus may be attractive alliance partners, they may also be more capable of achieving market success without cooperation. In particular, the complementarity of different commercial assets may better explain alliance formation than each firm's individual resource base. (Chung et al. 2000) show that differences in investment banks' industry and market specialization significantly influence alliance formation. Along the same lines, (Hitt et al. 2000) identify unique competencies and domestic market knowledge as factors attracting international cooperation partners to firms in emerging markets. (Ahuja 2000b) extends this logic to complementarities between technological and commercial capital, finding the interaction of both resource types significantly reducing the likelihood of alliance formation. More generally, (Combs and Ketchen

[80] While commercial capital thus encompasses a wide variety of resources (including truly intangible ones, such as management skills), measurability issues have limited prior empirical investigation to tangible assets. As illustrated in Table 40 of the appendix, firm size has been the predominant proxy of commercial capital.

[81] Contrarily, (Shan 1990) finds that firm size (measured as number of employees) is negatively associated with cooperative activity. In this context, firm size, public listing, and firm age may approximate both internal resources and public awareness.

1999a) argue that firms with sufficient internal technical capital will only enter into alliances if they lack sufficient commercial capabilities internally (and vice versa).[82] Overall, prior commercial resource endowments thus reduce collaborative incentives.

Access to external commercial resources may allow firms to expand their internal resource bases. For instance, (Shan et al. 1994) find that commercial ties are positively related with a firm's innovation output (i.e., number of patents).[83] Similarly, (Ahuja 2000b) documents a significant positive influence of marketing collaboration have a on the likelihood of technical alliance formation. These findings suggest that firms may raise the commercial (especially financial) resources required for internal R&D through collaboration. Furthermore, alliances may enable a direct transfer of commercial capabilities between collaborators. In particular, (Uzzi and Gillespie 2002) show that multiple long-standing bank relationships allow firms to improve internal commercial capabilities, such as trade credit management.

Finally, commercial capital may affect the performance implications of collaborative agreements. Similar to the case of technological capital, access to partner firm commercial resources may be fundamental to collaborative performance effects. For instance, Stuart (2000) finds that partner sales have a significantly positive impact on the sales growth experienced by small high-technology firms.[84] At the same time, the complementary resource contributions may further raise performance. Generally, (Pearce and Hatfield 2002) show that (manufacturing) JVs best achieve their goals, when both partners equitably contribute resources to the venture. In a study

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82 (Combs and Ketchen 1999b) find that firms lacking financial capital and brand name reputation engage in significantly more strategic alliances than firms already possessing such resources. More recently, (Combs and Ketchen 2003) provide meta-analytic evidence on the importance of commerical resource considerations on the choice of franchising as an entrepreneurial business model.
Additionally, (Ahuja 2000b) shows that capital-poor firms, i.e., below the sample median in technical, commercial, and social capital, may compensate for this deficiency, if they have achieved important technological breakthroughs over the preceding two to four years.

83 In theory, this evidence may be subject to an endogeneity bias (i.e., expected innovation output leading to commercial ties). However, (Shan et al. 1994) find no significant effect of patents on commercial ties.

84 In survey-based research, (Saxton 1997) highlights the significantly positive effects of partner firm's reputation for management and product quality on perceived alliance performance and satisfaction. This indicates that the relevant partner resources need not be financial or even tangible.

of Israeli high-technology firms, (Yeheskel et al. 2001) observe that production alliances with local partners and marketing alliances with international partners exhibit the best performance.

In brief, focal firms' commercial resource endowments affect opportunities and inducements to collaborate. Partner firm resources (and their complementarity) form the basis of further resource creation and collaborative performance.

Proposition 2.2:	Collaborative value creation is linked to focal firms' commercial capital, which facilitates alliance formation, and the complementarity of partner resources (including technological capital).

2.2.2.3 Social Capital and Alliance Networks

Social capital represents a company's prior external links and its embeddedness in relevant networks. Similar to other strategic resources, the goodwill associated with social capital may create both facilitative and substantive benefits [cf. (Ahuja 2000a)]. As a facilitator, social capital enables further inter-firm collaboration, which in return derives its substantive benefits from technological or commercial resources. This is may be due to the higher visibility of well-linked firms or to their greater awareness of alliance opportunities.[85] Substantively, social capital may be a value-creating asset in itself. For instance, network participation may allow firms to profit from knowledge spillovers and commercial opportunities arising within the network. Prior research has addressed three types of social resources: Personal, organizational, and network-embedded social capital.

Personal social capital refers to relations between individuals in different organizations. (Eisenhardt and Schoonhoven 1996) document a significant effect of management team characteristics facilitating alliance formation. Specifically, they observe that the rate of alliance formation is positively associated with management team size (number of executives), industry experience (number of previous employers), and seniority (mean previous job title). These findings suggest that executives' specific experience may allow them to develop social capital, facilitating alliance formation. Substantively, (Luo 2001) shows that personal relations between alliance partners improve alliance operations and firm performance. In

[85] Note that this is distinct from the greater level of trustworthiness attributed well-connect firms by potential partners, which essentially reflects reduced information asymmetries. This notion will be further addressed in section 2.3.2.

particular, an overlap in management tenure and cultural congruity between collaborating firms yield such personal social capital effects.[86]

Proposition 2.3a:	Collaborative value creation is linked to personal social capital, which facilitates alliance formation and, at the dyadic level, improves alliance performance.

Organizational social capital represents the existing ties a firm has to environment. Among others, (Ahuja 2000b) and (Sakakibara 2002) support the hypothesized facilitative effects of network size (proxied by the number of prior collaborations) on further alliance formation. The facilitating benefits of social capital may, however, decrease if it is overused. Along those lines, (Chung et al. 2000), while generally supporting the positive effect of social capital, show that the impact of ties between two partners on alliance formation decreases for particularly active dyads.[87] Similarly, (Park et al. 2002) observe that the diversity of alliance experience rather than the mere number of prior alliances increases the likelihood of alliance formation. This evidence suggests that prior alliances may create follow-on opportunities or serve as positive signals for potential alliance partners.

Organizational social capital also substantively affects alliance performance.[88] Using biotechnology firms' geographical location as an indicator for social capital, (Coombs and Deeds 2000) find that firms in main biotechnology clusters receive higher compensation as part of alliance agreements. Since such alliances are technology-driven, substantive effect of social capital may depend on the prospects of knowledge spillovers and

[86] The observed effects are not confounded by general managerial experience effects. As such, (Combs and Ketchen 1999b) do not find management experience within the industry and with the focal firm significant in determining alliance formation or performance (ROA and market-to-book ratio). Similarly, (Coombs and Deeds 2000) observe that management's international work experience is insignificant with regard to the revenue biotechnology firms derive from international alliances.

[87] In their study of the investment banking industry, (Chung et al. 2000) document significantly positive, but marginally declining effects of direct (i.e., participation of one bank in transactions led by the other) as well as indirect ties (i.e., both firms participating in a transaction led by a third institution). Similarly, a lack of reciprocity (i.e., the lead bank having offered overproportionally more transactions to the potential partner) is also associated with a lower likelihood of collaboration.

[88] As the performance impact of prior or concurrent alliances may stem from their social-capital effects or better alliance-management skills, this evidence is presented in subsection 2.2.2.4 (alliance experience).

better information access.[89] Moreover, (Lee et al. 2001) find that linkages to universities, venture capitalists, venture associations/networks, and financial institutions only significantly increase the sales growth start-up firms in combination with internal financial resources, technological capabilities, and entrepreneurial orientation.[90] Firms may thus require complementary internal resources to effectively realize the substantive benefits of social capital.

Proposition 2.3b:	Collaborative value creation is linked to organizational social capital, which facilitates the formation of new linkages and provides additional substantive benefits.

The entirety of companies' direct and indirect relationships with their environment constitutes their overall network. The characteristics of these networks can affect further alliance formation and performance.[91] With regard to facilitation, (Shan et al. 1994) find that the extent of network embeddedness significantly increases the number of additional commercial ties formed. More centrally located firms thus receive additional collaborative opportunities.

Substantively, extensive networks may provide the breeding ground for technological innovation. For instance, (Ahuja 2000a) shows that the overall number of direct and indirect ties has a positive impact on patenting. Similarly, (Yao and McEvily 2001)show embeddedness to be positively associated with innovation.[92] Conversely, (Ahuja 2000a) and (Yao and McEvily 2001) find structural holes [i.e., small numbers of redundant (both direct and indirect) ties] to have a negative impact on patenting rates.

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89 Conversely, (Park et al. 2002) do not document any evidence of location advantages for Silicon Valley semiconductor firms.

90 Conversely, (Lee et al. 2001) do not document any direct effects of prior linkages, except for venture capitalist funding. Additionally, linkages to other enterprises have neither significant direct nor indirect effects. As the authors note, such alliances prevalently involving other small Korean firms.

91 Actors' positions in social networks may be described along two main dimensions: First, structual centrality reflects the degree of an actor's entrenchment in a given network [cf. (Freeman 1978/79), (Friedkin 1991)]. Second, ease of information flows across the network is constitutes their efficiency [cf. (Coleman 1988), (Latora and Marchiori 2001)]. While a detailed discussion of these concepts exceeds the scope of the present work [see (Latora and Marchiori 2004) for a review], Table 41 of the appendix provides a summary.

92 While these findings refer to inter-firm networks, (Tsai 2001) also finds that one business unit's access to other business units' knowledge bases (intra-firm network centrality) significantly increases its rate of new product introductions.

While networks rich in redundant ties may generate valuable knowledge spillovers,[93] their commercial benefits are inferior to those of more efficient networks (i.e., networks having a greater share of exclusive ties and structural holes). Specifically, Baum/Calabrese/Silverman (2000) show that network efficiency has a significantly positive effect on the growth of young biotechnology firms. Selective (i.e., exclusive) ties thus yield better performance effects than vast but inefficient networks.[94]

Proposition 2.3c:	Collaborative value creation is linked to the social capital of network embeddedness, which generates additional alliance opportunities and substantively affects resource development and commercial performance.

To summarize, prior research provides comprehensive evidence that social capital facilitates alliance formation and substantively improves firm performance as well as further resource creation. Differences between personal, organizational, and network-based social capital exist, but are limited. In particular, the effects of personal social capital appear to be strongest at the dyadic level, i.e., pertaining to the specific pair of firms, whereas organizational and network-based social capital apply to all focal firm alliances.

2.2.2.4 Organizational Learning in Cooperative Settings

The three types of strategic resources discussed thus far have addressed the direct benefits such assets may have in an alliance context, i.e., how they affect alliance formation and alliance performance. Organizational learning extends this perspective by also considering the processes of resource transfers and resource generation in an alliance context. While acquiring knowledge is an important function of collaborative ventures, the learning perspective also applies to the act of collaboration itself, i.e., firms may

[93] (Owen-Smith and Powell 2004) distinguish between local and dispersed networks. In the local environment, being part of networks has a positive influence on innovation, whereas more diverse partners have a negative effect. This indicates greater knowledge spillovers in homogeneous local networks. Conversely, partner diversity in dispersed alliances has a positive impact on patent output, since they may allow firms to pick up new developments early.

[94] This is in line with (Burt 1992), who originally interpreted structural holes as allowing firms to capitalize on opportunities within the network by brokering among unrelated participants.

learn 'how to cooperate' as well learning 'specific content' through collaboration.[95] The present subsection addresses both issues.

Collaborative Competence & Alliance Experience

Collaborating firms differ in their ability to reap collaborative benefits. For instance, (Sividas and Dwyer 2000) find that collaborative competence has a positive effect on perceived success in collaborative new product development. Similarly, (Simonin 1997) documents a significant effect of collaborative know-how increasing tangible and intangible alliance benefits. Firms develop collaborative competence based on the insights they gain in prior alliances. As such, (Simonin 1997) shows collaborative know-how to be derived from collaborative experience. (Lyle 1988) also indicates that firms learn to adapt and improve their approach to collaboration with increased JV experience. In particular, firms may gain competence in (a) identifying and selecting potential partners, (b) negotiating the terms and structure of alliances, (c) monitoring and managing ongoing alliances, and (d) terminating collaborations [cf. (Simonin 1997)].

As the best available approximation for collaborative competence, alliance experience has therefore been extensively linked to improved alliance performance. For instance, (Glaister/Buckley 1996) demonstrate that firms with multiple alliances are significantly more satisfied with their alliances. Similarly, (Powell et al. 1996) show a significant influence of experience in managing organizational ties on company growth (as well as on the formation of additional organizational links).[96] In an international context, (Barkema et al. 1997) document a significant positive effect of previous JV experience on the survival of IJVs. Similarly, (Child and Yan 2003) find IJV performance to be strongly influenced by the combined IJV experience

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[95] (Inkpen 1998) identifies knowledge accessibility, knowledge connections, and effective knowledge acquisition as the prerequisites for successful interorganizational learning. For instance, firms may develop internal and intra-alliance routines to increase the effectiveness of knowledge acquisition and thus collaborative performance. See **Table 42** in the appendix for a general note on the concept of organizational learning.

[96] (Powell et al. 1996) also distinguish between experience in R&D versus other collaborations. Interestingly, the former only has a significant effect on the likelihood of a firm being publicly listed (as a growth indicator), whereas the latter also increases employee growth. In the biotechnology setting studies, this reflects the overwhelming importance of technological capabilities being sufficient to 'go public' without having expanded the business-side through commercialization alliances. In their research, (Powell et al. 1996) rely on the time since the inception of the first tie as a proxy for alliance experience.

of both partners.[97] Collaborative experience (and competence) thus has a well-documented positive influence on alliance performance. However, these benefits may be subject to time- and partner-specific moderation:

First, collaborative competence may be restricted by firms' general ability to internalize and maintain organizational knowledge. With regard to new resource creation (i.e., patenting), (Sampson 2002) observes a significantly positive but marginally declining effect of collaborative experience. Additionally, the advantages of alliance experience may decay over time, as (Sampson 2002) documents a significantly increased innovation output for firms having entered their most recent alliance in the year prior to the focal alliance's formation.[98] Consequently, a steady flow of alliance activity is required to maintain collaborative capability, whereas greater numbers of alliances are not associated with additional learning of 'how to cooperate'.

Second, it is important to distinguish between general alliance skills and partner-specific routines, which require prior or ongoing interaction with the given partner. In this context, (Sampson 2002) observes distinct significant effects of both general and partner-specific experience on alliance performance. Similarly, (Harrigan 1988c), (Luo 1997), and (Child and Yan 2003) find that JV performance is positively related to the time since JV inception and the history of partner familiarity (i.e., number of years firms have previously collaborated). These findings indicate that partner-specific routines may improve collaborative performance, but require evolving.[99]

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97 Conversely, other researchers failed to record a significant influence of prior experience on JV success [(Harrigan 1988c)] and learning in IJVs [(Inkpen 1995)]. This suggests that the effectiveness of collaborative experience may be affected by its specific context. Along those lines, both (Barkema et al. 1997) and (Child and Yan 2003) document a significant influence of prior international and host country experience on the survival and performance of IJVs, respectively.

98 More specifically, (Sampson 2002) finds having entered alliances within the past one to three years to improve innovation performance, whereas earlier alliance experience even has a slightly (marginally significant) adverse effect. Furthermore, (Sampson 2002) shows that firms having entered 5 or more alliances over that period do not generate greater innovation output than firms having at least one prior alliance. Consequently, the internalization and decay effects appear to be complementary.

99 Additionally, (Sampson 2003) provides evidence of these effects being most pronounced in joint venture (JV) rather than contractual alliances. As outlined in section 2.3.1, JVs are more complex and thus difficult to manage, thus increasing the need for partner-specific experience. Similarly, (Kotabe et al. 2003) observe a significant effect of link duration only for broad technology

Third, alliance experience needs to be effectively translated into improved alliance management practices, such as inter-firm communication [(Grant 1996)], information sharing [(Mohr and Spekman 1994)], and cooperative culture [(Brouthers et al. 1995)]. Along those lines, (Simonin 1997) indicates that collaborative competence may be a necessary mediator for the effect of between.[100] Concurrently, (Kale et al. 2000) find the mere existence of prior alliances between the partners insignificant when controlling for specific aspects of the inter-firm relationship. They rather show that the proactive management of conflict within an alliance is the most important determinant of successful learning alliances.[101]

Overall, the existing evidence suggests that collaborative competence is a necessary prerequisite for fully realizing collaborative benefits. It is developed over the course of alliance activity, either in general or with regard to a specific partner.

Proposition 2.4:	Collaborative value creation is linked to the collaborative competence resulting from alliance experience, which allows firms to manage alliances and collaborate more effectively.

Absorptive capacity & Learning races

The preceding discussion established the notion that firms may differently profit from collaborative learning opportunities. This may be even more prevalent with regard to technological learning, since firms start with

transfers as opposed to 'simple' technical exchanges. These more complex agreements initially have an adverse impact on supplier performance, which only turns positive once firms learn to more fully realized the benefits of collaboration.

Finally, Sampson (2002) suggests that prior alliance experience is most helpful in rather uncertain environments. This provides a first glance at the role of mutual trust, which is further discussed in section 2.3.2.

100 Specifically, all direct effects of alliance experience on tangible or intangible benefits are insignificant in the LISREL models (Simonin 1997) employs. Model specification is best for a parsimonious model without such direct effects.

101 In addition to having a significantly positive primary effect on perceived learning and protection of proprietary core assets, conflict management also significantly increases relational capital among alliance partners. Such relational goodwill in return is significantly associated with improved intra-alliance learning. Alternatively, relational capital may be rooted in partner similarity. For instance, (Lane and Lubatkin 1998) find that the similarity of lower management formalization, management centralization, research centralization, and compensation practices increases interorganizational learning.

vastly different backgrounds and capabilities.[102] Specifically, firms may differ in their abilities to (a) recognize the value of new, external information, (b) assimilate it into their knowledge base, and (c) apply it to further their commercial success. (Cohen and Levinthal 1990) devise the concept of a firm's 'absorptive capacity' (AC) to reflect these three dimensions of learning ability.[103] Similarly, the concept of 'receptivity' [(Hamel 1991)] identifies a firm's ability to absorb new skills from its partners. Both (Cohen and Levinthal 1990) and (Hamel 1991) agree that absorptive capacity (and receptivity) are dependent on a firm's prior experience in the area of focus, since only a stock of sufficiently related knowledge allows to more easily understand and learn new knowledge.

For empirical support, several studies provide evidence of absorptive capacity enabling firms to better profit from collaborative learning opportunities and thus to realize higher levels of innovation and commercial success. For instance, (Chen 2004) documents significantly better intra-alliance knowledge transfer for higher levels of absorptive capacity. Similarly, (Mothe and Quelin 2001) find an allying firm's R&D capabilities, i.e., its experience in the focal area of research, to be positively related to the creation of technological and intangible knowledge as part of the alliance. With regard to performance, (Luo 1997) finds that Chinese IJV parent firms' absorptive capacity, product relatedness, and prior international business experience all have significantly positive effects.[104] All this evi-

[102] In addition, some technological knowledge may be difficult to transfer or access. In particular, when such knowledge is intangible and non-codifiable, i.e., tacit, it may be difficult to learn. Other sources of tacitness include resources being embedded in a specific organizational context or ambiguous in their causal function. While hindering organizational learning, these characteristics make such resources difficult to replicate inimitable, and thus valuable. For the general notion of tacit knowledge, cf. (Teece 1981).

[103] Note that the concept on absorptive capacity more generally applies to all corporate learning, i.e., also outside of strategic alliances and with regard to other types of (non-technical) knowledge. In a collaborative context, it encompasses learning preexisting partner capabilities as well as internalizing newly generated knowledge. See Table 43 and Figure 53 of the appendix for further details.

[104] Moreover, (Tsai 2001) shows absorptive capacity to reinforce the advantages business units derive from being centrally located in an network [also see FN 92]. While both absorptive capacity and network centrality have independently significant effects, new product introductions and financial performance are even further increased by their interaction.

dence points towards absorptive capacity ameliorating collaborative learning and performance.[105]

While prior knowledge in targeted technological domains thus may facilitate the assimilation of external knowledge, a too extensive overlap may reduce the scope of potential learning. In this context, both (Yao and McEvily 2001) and (Sampson 2002, 2004a) show that the technological distance between the topic of collaboration and the focal firm's main area of expertise has a significantly positive but marginally declining impact on innovation output.[106] Similarly, (Lane and Lubatkin 1998) indicate that a mutual understanding of fundamental knowledge is helpful but sufficient for successful R&D collaborations.[107] Overall, these findings suggest that some (moderate) level of technological relatedness provides an optimal combination of absorptive capacity and new 'learnable' knowledge.

Proposition 2.5:	Collaborative value creation is linked to absorptive capacity. The latter facilitates learning from collaborative contacts, as long as partner knowledge remains sufficiently dissimilar to provide room for learning.

The fact that firms differ in their ability to value, assimilate, and apply partnering firms' knowledge may lead to alliances becoming competitive with regard to collaborative success. Specifically, the speed of learning may alter the balance of power within a collaborative relationship and reduce the incentive to cooperate for a partner firm who has sufficiently sat-

[105] At the same time, (George et al. 2001) provide evidence favoring a reciprocal relationship. Both indicators of absorptive capacity (R&D spending and patents) significantly increase with horizontal and attractive alliances, such as patent swap and licensing agreements. Since these alliances, however, do not have a direct effect on firm performance, their main functoin may be to position firms to profit from future learning opportunities. Such arguments are extended in subchapter 2.4.

[106] Conversely, (Ahuja 2000a) observes an outright negative effect of technological distance between alliance partners on patenting rates.

[107] (Lane and Lubatkin 1998) show that the number of shared research communities in general biochemistry increases learning in bio-pharmaceutical alliances, whereas specialized non-biochemical overlap even has an adverse effect on collaborative learning. As biochemistry forms the basis of all specialized area, this provides the 'common ground' for interorganizational R&D. Additionally, the interactions of both knowledge types relevance with shared research communities have significantly negative effects, indicating that absorptive capacity may be detrimental, when collaborating in own core businesses, where knowledge spillovers to the partner would substantially hurt the focal firm.

isfied its individual learning objective [cf. (Inkpen and Beamish 1997)].[108] Collaborators thus have an incentive to 'outlearn' their partners in order to reduce their dependence on partner knowledge and strengthen their bargaining power, e.g., leading to a more favorable partitioning of collaborative profits.[109] (Hamel 1991) refers to this situation as a "race to learn" (p. 85). Such learning races may result in alliance instability. As (Young and Olk 1994) and (Olk and Young 1997) empirically show, the achievement of firms' learning objectives in R&D consortia decreases their commitment and increases the likelihood of them leaving the consortium.[110]

In effect, firm heterogeneity in learning ability thus holds the danger of intra-alliance conflicts, expropriation, and alliance instability. This raises the questions why learning is pursued in alliances rather than by acquisitions or other means and how collaborators can protect themselves from expropriation risks, if alliance-based learning is chosen. The organizational economics approaches discussed in the following section address such issues.

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[108] (Inkpen and Beamish 1997) deduct that alliances geared towards acquiring partners' knowledge may lead to instability, whereas cooperation based on a mutual interest in accessing complementary knowledge will be highly stable. Similarly, (Shenkar and Li 1999), addressing the knowledge sought by Chinese JV partners, find that firms mostly focus on complementary knowledge rather than searching additional (specialized) knowledge in their own core knowledge areas. This may limit the learning benefits available to collaboration partners. See (Grant and Baden-Fuller 2004) for a more thorough distinction of knowledge acquiring versus knowledge accessing alliances.

[109] Similarly, (Yan and Gray 1994) suggest that relative bargaining power influences the control over management exerted by JV parents, which in return affects the achievement of parent-specific collaboration objectives. Furthermore, (Yan and Gray 1994) distinguish the determinants of bargaining power as context-based, i.e., stakes in and alternatives to the collaboration, and resource-based. More generally, the notion on organizational dependence on external resources forms the basis for the resource dependence theory [(Pfeffer and Salancik 1978)].

[110] Conversely, dependence on the consortium and the importance of the joint research to the firm's primary area of research increase and induce a desire to remain part of the consortium. The magnitude of the 'satisfied learning' effect in (Young and Olk 1994) is at least as large as the positive impact of overall satisfaction with the consortium. In (Olk and Young 1997), however, the effect, while significant, is more than overcompensated by overall satisfaction and involvement/embeddedness in the consortium.

2.3 Organizational Economics of Collaboration

Market-based corporate strategy and the RBV highlight the advantages of corporate combinations, without explicitly addressing the choice of collaboration over alternative transaction schemes. That is, many strategic benefits (e.g., market power, economies of scale) could be similarly achieved by M&A and strategic resources may be acquired through arm's length transactions.

The new institutional economics (NIE) paradigm outlined by (Williamson 2000), among others, takes a complementary perspective by emphasizing the efficiency of organizational designs.[111] In the following, transaction cost economics (TCE) will serve as foundation for the trade-off between alternative transaction structures (section 2.3.1). Agency-based (and game-theoretic) considerations extend this approach by addressing the antecedents of cooperative post-formation behavior (section 2.3.2).

2.3.1 Transaction Cost Economics and Alliance Structure

2.3.1.1 Transaction Costs and Hybrid Organizations

TCE aims to explain the simultaneous existence of alternative organizational designs, i.e., firms, markets, and hybrid mechanisms for conducting transactions.[112] The establishment of collaborative ventures (as a form of hybrid organization) involves transaction costs at two distinct levels: On one hand, transaction costs may play an important role in explaining the choice of hybrid over hierarchical (i.e., intra-organizational) or market-based (i.e., arm's length) transactions. On the other hand, transaction-cost

[111] More specifically, (Williamson 2000) identifies four levels of NIE. The first and second levels, embeddedness and the institutional environment, provide the general background of economic activity. TCE (and to some extent also agency theory) constitutes the third level, since it targets the alignment of governance structures and transaction characteristics. Agency theory, for the most part, is part of the fourth level, the marginally optimal allocation and employment of resources.

[112] The general TCE framework is based on the pioneering work of (Coase 1937) and has been further developed starting in the 1970s, most notably by (Williamson 1975, 1985). For recent reviews of TCE, see (Rindfleisch and Heide 1997), (Slater and Spencer 2000), and (Madhok 2002), among others. Furthermore, (Shelandski and Klein 1996) and (Rindfleisch and Heide 1997) assess of the empirical evidence regarding TCE. Also see Table 44 in the appendix for a further discussion of the general intent and critique of TCE.

considerations may affect the design of collaborative structures, i.e., the choice of contractual alliances vis-à-vis equity-based JVs (including minority equity stakes) [e.g., (Hagedoorn 1990), (Osborn and Baughn 1990)].[113] At either level, transaction cost efficiency depends on the match of an organizational design's cost profile to the given transaction context.

First, alternative transaction mechanisms are associated with quite dissimilar direct and indirect costs of conducting a given transaction.[114] Direct costs are incurred to initiate and manage an exchange relationship. These, for instance, include the ex ante costs of drafting and negotiating contracts as well as the ex post costs of monitoring and enforcing them. Indirect (or opportunity) costs of organizing transactions inefficiently also form part of the overall transaction costs. The direct costs of a market transaction are limited to the search for and screening of transaction partners, the negotiation and the monitoring of contract terms. However, market transactions may leave a party susceptible to partner opportunism, since they are only safeguarded to the extent that formal contract provisions are enforceable in a court of law. Contrarily, hierarchical coordination may rely on a wider array of tools for adaptation and ensuring cooperative (i.e., non-opportunistic) behavior (e.g., internal dispute resolution) [cf. (Williamson 1999a)]. However, the increased level of control incurs higher bureaucratic (i.e., direct transaction) costs.

Hybrid forms of transaction governance take an intermediate position in the trade-off between direct and indirect transaction costs [cf. (Jones and Hill 1988)]. Specifically, collaborating firms are mutually dependent and will thus have an incentive to abstain from opportunistic behavior towards the alliance partner.[115] However, these advantages require interorganiza-

[113] In this context, (Tallman and Shenkar 1994) describe the two-stage decision making process leading to cooperative arrangements. Similarly, (Hennart 1988) points out that joint ventures are only sensible (a) to circumvent inefficient markets and (b) if they are superior to contracts, acquisitions, or Greenfield investments. Consequently, efficient decisions at both levels are required for transaction cost minimization.

[114] The existence of transaction costs hinges on three basic behavioral assumptions, which diverge substantially from the neoclassical market perspective: Bounded rationality, opportunism, and risk neutrality. In particular, transaction costs exist, since boundedly rational individuals cannot ex ante prevent transaction partners from behaving opportunistically. Table 45 of the appendix provides a summary of the three behavioral assumptions.

[115] (David and Han 2004) point towards hybrid forms of governance as providing a “tolerance zone” (p. 40) of adaptation, information disclosure, and conflict resultion. (Rindfleisch and Heide 1997) suggest that the details of these intra-organizational governance costs have only briefly touched upon in existing

tional coordination, the costs of which are higher than in market-based transactions but lower than for hierarchies.

Akin to the choice of market, hybrid or hierarchical governance, different collaborative structures possess heterogeneous transaction cost profiles. As outlined by (García-Canal 1996), equity-based alliances and joint ventures are more hierarchical and thus induce higher (direct) ex post coordination costs, whereas contractual alliances are associated with (direct) ex ante costs of contract specification as well as the (indirect) costs of misspecification.

Second, the relative efficiency of market, hierarchical, and hybrid transaction modes results from their alignment with the specific transaction context [cf. (Williamson 1985, 1999a)]. In particular, the levels of (environmental) uncertainty, specific investments, and transaction frequency represent key drivers of transaction costs. Uncertainty and asset specificity open the door for opportunistic exploitation and thus induce a need for more stringent control. In addition, the frequency of transaction increases the attractiveness of hierarchical coordination through fixed-cost digressions.[116] While high environmental uncertainty, highly specific investments, and high transaction frequency thus favor hierarchical control as opposed to market-based transactions, hybrid arrangements are efficient organizational forms for intermediate levels of uncertainty, asset specificity, and transaction frequency.[117] Similarly, asset specificity, uncertainty, and expected frequency of collaboration increase the complexities of collaboration, i.e., render it more difficult to plan for future states of nature and costly not to account for potential transaction hazards. Consequently, such circumstances favor JVs, whereas 'simpler' agreements are efficiently are organized as contractual collaborations.[118]

TCE research, but may be substantial, including management compensation, incentive payments etc..

116 For further details on the three determinants of transaction costs, see Table 46 in the appendix. Note that since boundedness of rationality, opportunistic predispositions, and risk preferences are assumed to be constant across a great number of transactions [cf. (Hill 1990)], they not differentially affect the individual transaction governance mode choice.

117 Note, however, that extremely high levels of environmental uncertainty may have an inverse effect, since the flexibility inherent in market transactions may counterweigh the risk of opportunism. Hybrid forms may not be suitable under such conditions, since they require bilateral adaptation [cf. (Shelanski and Klein 1995), as well as the empirical evidence cited by (Rindfleisch and Heide 1997)].

118 While transaction-cost arguments are very prevalent in academic literature on collaboration governance, a variety of other factors may also be relevant deci-

Reasoning 3:	The appropriation of collaborative value requires efficient choices of hybrid (over hierarchical and market-based) transaction governance and contractual or equity-based collaboration, i.e., minimizing transaction costs in a given context.

On an aggregate level, empirical literature supports the notion of transaction costs requiring specific transaction structures to protect collaborative benefits. For instance, (Brockhoff 1992) finds alliance success being negatively related to perceived transaction costs.[119] Similarly, (Parkhe 1993b) shows perceived opportunistic behavior having a significantly adverse effect on collaborative performance. More specifically, (Sampson 2004a) distinguishes whether collaboration schemes are aligned with the respective transaction conditions. Transactions organized in line with the contextual necessities outperform 'misaligned' collaborations by 61%, on average.[120]

2.3.1.2 Asset Specificity, (Environmental) Uncertainty, and Transaction Frequency

TCE predict that moderate asset specificity, environmental uncertainty, and transaction frequency are conductive to collaborative activity. Addi-

sion parameter. For example, (Desai et al. 2002) document ownership restrictions, tax rate differences, and the reliance on host- or home-country resources affecting the choice of internal, equity-based, contractual or market-based transaction modes. Similarly, (García-Canal 1996) suggests that the complexity of a collaboration depends the number of partners in addition to its duration, international scope and functional areas involved, in particular whether it relates to the transfer of knowledge resources.

[119] Additionally, he shows perceived transaction costs being higher for contractual agreements (as opposed to EJVs). Note, however, that (Brockhoff 1992) studies technology-related collaboration only. As will be argued in subsection 2.3.1.1, such transactions are subject to a high degree of asset specificity, i.e., they tend to be associated with higher transaction costs and better suited for equity-based contracts.

[120] In particular, (Sampson 2004a) predicts the use of equity-based or contractual forms using a model incorporating cooperation and environmental characteristics such as scope of joint activities and intellectual protection regimes. Equity joint-ventures employed in conditions allowing contractual alliances (based on these predictions) have a two- to three-times lower patent performance. Conversely, pooling contracts in situations requiring more hierarchical governance only marginally decrease collaborative benefits. (Sampson 2004a) uses citation-weighted patent count as performance measure.

tionally, higher levels of these influences favor equity-based as opposed to contractual forms of collaboration. This section further explores the empirical evidence on these issues.[121]

Asset Specificity

In a collaborative context, the predominant type of specificity relates to technological knowledge.[122] Specifically, R&D alliances may induce higher transaction costs due to the risk of knowledge spillovers and difficulties of coordinated knowledge exchange (or creation). Additionally, the extent of transaction costs may be related to the collaborating firms' knowledge stocks [cf. (Gatignon and Anderson 1988)].

On a transaction level, numerous prior studies have observed that R&D-related collaborations are more likely established as EJVs rather than contractual arrangements [e.g., (Gulati and Singh 1998), (Gulati 1995a), (Osborn and Baughn 1990), (Pisano 1989)].[123] Similarly, (Sengupta and Perry 1997) show joint upstream (i.e., R&D, manufacturing etc.) more likely organized as JVs than downstream activities (i.e., marketing/

[121] In their recent meta-analysis of empirical TCE literature, (David and Han 2004) observe rather ambiguous empirical evidence regarding the predictions of transaction cost theory. Regarding the choice of hybrid forms of governance supportive (16) and opposed studies (14) nearly offset. Hypotheses regarding the effectiveness of hybrid coordination are largely supported by prior research (63% or 5 of 8 studies in favor, none opposed). The choice and performance of collaborative agreements, however, only makes up a small share of the entire empirical research in the field. Most prior evidence addresses the choice between market and hierarchy (117 of 308 tests).

[122] More generally, all assets that are specific to a given use leave room for opportunism and thus incur transaction costs. Physical, human, and brand name assets may site-specific, dedicated or temporally specific for a given transaction [cf. (Williamson 1991)]. Given the scope of this thesis and its focus on a knowledge-intensive industry, other types of specific assets are not considered further.

Evidence on marketing expenditures as a proxy for asset specificity are similar. For instance, (Moon 1999) and (Lu 2002) find a firm's marketing intensity increasing its reliance on proprietary strategies (i.e., M&A and wholly owned subsidiaries rather than JVs, respectively). (Ingham and Thompson 1994) show specific marketing assets positively related to proprietary market entry. Finally, (Dai and Kaufmann 2004) find that vertical alliances between B2B marketplaces and their customers are more likely equity-based or exclusive.

[123] (Pablo and Subramaniam 2002) provide concurrent findings for different types of knowledge-related alliances, distinguishing joint R&D, technology transfer, and product development. Conversely, (García-Canal 1996) finds R&D alliances more likely organized as contractual agreements than joint ventures.

distribution, aftersales etc.). (Rothaermel 2001) finds stronger ties (i.e., equity as opposed to non-equity forms of cooperation) yielding greater product development success. Consequently, firms choose JV structures to mitigate the transaction costs associated with R&D collaboration and JVs appear to effectively do so.

The relative importance of a given collaborative project may magnify firms' misappropriation concerns.[124] In this context, (Oxley 1997) and (Oxley and Sampson 2004) show incremental (as opposed to fundamental) collaborative R&D projects to be significantly less often organized as an equity JV. (Sampson 2004a) extends these findings to far-reaching (i.e., next generation) R&D as well as for alliances involving joint marketing and/or production in addition to R&D cooperation.[125] Finally, the above effect of important innovations increasing the formation of collaborative ventures documented by (Ahuja 2000b) [see subsection 2.2.2.1] extends only to JVs but not contractual research agreements.

Proposition 3.1a:	The appropriation of collaborative value requires more restrictive (equity-based) hybrid governance, when agreements address R&D activities; in particular, if projects are strategically important.

On a firm level, several studies observe that R&D investments may lead firms to choose proprietary over cooperative strategies [e.g., (Yiu and Makino 2002), (Gatignon and Anderson 1988)]. The valuable, intangible resources created by such investments may be at risk of expropriation or require additional coordination in collaborative arrangements. More specifically, (Combs and Ketchen 1999b) find firms abstaining from collaboration under adverse exchange conditions (high knowledge specificity, low (partner) asset specificity and low internal coordination costs), unless

[124] Similarly, (Hagedoorn and Duysters 2002a) find that firms use M&A rather than cooperative or mixed strategies, when transacting in their core businesses. (Pisano 1991) also finds firms having a particularly strong focus on the pharmaceutical business (measured as % of its total sales) being more likely to perform R&D activities internally rather than as cooperative ventures.

[125] At the same time, (Sampson 2004a) finds alliances narrowly focused on exploiting existing technologies also being more often organized as JVs compared to alliances of intermediate scope. While this is counterintuitive from a transaction-cost perspective, (Sampson 2004a) argues that it may reflect a higher propensity of narrow alliances being international and thus requiring greater coordination. As such, (Sampson 2004b) shows no difference in the governance of alliances addressing narrow and intermediate R&D activities in purely domestic alliances. (Note: both publications analyze the telecommunication equipment industry over the 1991-1993 time period)

they are forced to cooperate due to a lack of internal resources. Those firms collaborating in spite of unfavorable exchange conditions were punished by means of substantially decreased performance.[126] While evidence on firm R&D investments thus supports asset specificity considerations, two characteristics of the particular dyadic relationship may moderate these effects:

First, opportunistic incentives are greatly reduced by reciprocal dependence among cooperation partners, i.e., if all parties have a similar exposure to transaction risks [cf. (Teece 1986), (Heide and John 1988)]. Along those lines, (Parkhe 1993b) argues that investments in specific assets serve as ex ante deterrents to opportunism. Based on survey data, he observes a significant negative relationship between non-recoverable investments made by the transaction partner and observed opportunism as well as a positive effect on reported performance. Similarly, (Combs and Ketchen 1999b) demonstrate a significantly positive impact of (bilateral) physical asset specificity on the likelihood of allying.

Proposition 3.1b:	The appropriation of collaborative value requires more restrictive (equity-based) hybrid governance, when asset specificity creates expropriation risks, unless investments are bilateral and/or knowledge relatedness is limited.

Second, technological similarity may render knowledge more easily appropriable (or expropriable). In this respect, (Subramanian 2004) shows firms with similar patent portfolios (and overlapping industry activities) choosing more restrictive (i.e., hierarchical) forms of governance.[127] Con-

[126] (Moon 1999) shows R&D intensive firm to favor joint ventures over acquisitions and (Lu 2002) shows R&D intensity having no significant effect on the choice of market entry mode. This may, however, be specific for the choice between joint venturing and full-blown acquisitions. In this context, (Gulati 1995a) and (Anderson and Gatignon 1986) argue that specific knowledge (developed through R&D expenditures and affected by R&D alliances) is subject to asymmetric information regarding its usefulness and value. This notion is at the root of agency conflicts and will be further addressed in section 2.3.2.
Since both (Moon 1999) and (Lu 2002) specifically refer to international cooperative ventures, the transaction costs of specific knowledge assets may also be overcompensated by other factors, e.g., firms utilizing collaboration as a means to internationalize.

[127] This is in line with the facilitating effect of absorptive as well as the resulting risk of intra-alliance competition and learning races [see subsection 2.2.2.4]. However, (Subramanian 2004) argues based on learning incentives rather than knowledge protection, specifically that knowledge similarity requires greater

currently, (Sengupta and Perry 1997) observe partners with different industry origins (i.e., different 2-digit SIC codes) favoring contractual arrangements. More specifically, (Sampson 2004b) finds the choice of equity-based transaction modes to first increase with technological diversity, then to decrease (inverse U-shape). While the former suggests increasing risk of knowledge spillovers or misappropriation, the latter may reflect the lack of absorptive capacity if partners are highly unrelated. Moreover, (Sampson 2003) shows the positive (but marginally declining) effect of cooperating firms' technological diversity on innovation performance to be vastly more pronounced in equity joint ventures.[128] This suggests that the full benefit of mutual learning may only be realized if appropriate governance schemes are implemented.

Environmental Uncertainty

From a TCE perspective, environmental uncertainty may necessitate hierarchical governance forms, since they provide elaborate adaptation mechanisms and additional protection from opportunism. Environmental uncertainty is reflected on two different levels: On one hand, certain industry traits may reflect dynamically changing market conditions. On the other hand, firms' perceived level of uncertainty may be quite different depending on firm size.

Most prominently, industry R&D-intensity (i.e., R&D-to-Sales ratios) is indicative of technological uncertainty.[129] R&D-intensive industries also

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access (such as through JVs or hierarchical integration). Conversely, integration of dissimilar knowledge would induce inefficient overinvestment, i.e., such transaction are best handled at arm's length or through contractual collaboration.

[128] Note that the choice of governance mode itself exerts no significant influence on innovation performance. Therefore, the primary strength of joint ventures lies in its facilitation of transactions among technologically distant partners. Conversely, (Sampson 2004a) does not document a significant effect of technological diversity on governance mode choice, when controlling for country-specific factors in international alliances.

[129] In addition, demand uncertainty may reflect greater expropriation risks. In this context, (Moon 1999) observes a positive effect of industry marketing intensity on the choice of acquisitions over JVs. For advertising intensive industries, he also documents a similar effect of firm-level marketing intensity. This mirrors the risk of brand capital misappropriation in highly competitive markets. Brockhoff (1992) also documents higher perceived transaction costs for late technology life-cycle stages, which may reflect high demand uncertainty in declining markets. Convsersely, (Subramanian 2004) tests for effects of av-

appear to favor collaborative market entry over acquisitions and fully owned subsidiaries [(Moon 1999) and (Desai et al. 2002),[130] respectively]. Similarly, high-tech sectors rely more heavily on strategic alliances, whereas low-tech industries tend to choose M&A transactions [(Hagedoorn and Duysters 2002a)]. Various studies provide evidence of R&D intensity being associated with a heavier reliance on contractual alliances compared to equity JVs [e.g., (Osborn and Baughn 1990), (Sengupta and Perry 1997)].[131] Finally, Brockhoff (1992) documents higher perceived transaction costs in early life-cycle stages. These findings suggest that, faced with high environmental uncertainty, firms tend to collaborate and choose rather flexible forms of governance. In contrast to the standard TCE rationale this suggests that the benefits of joining technological resources (e.g., bilateral asset specificity) and the medium- to long-term perspective of technological collaboration may sufficiently offset the misappropriation risks of environmental uncertainty.[132]

Proposition 3.2:	The appropriation of collaborative value requires more flexible (contractual) hybrid governance in technologically uncertain environments.

Firm size may moderate the level of perceived uncertainty, since larger firms will generally be less threatened by a given risk level. This is supported by (Osborn and Baughn 1990) showing a statistically significant effect of the interaction between industry R&D intensity, joint R&D as transaction focus, and at least one small firm being involved. Conversely, (Ingham and Thompson 1994) find large, well-endowed firms to more

erage industry advertising and capital intensity, but finds both being insignificant.

130 Note that (Desai et al. 2002) regard industry R&D intensity as reflection of asset specificity. Their findings would thus oppose the above evidence on firm-specific R&D investments. While Moon (1999) finds the primary effect of industry R&D intensity insignificant, firm R&D intensity favors less hierarchal governance in R&D intensive industries.

131 Only (Subramanian 2004) finds industry volatility, R&D-to-sales intensity, and average tobin's q inducing hierarchical control.

132 Several approaches may alternatively explain these findings. From a learning perspective [see subsection 2.2.2.4], collaborative modes of organization may allow to profit from partner resources or jointly generate knowledge. From an evolutionary perspective, it may be the primary objective of firms to achieve a satisfactory technological positioning. Reserving the 'right to play' through flexible alignments and multiple linkages may make the protection of proprietary knowledge an afterthought [e.g., (Osborn and Baughn 1990)]. Subchapter 2.4 builds on this perspective.

likely internalize transactions bearing (credit) risks and requiring substantial initial investments. More generally, (Hagedoorn and Duysters 2002a) find firm size negatively related to the usage of M&A transactions (relative to cooperative strategies). Evidence on the net effect of firm size thus remains inconclusive.

Transaction Frequency (Scope)

While transaction frequency itself has not been explicitly considered in studies of hybrid organizations, the scope of collaborative activities may have a significant impact on the choice of transaction governance. It reflects the extent and complexity of interactions between transaction partners [(Gulati and Singh 1998)] as well as greater risk of misappropriation of specific assets [cf. (Oxley and Sampson 2004)]. Managing and controlling broader collaboration thus incurs substantially higher costs of coordination. The complexity of such transactions may best be handled using restrictive governance modes, e.g., JVs rather than contractual alliances.

Empirical evidence broadly supports this perspective. (Gulati and Singh 1998) show that transactions extending beyond the mere pooling of resources are more often organized as JVs than contractual arrangements. Additional interaction among collaborators creates a dependency on partner actions and thus requires greater coordination and adaptation.[133] Similarly, (García-Canal 1996) finds that collaboration involving multiple functional areas is more likely organized as JVs.

At the same time, transaction scope is itself an endogenous factor, since collaborating firms have great latitude to include or withhold particular activities from an agreement. In this context, (Oxley and Sampson 2004) suggest that collaborating firms may choose to limit the scope of an alliance in response to risks of expropriation (i.e., high transaction costs). Specifically, they find partnering firms overlapping in geographic and/or product-market terms tending to reduce alliance scope, in particular excluding joint marketing activities.[134] Similarly, (Anand and Khanna 2000b)

[133] Such interaction may be sequential as well as reciprocal. Reciprocal interdependence [cf. (Borys and Jemison 1989)] is associated with the sharing of complementary technologies and joint development of new technologies. At first sight, this evidence might thus appear to reiterate the above findings relating to the asset specificity of R&D cooperation. However, sequential interaction such as required for market access, distribution or supply alliances also leads to an increased use of hierarchical controls [cf. (Gulati and Singh 1998)].

[134] While market and geographic overlap do significantly reduce the likelihood joint manufacturing being included in an R&D alliance, (Oxley and Sampson 2004) find them to also increase the use of equity joint-ventures.

provide evidence of licenses less likely being exclusive in the (ex post) licensing of existing technologies and in cross-border transactions. Additionally, (Subramanian 2004) finds an industry's capital intensity (capex-to-sales ratio) reducing the extent of access to proprietary technologies.[135] All of these findings suggest that in addition to inducing the need for more formal governance, market-related asset specificity and uncertainty may lead firms to reconsider the scope of their collaborative activities.

Based on the documented findings, the choice of transaction scope and governance may be interdependent. Along these lines, (Desai et al. 2002) suggest that the access to (or transfer of) intangible assets is broader in wholly or majority-owned affiliates compared to 50-50 and minority JVs.[136] (Oxley and Sampson 2004) explicitly demonstrate reciprocally significant effects between equity-based governance and transaction scope. More specifically, their evidence suggests that firms choosing joint manufacturing for technological (or need-based) reasons, and rely on equity-based governance to mitigate the arising transaction costs. Conversely, they may refrain from including joint marketing in alliances with competing firms, since this would otherwise incur high transaction costs.

Proposition 3.3:	The appropriation of collaborative value requires matching choices of narrow or broad transaction scope and contractual or equity-based hybrid governance, respectively.

2.3.1.3 Other Determinants of Transaction Structure

While the above arguments focused on transaction costs due to opportunistic threats, empirical literature has also identified other influences on the

[135] As above, technological uncertainty does not appear to have such an effect. Specifically, (Subramanian 2004) does not observe partners in high R&D intensity industries or with overlapping activities and IP portfolios granting their transaction partners less extensive access to proprietary technologies. (Oxley and Sampson 2004) even show that technological overlap (i.e., the similarity of collaborating firms' patent portfolios) is linearly associated with larger alliance scope (i.e., R&D collaborations among technologically similar firms often also include joint manufacturing activites).

[136] (Desai et al. 2002) use the amount of the royalties paid to the parent firm (i.e., the legal entity providing technology access) as a proxy for the extent of technology access. Higher royalty payments are also associated with R&D intensiveness, reflecting the need for the knowledge transfers. Finally, R&D intensiveness and whole/majority ownership interact significantly with regard to the provision of intangible assets (i.e., royalty payments).

choice of alternative governance schemes. In particular, coordination costs vary across different international settings and based on prior experience with a given transaction scheme.

The costs of international coordination may be lower for firms possessing sufficient knowledge of the local market.[137] First, coordination may be easier between partners from geographically and culturally related countries. (Gulati and Singh 1998) substantiate this argument by showing that collaborative arrangements between European firms and between Japanese firms are more likely to take the form of contractual alliances than intercontinental agreements. Similarly, (Sengupta and Perry 1997) document collaboration involving U.S. and either European or Japanese partners relying more heavily on equity-based governance than between U.S. firms. At the same time, (Moon 1999) shows that the cultural distance between the focal firm's home and target countries increases its reliance on joint ventures (compared to M&A). (Yiu and Makino 2002) find both ethnocentricity and cultural distance being positively related to joint venturing (as opposed to proprietary market entry).[138] Consequently, JVs may provide internationalizing firms sufficient control (vis-à-vis contractual collaboration), while giving access to local firms' market know-how (as opposed to M&A/Greenfield investments).

Second, prior presence in the host country may reduce the coordination costs of additional international transactions. Prior studies find several different measures of international experience associated with proprietary rather than cooperative strategies, including a firm's host country experience [e.g., (Hennart and Reddy 1997), (Yiu and Makino 2002)] as well as its cultural diversity, i.e., overall exposure to international contexts [(Moon 1999)].[139] Overall, local market know-how and international experience

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[137] Of course, the choice of market entry mode may also be affect by various country-specific factors. For instance, (Desai et al. 2002) show differences in international tax rates increasing the likelihood of fully-owned market entry. Under such conditions, international tax management (e.g., through intra-firm transfer pricing) allows to increase after-tax profits under such conditions, representing opportunity costs of non-proprietary ventures.

[138] (Glaister/Buckley 1996), however, do not show cultural distance to significantly affect alliance satisfaction, whereas partner behavior is the primary determinant. Consequently, the use of equity-based governance may be successful in mitigating the increased risks associated with culturally dissimilar alliance partners.

[139] As one contradictory finding, (Lu 2002) shows firms' prior experience in a given country to increase the likelihood of joint venturing, and international experience in general having no significant effect. Such observations suggest that the effects of international experience may not be linear. For instance,

may render proprietary operations more attractive than cooperative ventures.

Proposition 3.4a:	The appropriation of value from international market entry requires less flexible (hybrid) transaction governance given prior international experience and host-country presence.

Coordination costs may also be lower for firms having prior experience with a specific transaction mode, leading to history-dependence in transaction patterns. For instance, (Hagedoorn and Duysters 2002a) show that firms having over-proportionally (relative to the respective industry average) relied on either strategic alliances or M&A transactions continue to predominantly use that type of approach.[140] (Yiu and Makino 2002) document similar path-dependence in the transaction mode choices of firms having previously employed JVs. (Lu 2002) distinguishes country- and industry-specific entry mode experience (i.e., the share of prior transactions using the given scheme) and finds both significantly increasing the subsequent choice of that same mechanism.[141]

Similar to historical norms, (Gulati 1995a), (Yiu and Makino 2002), and (Lu 2002) show that firms' choices of JVs over proprietary market entry are subject to mimetic behavior, i.e., positively related to other firms' precedents. The more competitors rely on JVs, the more firms tend to follow suit. (Lu 2002) suggests this effect being driven by firms imitating the successful market-entry strategies of similar companies (i.e., other Japanese enterprises as opposed to less successful Japanese and successful international firms). Finally, (Lu 2002) also addresses the interaction of historical path-dependence and mimetic behavior. Specifically, the level of prior experience in a given (country or industry) market reinforces the his-

(Desai et al. 2002) observe that firms operating in a great number of countries have a preference for JVs, which may reflect increasing coordination costs of large subsidiary networks.

140 Additionally, (Hagedoorn and Duysters 2002a) find firms having previously used both approaches preferring either strategic alliances or M&A transactions over continuing a mixed strategy. This suggests that, with experience, firm learn to favor transaction schemes meeting their needs rather than merely apply standard practices.

141 For R&D alliances, (Hernán et al. 2003) document a significantly positive influence of prior participation in cooperative R&D programs on the likelihood of further research JVs. Conversely, (Pisano 1991) shows no significant effect of biotechnology firms' internal and/or external R&D history on the choice of in-house versus external research.

torical path dependence while negating the mimetic effect of other successful market entrants. Consequently, imitation primarily serves as a substitute for inexistent first-hand experience.[142]

All in all, this evidence posits that firms learn to choose efficient transaction schemes. Additionally, path-dependence may reflect decreasing costs of coordination with growing experience in the most suitable transaction mode, e.g., through firm routines for JV management. A similar logic may be applied to the substantive benefits of alternative governance schemes:

Proposition 3.4b:	The appropriation of collaborative value is linked to firm experience in the given governance mode and (in the absence thereof) to successful precedents of other firms in similar contexts.

2.3.2 Agency and Game Theories of Cooperation

2.3.2.1 Fundamentals of Agency Relations in Corporate Collaboration

While TCE focuses on the efficient conduct of transactions, the unit of analysis in agency theory is the dyadic relationship between transaction partners. Agency relationships refer to situations in which one party (the principal) relies on another party (the agent) to perform certain tasks or to provide certain goods. Generally, information relevant to transaction success is distributed asymmetrically between the two parties, with the agent being in a privileged position. This enables her to benefit at the expense of the principal.[143]

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[142] (Koza and Lewin 1998) argue in support of this logic. They suggest that mimetic behavior will occur if firms lack own prior experience, whereas past alliance success will induce greater persistence in alliance-formation behavior. Alternatively, mimetic behavior may be an attempt to gain organizational legitimacy [cf. (DiMaggio and Powell 1983)], i.e., being recognized as following prevailing market rules and business norms. Both aspects are often referred to as institutional theories, which are not limited to the choice of governance mode and will be further addressed in subchapter 2.4.

[143] The fundamental, behavioral assumptions of agency theory are closely related to TCE. Agency problems would not exist, if the principal's rationality was unbounded or if the agent was not self-interested enough to opportunistically pursue her goals. For more thorough reviews of the similarities and differences between TCE and agency theory, see (Williamson 1988) and (Bergen et

More specifically, two types of information asymmetries exit in agency situations. On one hand, the agent may be better informed with regard to existing characteristics of the transaction object, the market environment, or the agent's capabilities. Such hidden characteristics may result in a situation of adverse selection, i.e., principals systematically receiving worse-than-expected quality. On the other hand, the agent's information advantage may pertain to her behavior after the initial transaction takes place. Hidden action, i.e., unobservable agent behavior, may exert a moral hazard, i.e., be an incentive for the agent to behave opportunistically.[144] In the present context, agency relations of either type may be diverse, but most prominently exist between the collaborating firms. Depending on the extent of information asymmetries, they may lead to inefficiencies or even outright market failure [e.g., (Akerlof 1970)], i.e., firms altogether abandoning their intent to collaborate. Consequently, both principals and agents stand to gain from a cooperative solution.

Adverse selection and moral hazard problems may be resolved. On one hand, the principal may engage in (ex ante) screening[145] and (ex post) monitoring activities to actively reduce the extent of information asymmetries. Partner selection and alliance management may be important tools in collaborative settings. On the other hand, the agent may signal her quality or the principal may employ contract designs targeting an alignment of interest between both parties.[146] Along those lines, alliance contracts may account for potential information asymmetries.

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al. 1992), among others. (Hart and Holmstrom 1987) and (Kreps 1990), among others, provide extensive reviews of agency theory.

Finally, game theory provides the modeling tools for assessing the outcomes of agency situations. While it is not generally discussed here, contractual incentives, signalling, and trust are rooted in game theory. A broad overview is provided by (Fudenberg and Tirole 1991), among others.

144 See Table 47 of the appendix for a summary of hidden characteristics and hidden action. Interestingly, situations in which both parties reciprocally rely on each other (i.e., two-sided agency problems) are conceptually equivalent to the Prisoners' Dilemma concept fundamental to game theory [cf. (Parkhe 1993b)].

145 Explicit screening of alliance partners has received little consideration in prior research. Regarding the formation phase, (Child and Yan 2003) providing evidence of Chines firms' profiting from extensively assessing alternative partners, but no such effect for the U.S. partner or the overall time allowed for IJV formation. This suggests that screening may be limited to the general alliance formation issues discussed here.

146 The latter may include both (ex ante) self-selection, i.e., conditions to which only certain types of agents will agree, as well as (ex post) incentives rendering collaborative behavior beneficial to both parties.

Reasoning 4:	Information Asymmetries may hamper collaborative value creation unless specific measures mitigate them or align principal and agent objectives.

The following subsections further elaborate on the information asymmetries relevant to corporate collaboration (2.3.2.2) and on corresponding solution mechanisms (2.3.2.3).

2.3.2.2 Alliance-Related Information Asymmetries

In contrast to the transaction cost approach above, agency theory has not been applied consistently in collaborative contexts. For the purpose of thesis, two different types of agency relationships are relevant. Before (re)focusing on the intra-alliance perspective, the effects of collaborative ventures on other firm-level agency relationships will be addressed.

Alliances and Extra-Alliance Information Asymmetries
Information asymmetries exist between companies' management and their shareholders. For instance, moral hazards may materialize in management growing or diversifying the firm beyond an economically reasonable scale/scope. Along these lines, numerous authors have documented value destruction in M&A transactions, in particular, when management is not sufficiently controlled or incentivized to act in the best interest of its shareholders [e.g., (Amihud and Lev 1981), (Demsetz and Lehn 1985), (Shleifer and Vishny 1996)]. In the context of corporate collaboration, (Reuer and Ragozzino 2006) document significantly higher rates of joint venture and alliance formation for firms without substantial managerial shareholdings or financial leverage.[147] This evidence may suggest that management may invest in collaborative ventures to pursue private benefits, such as personal reputation.

Firm-level information asymmetries also extend to the relationship with other capital market participants. Unobservable firm quality constitutes an adverse selection problem in lending and investment decisions. In particular, credible signals may be required to overcome the adverse selection risks associated with the public common stock offerings [e.g., (Carter and

[147] The general findings presented by (Reuer and Ragozzino 2006) are consistent for international and domestic transactions (both contractual and equity-based) as well as across various model specifications. Additionally, potentially confounding firm and industry-level factors are controlled for, underscoring a linear unmediated/ moderated effect of managerial ownership. However, the findings may not be easily generalized, since they draw on a the sample of U.S. manufacturing firms, only.

Manaster 1990), (Podolny 1994)]. For instance, For the case of alliances, (Stuart et al. 1999) indicate that alliances with prominent partners may provide young firms with the legitimacy needed for swift IPOs.[148] Alliances thus may serve as signals of firm quality, helping to mitigate other external agency problems [e.g., (Häussler 2005)].

In summary, extra-alliance information asymmetries may both reduce and increase anticipated collaborative benefits. The controversial arguments (and evidence) may each be relevant for different types of firms. On one hand, alliance formation may reflect agency hazards if the substantive value of collaboration is limited, e.g., for established firms in rather stable environments such as the U.S. manufacturing sector studied by (Reuer and Ragozzino 2006). On the other hand, the signaling effect may dominate under comparably uncertain conditions, such as the small DBF setting considered by (Stuart et al. 1999).[149]

Proposition 4.1a:	Information asymmetries between management and shareholders reduce collaborative value creation, since alliances may yield private managerial rather than shareholder benefits.
Proposition 4.1b:	Information asymmetries between focal firms and capital markets compound collaborative value creation, since partner reputation serves as a signal for unobservable firm quality.

Alliance Formation and Intra-Alliance Information Asymmetries

Agency theory suggests that information asymmetries between prospective alliance partners may reduce collaborative benefits and, at worst, prevent alliance formation: The greater the information asymmetries, the more difficult and costly it is for principals to validate agent quality and behavior.

[148] The effect of non-equity alliance partners' reputation is, however, only significant in interaction with a dummy variable for very young firms (<3 years). Neither technological nor commercial partner prominence in isolation exhibit significant effects on time-to-IPO.

[149] Additionally, both private managerial benefits and signalling effects are additive to the substantive benefits of collaboration. That is, neither do private managerial benefits exclude the possibility of simultaneous benefits to shareholders, nor do positive signalling effects guarantee them. Consequently, (Reuer and Ragozzino 2006) agree that the negative and significant effect of managerial stock-ownership on the formation of domestic contractual alliances is surprising in light of the generally positive value generated.

The magnitude of agency costs thus varies with the uncertainty surrounding the agent as well as the ability of the principal to assess partner quality.

First, if information available on partnering firms is limited, principals may discount agent compensate or require more restrictive governance. In particular, the value of the agent's technological resources may be difficult to assess ex ante. (Nicholson et al. 2002) observe that biotechnology firms are faced with significant discounts, when entering into their first alliance with a major pharmaceutical firm.[150] (Robinson and Stuart 2002) indicate that collaborating firms' network centrality reduces the need for equity-based governance and increases the cash-payments they receive in alliances [also see subsection 2.2.2.3, in particular FN 91]. Similarly, (Coombs and Deeds 2000) observe patents and successfully advanced development projects are positively related to financial inflows from alliances [also see subsection 2.2.2.2, in particular FN 79]. All this evidence points towards young high-technology firms requiring external validation to fully reap collaborative benefits.

Second, the principal's prior experience in or close relatedness to the area of collaboration reduce perceived agency costs. (García-Canal 1996) finds collaborations, in which at least one partner enters a new product market, more likely organized as JVs than contractual agreements. That is, inexperienced partners may require more restrictive collaborative governance. In contrast, the evidence on the choice of collaborative as opposed to proprietary market entry is contradictory. On one hand, (Desai et al. 2002) observes firms preferring fully-owned rather than joint venture market entry when diversifying. On the other hand, (Pisano 1991) shows that firms possessing prior experience in a specific technological field are more likely to internalize R&D activities.[151] Similarly, prior experience may allow firms to better collaborate [e.g., (Moon 1999)] or to better value other firms, facilitating M&A transactions [cf. (Balakrishnan and Koza 1993)].[152]

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[150] This situation may present firms with the dilemma of having to disclose information on their achievements in order to convince transaction partners of their scientific capabilities, which simultaneously imposes a risk of involuntary knowledge transfer.

[151] To round out the picture, (Lu 2002) documents no effect of prior industry experience. Also, (Moon 1999) finds that transactions outside the focal firms' primary business are not more likely JVs than acquisitions.

[152] More generally, (Balakrishnan and Koza 1993) argue that asymmetric information prevent one firm from accurately valuing another, which favors JVs. Conversely, (Hennart and Reddy 1997) suggest that difficulties in separating target firm resources may be the primary reason for collaborative ventures being preferred to acquisitions ['indigestibility' problem]. The resulting contro-

In summary, existing information asymmetries appear to reduce collaborative benefits, but the role of prior experience remains unclear.

Proposition 4.2:	Information asymmetries between collaborating parties reduce collaborative value creation by hindering principals' ability to adequately value (and compensate) agents' contributions.

2.3.2.3 Contractual Safeguards and Trust in Strategic Alliances

For firms to enter into collaborative agreements, they need to sufficiently garner confidence in each other. In contrast to the above information asymmetries, such confidence reflects "a firm's perceived certainty about satisfactory partner cooperation" [(Das and Teng 1998), p. 492]. Moreover, (Das and Teng 1998) distinguish two sources of partner confidence in a collaborative context: Control and trust. While control is grounded in structural or contractual safeguards,[153] trust may evolve from prior interactions or reputation effects.

Contract Design in Strategic Alliances

Contractual control mechanisms have a long tradition in various agency-related contexts, such as venture-capital financing [cf. (Kaplan and Strömberg 2004); as well as (Triantis 2001) for a review]. With regard to strategic alliances, (Parkhe 1993b) identifies information rights, confidentiality provisions, termination arrangements, and arbitration clauses as relevant contract constituents. (Luo and Tan 2003) conclude that the overall completeness of contracts (i.e., across diversity, clarity, and flexibility dimensions) may be the best proxy for the effectiveness of contractual control.[154]

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versy with Koza and colleagues is well documented [cf. (Reuer and Koza 2000a), (Hennart and Reddy 2000), and (Reuer and Koza 2000b)].
Similarly (Simonin 1999) shows that alliance experience and duration reduce causal ambiguity. While knowledge tacitness remains an impediment to inter-organizational learning regardless of prior experience, less experienced firms also suffer from knowledge specificity and cultural distance.

153 Note that the equity-based governance perspective rooted in TCE represents structural control. While structural governance design is an ex post approach, i.e., allocating management and residual control rights in order to minimize transaction (or agency) costs, incentive schemes, signaling, and screening mechanisms aim to ex ante preclude the costs of inefficiency.

154 Moreover, contracts may provide a road-map for alliance management and activities, extending far beyond provisions enforceable in a court of law [cf. (Ryall and Sampson 2003), (Doz 1996), (Ring and Van de Ven 1994)].

In addition to the diversity of provisions, the effectiveness of contracts may be affected by their clarity of specification [(Borys and Jemison 1989)] as well as the inclusion of contractual flexibilities [(Elfenbein and Lerner 2004)].

Empirically, (Parkhe 1993b) shows that both the perceived threat of opportunistic partner behavior and the payoffs from unilateral cooperative behavior favor the use of contractual safeguards. It may thus be systematically linked to information asymmetries and the potential losses from them: First, (Robinson and Stuart 2002) and (Lerner and Merges 1998) find project stage positively and partner firm size negatively related to the use of contractual control mechanisms. While early-stage agreements generally are subject to greater information asymmetries, partner firm size coincides with publicly available information. Furthermore, (Robinson and Stuart 2002) observe that network centrality is negatively related to contractual completeness, suggesting that the need contractual control may lower in the presence of external signals of firm quality.[155]

Second, the potential losses due to expropriation may be highest for strategically vital, since their failure might even endanger the parent firm [(Singh and Mitchell 1996)]. Accordingly, (Reuer and Ariño 2002) find strategic importance and specific investments leading to more extensive contractual safeguards.[156] (Robinson and Stuart 2002) observe that the overall value of an alliance as well as the money committed in equity investments and upfront payments increase the information content of alliance contracts. Both of these findings support the notion that the magnitude of payoffs at risk induces a need for more extensive contractual safeguards.

The explicitness of contractual provisions is related to similar factors as their extensiveness. (Robinson and Stuart 2002) observe that the degree to which each partner's contributions are specified depends on the extent and importance of information asymmetries. Similarly, (Reuer and Ariño 2002) find confidentiality, termination, and arbitration clauses more explicitly

[155] In addition, the relative bargaining power of collaborating parties may affect the extent of contractual control. For instance, (Lerner and Merges 1998) observe 'seller' firm's external access to capital (proxied by the total amount of equity raised) reducing the extent of control rights granted to the 'buyer' firms. That is, better outside alternatives allow firms to negotiate more favorable contractual terms. Also see FN 109 with regard to the determinants of bargaining power in collaborative ventures.

[156] The findings by (Reuer and Ariño 2002) indicate that strategic importance or asset specificity increase the need for explicit confidentiality, termination, and arbitration clauses, but not more extensive monitoring and other control rights (including reporting, notification, and auditing rights).

specified in strategically important alliances involving specific investments. Furthermore, some provisions may mostly be in particular collaborative settings. For instance, (Ryall and Sampson 2003) indicate that cross-border alliances require more explicit specification of development objectives and intellectual property rights. Similarly, (Robinson and Stuart 2002) find specific termination provisions significantly more often included in later-stage alliances and longer-duration contracts.[157]

Proposition 4.3a:	If information asymmetries create economically important expropriation risks, full collaborative value creation and appropriation requires more extensive and explicitly specified alliance contracts.

While the level of expropriation risk thus affects the extent and explicitness of contractual safeguards, environmental influences may reduce their usefulness. In particular, environmental uncertainty may render explicit control ineffective due to incomplete contract specification. (Luo and Tan 2003) empirically demonstrate that dynamic and complex environments reduce the specificity of contractual provisions.[158] Under dynamic, complex, and hostile market environments contingent control rights may be much effective. In addition to monitoring and control rights, these include contractual flexibilities and state-contingent control rights. These allow renegotiation or termination depending on the achievement of pre-set targets. (Elfenbein and Lerner 2004) provide evidence of market-segment maturity reducing the usage of (both technical and market-related) contingency clauses in internet-portal alliances. Similarly, (Luo and Tan 2003) document that contractual contingencies significantly increase financial and market performance under dynamic, complex, and hostile environmental conditions.

Additionally, the use of contractual contingencies may be related to information asymmetries Along those lines, (Luo and Tan 2003) observe cultural distance between partners as increasing contractual contingency.

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[157] Conversely, (Reuer and Ariño 2002) observe time-bounded alliances more specifically including termination clauses. Therefore, planning for the eventual end of a collaborative venture may be a more important issue when duration is non-standard, since termination is either immanent (fixed-term) or unwanted (long-term).

[158] Similarly, (Ryall and Sampson 2003) posit that "next generation" (as opposed to incremental) technology alliances are associated with less extensive and complete contracts. As the development of 'next-generation' technologies is associated with substantial technological uncertainty, explicit contractual provisions may not be applicable in this context.

Similarly, (Elfenbein and Lerner 2004) show contracts employing substantially more contingent control rights when also using exclusiveness provisions, which may be indicative of incongruent incentives. Finally, (Reuer and Ariño 2002) find that limited contract duration allows to reduce the scope of monitoring and control rights (but not other contractual provisions), which suggests time-limitedness may substitute for direct monitoring, similar to the staged-investment approach used by venture-capital firms.

In all, evidence suggests that information asymmetries generally constitute the need for contractual control, whereas environmental uncertainty is the most specific determinant regarding the use of contingent control rights.

Proposition 4.3b:	Environmental uncertainty may render explicit contractual provisions ineffective and require the use of contingent control rights to assure value appropriation.

(Endogenous) Trust in Alliance Formation

Trust represents collaborating firms' belief in partner goodwill and reliability [(Ring and Van de Ven 1992)]. While the determinants of trust may be manifold, an important feature of corporate collaboration is that they endogenously produce trust.[159] In particular, trust may arise from both the prospect of ongoing collaboration as well as a history of cooperation.

First, trust may be based on the economic reasoning of long-term benefits of collaboration outweighing the short-term benefits of defection, i.e. the 'shadow of the future' [cf. (Parkhe 1993b)]. In particular, (Axelrod 1984) showed that repeated interactions of the prisoners' dilemma may allow mutual collaboration if the number of games is infinite (or unknown). A stable pattern of reciprocal cooperation may result, although either player would have a short-term incentive to defect.[160] In support of the

[159] More generally, (Kautonen 2005) distinguishes endogenous and exogenous determinants. The latter including reputation effects, intermediaries, and institutions. In the present study, some of these factors were already considered in the assessment of social capital, information asymmetries and contractual safeguards. Therefore, this subsection focuses on the endogeneous developmen of trust in collaborative relations.
For more extensive work on the concept of trust, see (Kautonen 2005), (Ariño et al. 2001), and (Argandoña 1999), among others.

[160] In the bargaining experiments conducted by (Axelrod 1984), a strategy combining initial cooperative behavior with retaliation for uncooperative partner behavior, 'Tit for Tat', outperformed alternative approaches. Alternative solu-

'shadow of the future' effect, (Rokkan et al. 2003) show the time horizon of an interorganizational relationship to be negatively associated with perceived opportunism. Similarly, (Ryall and Sampson 2003) find the person of the alliance manager being less often explicitly specified in alliances involving joint marketing and joint manufacturing in addition to R&D, which may be reflect continuing collaboration even after R&D has been completed. (Zucker et al. 1995) provide evidence of biotechnology researchers preferring collaboration with other scientists in the same organizations, where future interactions are inescapable.[161]

Second, trust may evolve over the course of a relationship, as information asymmetries decrease and mutual confidence increases. Along those lines, (Parkhe 1993b) shows that cooperative history (i.e., the existence of prior linkages between the partnering entities) to significantly reduce the perceived threat of opportunism. (Levinthal and Fichman 1988) posit that the likelihood of engaging with certain potential partners increases with prior relations. In their study of licensing contracts, (Anand and Khanna 2000b) find that related parties are preferred as licensors under conditions of high expropriation risks (i.e., weak intellectual property protection and cross-border licensing).[162] Similarly, (Gulati 1995a) and (Gulati and Singh 1998) show repeated transactions (i.e., between firms already having established cooperative ventures) to significantly more often take the form of contractual relation rather than JV or minority investment.[163] (Robinson and Stuart 2002) extend this evidence to shared third-party ties.

While the preceding findings indicate that prior relations may substitute for restrictive governance schemes, their substantive benefits may be lim-

tion mechanisms to the prisoners' dilemma include the enforcement of truthful signals, e.g., documented by (Arend 2005).

[161] While this evidence may equally reflect third-party enforcement (e.g., by management), (Zucker et al. 1995) argue that the 'shadow of future' is at least partially responsible for the observed pattern of collaboration. This effect is particularly relevant for high-quality research, i.e., the particularly valuable intellectual capital.

[162] At the same time, (Anand and Khanna 2000b) show parties without prior relations more frequently choosing cross-licensing agreements. In lack of a trustful relationship, they may thus rely on reciprocal commitments. Similarly, licensing in the electronics industry (i.e., low intellectual protection compared to pharmaceutical industry) and (ex ante) licenses referring to technologies still under development also more often take the form of cross-licenses.

[163] However, (Gulati 1995a) only observes a significant effect for equity ties. Moreover, (Oxley and Sampson 2004) and (Sampson 2004a) do not find an effect of prior alliances with collaboration partners (or overall collaborative experience) on the choice of joint ventures over contractual arrangements.

ited. (Saxton 1997) finds that alliances between firms with prior relationships (including customer/supplier relations) yield higher initial satisfaction levels but not better assessments of long-term performance. Similarly, (Robinson and Stuart 2002) do not observe a significant effect on the cash pledged to the alliance partner. The advantages of prior relations may thus primarily pertain to the alliance formation process, i.e., be facilitative in nature.

Overall, the 'shadow of the future' and prior ties appear to create trust and confidence, which in return affects the choice of collaboration partners and collaborative governance.

Proposition 4.4a:	Trust arising from long contract duration and prior interactions allows realizing collaborative value without resorting to costly governance schemes.

Trust may complement or substitute other governance mechanisms to create the level of confidence necessary for alliance formation in spite of information asymmetries. (Ring and Van de Ven 1994) and (Madhok 1995) view trust and control as alternative mechanisms, i.e., having a substitutive relationship. Conversely, (Das and Teng 1998) argue that trust and control are bilaterally interrelated and complementary.

Empirically, (Parkhe 1993b) does not observe a significant effect of transaction frequency on contractual safeguards. Similarly, (Reuer and Ariño 2002) observe that prior ties between contracting parties do not significantly influence contractual heterogeneity and extra-alliance commitments (such as confidentiality, termination, arbitration). However, such prior relations significantly reduce the scope of monitoring and control rights. Inter-partner trust consequently may not substitute for explicit contract specification, but it may reduce the need for ongoing control.

(Ryall and Sampson 2003) find that ongoing (concurrent) alliances with the same partner reduce the completeness of alliance contracts, which supports the substitutive view. If prior relations have ceased, however, contracts are significantly more elaborate. The latter points towards partners having collaborated previously knowing more specifically, which provisions to include in alliance contracts.[164] (Poppo and Zenger 2002) observe relational governance and contractual complexity to reciprocally affect and complement each other, i.e., better partner relations coincides with greater

[164] (Ryall and Sampson 2003) also observe greater contractual completeness for firms with extensive overall alliance experience, i.e., irrespective of the specific partner, which may indicate that firms learn to devise effective alliance contracts.

contract complexity.[165] Similarly, (Luo and Tan 2003) suggest that 'goal congruity' has a significantly positive effect on contractual completeness, specificity, and contingencies. These findings suggest that trustful relations may allow collaborators to agree on appropriate contractual provisions.

Proposition 4.4b:	Inter-partner trust may assure value appropriation through better specified contractual statutes and a reduced need for ongoing monitoring and control.

Other Mechanisms for Reducing Information Asymmetries (Exogenous Sources of Trust)

As patents may render assets fully appropriable by the patent owner, patent protection may reduce the risk of knowledge expropriation and thus facilitate collaboration.[166] Most generally, (Hagedoorn and Schakenraad 1994) encounter significantly higher partnering rates for patent-intensive industries.[167] More generally, (Oxley 1999) and (Sampson 2004a) document that the effectiveness of intellectual property rights (as well as judicial efficiency, rule of law, and (low) political risk) is negatively related to the choice of EJVs over contractual alliances. (Subramanian 2004) shows that collaboration in high patent protection industries benefit from cooperative behavior and more extensive technology sharing without extensive hierarchical controls. (Anand and Khanna 2000b) observe fewer licenses granted in cases of weak protection schemes and exclusive licenses most common in chemical and pharmaceutical industries, where intellectual protection is

[165] Based on survey data, (Poppo and Zenger 2002) measure relational governance as incorporating communication, trust, and cooperation among partners. Similarly, contractual complexity refers to the degree of customization and legal detail. In a three-stage simultaneous equation (GLS) specification, both constructs exert distinctly positive effects on alliance performance.

[166] Note that this is in contrary to the spillover internalization hypothesis above [subsection 2.2.1.2], which argued that the inadequate investment incentives associated with insufficient innovation appropriability necessitates collaboration.

[167] Similarly, (Gulati and Singh 1998) find automotive and new materials firms to establish more joint ventures or use minority investments compared to more contractual relations in the pharmaceuticals industry. That is, relatively weak property rights encourage automobile firms to utilize joint ventures and equity linkages to reduce agency costs. Additionally, (Gulati and Singh 1998) document a significantly positive interaction effect of R&D alliances in the automotive industry.

strongest.[168] All in all, research has thus demonstrated that effective patent protection significantly reduces the need for restrictive transaction governance.

With regard to specific patent characteristics, (Subramanian 2004) exhibits the generality of a firm's patent portfolio to reduce the propensity of hierarchical control as well as the extent of technology access. That is, patents applicable in a wide range of domains may be less expropriable despite limiting the explicit access to these technologies. However, the effects of patent protection and generality are not fully additive, since both factors interact in favor of hierarchical control.[169] Patent generality thus may primarily reduce the need for patent protection.

Generally, evidence supports the view of patent protection reducing expropriation risks and instilling confidence in alliance partners.

Proposition 4.5:	Effective patent protection may enable the appropriation of collaborative value without incurring the costs of more restrictive governance.

2.4 A Dynamic Theory of Cooperative Value Creation

2.4.1 Background and Value-Creating Mechanism

This chapter has so far considered various sources of strategic collaborative benefits (subchapter 2.2) as well as reasons for alliances being efficient organizational structures (subchapter 2.3). Both represent necessary antecedents of collaborative value creation. However, they can only sufficiently explain this phenomenon, if they adequately reflect the benefits and costs of collaboration over the long term.

Indeed, many of the approaches discussed above include references to the time dimension of collaborative activity. For instance, the strategic objectives of market power, entry, and competitive advantages are based on the idea of achieving a future value-maximizing state. Similarly, the no-

[168] Conversely, (Hagedoorn and Duysters 2002a) fail to show a significant effect of a firm's patenting intensity (relative to the industry average) on the choice of cooperative or acquisitive transactions.

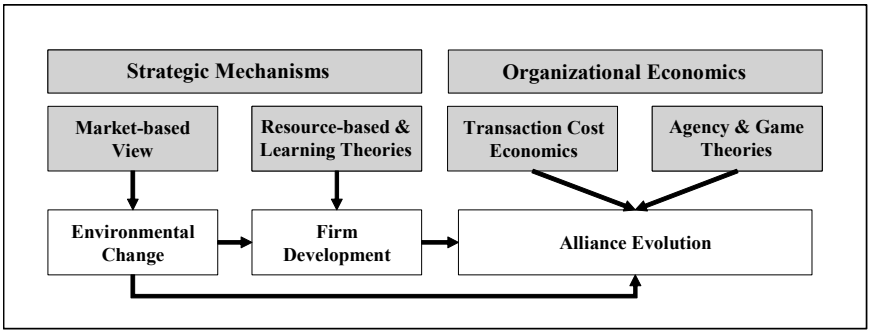
[169] At the same time, patent protection and generality interact to further broaden technology access [(Subramanian 2004)], indicating that patent protection allows alliances to extend to the entire patent scope. Note that these findings also are cosistent with the notion that transaction scope and governance are mutually related [see subsection 2.3.1.2, in particular proposition 3.3].

tions of trust and social capital are inherently time-dependent, since they link prior behavior (e.g., alliance formation) to current behavior and results (i.e., alliance formation and performance). Moreover, the learning perspective and the transaction cost rationale essentially address post-formation behavior.

Given that the present study focusses on dynamic drivers of collaborative value (Objective 3, section 1.2.1), this section more explicitly considers dynamic extensions of the general alliance-related theories. This relates to all factors reflecting changes in the net benefits of alliances over time:

- The market-based view (section 2.2.1) posited that collaboration improves firms' competitive positioning and rectifies suboptimal R&D incentives. Environmental change alters the status quo and therefore the benefits of collaborative ties. At an aggregate level, industry dynamics determine the value of firms' alliance portfolios and positioning in alliance networks. While corporate strategy views alliances as tools to achieve competitive advantages, the above alliance-related evidence does not account for changes in firm's environment, which may affect the value of collaborative activities.
- The resource-based view (section 2.2.2) argued that focal and partner firm resources form the basis of collaborative benefits. The evolution of firms' internal resource bases (firm development) affects the value of resources accessed through alliances. While the RBV generally mandates resource complementarity, it does not address systematic changes in resource needs arising from firm development. Neither does it explicitly examine the role alliances play in fostering firm development.
- The organizational economics approaches highlighted that alliances may be optimal organizational modes under specific environmental conditions (transaction cost economics, section 2.3.1), but need to consider the stability of inter-partner relations (agency theory, section 2.3.2). This implies that a collaborative relationship may change over its course. However, standard organizational economics do not consider the evolution of collaborative value along an alliance's developmental path.

Figure 12: Dynamic Extensions of Fundamental Theories



Source: Own Illustration

As illustrated in Figure 12, the present section addresses the dynamic extensions of these fundamental theories. They have common that they consider the value of a collaborative venture depends on its congruence with changing environment conditions.[170] Such dynamics may refer to conditions outside the firm (e.g., market competition, technological development), within the firm (e.g., changing resource endowments and needs), or pertaining to the alliance itself (e.g., partner relations, alliance performance).

The actual mechanisms of dynamic collaborative value creation may differ: On the one hand, strategic alliances may enhance corporate value by helping firms adapt to new (environmental or firm-level) requirements. Alliances thus may serve to facilitate evolutionary processes and allow firms to continually stay abreast of their competition.[171] On the other hand, alliances are inherently flexible and may present opportunities for future adap-

[170] More generally, the viability of any organization is determined by its ability to withstand market selection. This general notion of economic evolution forms the theoretical basis for any dynamic perspective Table 48 in the appendix provides an overview of the general concept. (Van de Ven and Poole 1995) and (Von Schroeter 2004) provide more extensive overviews of relevant theories.

[171] In their seminal work on dynamic firm capabilities, (Teece et al. 1997) suggest that long-term market success can only be reached by continually developing new forms of competitive advantage. Processes of learning, reconfiguration, and transformation are essential antecedents of such adaptation. In particular, the firm's ability to evaluate its market environment, anticipate and fulfill the need for reconfiguration is such a dynamic capability. As these routines are tacit and hardly observable, they are difficult to replicate internally, let alone imitate externally. Alliances may be part of such routines.

tation. That is, they may position firms to react to future developments without requiring full engagement in downside risks.[172]

Overall, firms thus may enter into alliances to provide flexibilities and realize the value of these flexibilities for adaptive purposes.

Reasoning 5:	Alliances create firm value by generating and exercising strategic flexibilities under conditions of dynamic external environments, changing organizational requirements, and endogenous alliance evolution.

2.4.2 Dynamic Collaborative Benefits

The present section details the dynamic properties of strategic alliances and collaborative benefits. In sequence, it considers the effects of environmental dynamics (subsection 2.4.2.3), firm development (subsection 2.4.2.1) and alliance evolution (subsection 2.4.2.2).

2.4.2.1 Implications of Environmental Dynamics

Environmental change induces firms to adapt in order to remain profitable and survive. In the short term, it requires firms to reconsider their current positioning. For the long term, it implies a need to take precautionary measures in anticipation of further change. Both of these aspects are important in a collaborative context.

Pressure to (Re)Structure Alliance Network

Different environmental conditions may require specific forms of organization [cf. (Hannan and Freeman 1989)]. This is reflected in the fact that different industry exhibit varying levels and types of alliance activity [cf. (Cairnarca et al. 1992)].[173] The resulting industry-specific network struc-

[172] While real-option theory is not the explicit focus of the present section, this coincides with the three basic characteristics of real options: uncertainty, flexibility, and irreversibility (see Table 49 of the appendix for details). Consequently, several authors have referred to collaborative ventures as real options [e.g., (Folta and Miller 2002), (Vassolo et al. 2004)] For a recent review of real-option theory, see (Baecker and Hommel 2004).

[173] (Davenport and Miller 2000) summarize that the dominant motive and mode of technology alliances differ with the sector and life-cycle stage. Specifically, firms in "mature" industries form (non-equity) alliances to influence demand and control market structure. Contrarily, firms in emerging industries ally to

tures represent an evolutionary reaction to the specific requirements each setting [(Nelson and Winter 1982)]. Therefore, being entrenched in an industry network should be associated with strategic benefits, i.e., firms in the center of a network may have optimally positioned themselves under the given conditions.[174] Along those lines, (Gulati et al. 2000) argue that firm performance may be substantially hurt by being excluded from the advantages of membership in core industry networks (lock-out effect).

With regard to the process of network establishment, (Doz et al. 2000) suggest that networks of interorganizational relations emerge in response to perceived interdependence among firms, who react by pursuing their common interests through collaborative ventures.[175] The most prominent examples of collaboration networks forming in response to strong exogenous influences were the Western automobile industry faced with increased Japanese competition [cf. (Nohria and Garcia-Pont 1991)] and the global pharmaceutical industry in the wake of the 'biotechnological revolution' [(Zucker and Darby 1995)]. On a more continuous level, (Link et al. 2001) observe that business cycles and the national competitive position in high-technology industries are negatively related to the establishment of research joint ventures. Similarly, (Burgers et al. 1993) show that firms with declining market shares enter into a greater number of alliances.

All these findings point towards environmental change inducing network formation. In particular, eroding market prospects create incentives to seek network benefits. This suggests that alliances may help firms overcome the effects of adverse environmental change.

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combine human and technological resources (using equity). (Sydow and Windeler 1998) provide different examples.

174 (Nohria and Garcia-Pont 1991) provide evidence that interorganizational relations even may evolve into competitive constellations (i.e., strategic blocks) providing all associated firms with access to a similar range of capabilities, i.e., the strategic blocks themselves may become the competitors in an industry.

175 Specifically, interdependent firms recognize their similar interests and find it not overly difficult to reach consensus regarding the domain of collaboration, resulting in network structures, perceived as desirable by their members (as reflected in relatively long expected network membership).
Alternative to an emergent process, networks may be proactively engineered by a triggering entity. Specifically, (Doz et al. 2000) find the existence of a triggering entity negatively related to environmental interdependence, suggesting that engineered processes will be resorted to if environmental pressure for collaboration is insufficient. In this context, (Koza and Lewin 1998) refer to intentional or rational network creation.

Proposition 5.1a:	Alliances create firm value by positioning firms in industry networks, which may alleviate competitive disadvantages and unfavorable environmental conditions.

Environmental change may equally affect the structural integrity of existing networks. (Madhavan et al. 1998) propose the distinction of structure-reinforcing and structure-loosening events, depending on whether they strengthen or alter an industry's basis of competition.[176] In this context, (Duysters et al. 2002) suggest that firms deeply entrenched in collaborative networks may be better positioned to benefit from incremental developments, whereas their innovativeness may be hampered by over-embeddedness under conditions of radical technological change.[177] (Burkhardt and Brass 1990) find that, pursuant to technological shifts, early adopters of novel technologies increased their centrality in industry networks compared to later adopters. Similarly, the prior network structure was strengthened (i.e., reinforced) if the early adopters already were centrally located. Technological development thus may provide an opportunity for innovators to more prominently position themselves in industry networks and may threaten embedded incumbents.

In the face of environmental change, it may thus be prerogative to collaborate in order to maintain valuable network positions. Firms not participating in the process of network reconfiguration may be at a disadvantage. Along those lines, (Silverman and Baum 2002) show that the formation of horizontal and some forms of vertical alliances increases the likelihood of market exit for excluded rivals.[178] As a result, firms may even enter alli-

[176] For the global steel industry, (Madhavan et al. 1998) observe a reinforcement of network structure following a regulatory event facilitating collaboration without affecting the underlying bases of competition. For a technological event providing increased opportunity for market competition, however, they exhibit a significant modification of network structure.

[177] The concept of over-embeddedness goes back to (Uzzi 1997). (Gulati et al. 2000) propose alliance exclusiveness and 'partner fidelity' as the main determinants of such lock-in effects. Moreover, incumbent firms may be less able to accommodate technological changes For instance, (Zucker and Darby 1995) document such difficulties for big pharmaceutical firms faced with the 'drastic' innovations associated with the biotechnological revolution. (Henderson and Clark 1990) make a similar argument with regard to 'non-drastic' reconfigurations of exiting products.

[178] The magnitude of these effects suggests that the increase in competitive pressure due to being excluded from collaboration is the driving force behind these market exits. (Silverman and Baum 2002) also find additional horizontal alliances by rivals tied to the focal firm by a prior alliance as having this ef-

ances for the sake of belonging to the network irrespective of other immediate gains [cf. (Park and Zhou 2005)]. Concurrently, (Park et al. 2002) find that the overall number of alliances in an industry to have a positive effect on alliance formation.[179]

In total, these findings indicate that collaborative benefit increase, when environmental change requires network adaptation.[180]

Proposition 5.1b:	Alliances create firm value by helping firms reach or maintain favorable positions in reconfiguring networks.

Need for Flexibility

Since over-embeddedness may be a constraint in the face of revolutionary technological change, it may have adverse effects under conditions of high environmental uncertainty. The danger of being locked into a specific network position may, however, be mitigated through diversification of linkages. Diverse partners and types of relations provide firms with the flexibility to reprioritize their alliances in their depending exogenous developments.

Alliance portfolios thus represent bundles of distinct strategic options.[181] For R&D alliances, (Vassolo et al. 2004) refer to these as options on the highest of two asset values. Similarly, (Zucker and Darby 1995) suggest that flexibilities not only refer to switching among different collaboration projects, but also to learning whether to build up certain capabilities internally (option to stage invest). (Duysters and de Man 2003) even argue that

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fect. That is, the disadvantage of being excluded from horizontal alliances dominates any benefits of prior involvement. Contrarily, vertical alliances of such 'coopetitors' reduce the firm drop-out rate. This suggests that firms may profit from second-hand knowledge spillovers.

179 Note that the effect observed by (Park et al. 2002) becomes insignificant (while maintaining its positive sign) if the interaction terms of internal resources and market demand changes are entered, which may reflect endogeneity, since the aggregate alliance decisions are strongly driven by the existing resource bases and market uncertainties.

180 Alternatively, such findings may reflect (at least some) firms mimicking successful competitors' actions, a phenomenon dubbed 'mimetic isomorphism' by (DiMaggio and Powell 1983). This would imply that firms follow prescribed patterns regardless of their economic rationality. Also see subsection 2.3.1.3 and FN 142 on mimetic behavior in the choice of organizational modes of international market entry.

181 More generally, (Williamson 1999b) refers to creating a portfolio of strategic options as the overall objective of corporate strategy, since they allow to opportunistically exercise those turning out to be most attractive.

transitory alliances, i.e., collaboration focusing on narrowly defined tasks and ex ante intended to be of short duration, may be specifically entered for such purposes.

Under conditions of uncertainty, the value of flexibilities inherent in strategic alliances increases. In particular, the volatility of potential gains renders it beneficial not to irreversibly commit resources.[182] Along those lines, (Harrigan 1988a) highlights the importance of demand and competitive uncertainty for the frequency of collaboration. (Park et al. 2002) also link the change in market demand to increased alliance formation, albeit at a marginally decreasing rate. (Dickinson and Weaver 1997) find general environmental uncertainty as well as changing technological and demand conditions positively related to the use of alliances.[183] Similarly, (Gersony 1996) and (Eisenhardt and Schoonhoven 1996) observe that alliance activity is greater in emerging-stage industries than in technologically more settled domains. Finally, (Sarkar et al. 2001) suggest that pursuing collaborative flexibilities in uncertain environments of may enhance firm performance.[184] Similarly, (Hagedoorn and Duysters 2002b) provide evidence of many, seemingly redundant alliances increasing performance in the computer industry.

The presented evidence supports the view that environmental uncertainty increases the frequency and potential benefits collaboration. In particular, collaborative flexibilities may position firms for future environ-

[182] This notion is in line with evidence that uncertainty shifts governance-mode choice from proprietary (e.g., mergers and/or acquisitions) towards collaborative [see subsection 2.3.1.2 for details]. These findings even more strongly support the flexibility value argument, since they are contrary to transaction-cost reasoning.

[183] Additionally, (Dickinson and Weaver 1997) suggest that these effects may be moderated by management characteristics. In particular, entrepreneurial orientation and individualistic cultural traits reduce the propensity of managers to employ collaborative flexibilities. While not significant explanatory variables by themselves, they negative interact with uncertainty and positively with the firm's internal growth potential, suggesting that these firms prefer 'putting all eggs into one basket'.

[184] Specifically, (Sarkar et al. 2001) find the interaction of uncertain or rapidly changing demand conditions and alliance proactiveness to have a positive impact on market success. Conversely, uncertainty regarding technological advances and competitive action do not increase the benefits of proactive alliance formation.

mental change and allow them to profit from arising market opportunities.[185]

Proposition 5.2:	Alliances create firm value by providing strategic flexibility, in particular under conditions of high environmental uncertainty.

2.4.2.2 Effects of Firm Development on Alliance Activity

Diverse evidence has documented effects of collaborative activity on firm development, using indicators such as patenting, new product introductions, sales growth, and firm survival [see subchapters 2.2 and 2.3]. At the same time, progression along a firm's developmental path may also affect its incentives to collaborate. In particular, (Koza and Lewin 1998) suggest that the strategic intent of alliance may co-evolve with changes in corporate strategy, managerial preferences or the organizational environment. This section addresses the influences of firm development on the relevance of collaborative activity in general and on the benefits from specific types of alliances.

Relevance of Alliance

Alliances appear to most benefit firms lacking certain capabilities (such as an existing market presence, cf. subsection 2.2.1.3) or resources (such as technological or commercial capital, cf. subsection 2.2.2.2). More generally, young and small firms may draw on collaborative ventures to further their development.

Prior evidence supports this notion. For instance, (Shan 1990) shows that smaller firms are more likely choosing alliances over proprietary commercialization strategies.[186] Similarly, (Sarkar et al. 2001) find the

[185] Environmental uncertainty may also affect less obvious sources of collaborative value. For instance, (Chung et al. 2000) find that the effect of social capital (prior direct and indirect ties) on alliance formation is stronger in situations of greater uncertainty. In particular, investment banks collaborate more often on (high uncertainty) IPOs than on (low uncertainty) secondary public offerings. This suggests that trust developed through prior contacts facilitates collaboration under adverse environmental conditions.

[186] Studies on alliance motives also support the general notion of small firms allying to promote their development. Specifically, (Glaister/Buckley 1996) document that technology development and product diversification are more important motives for smaller firms. Similarly, (Hagedoorn 1993) shows technological complementarity and reduced lead times to be of greater importance

positive association between alliance proactiveness and firm performance being negatively moderated by firm size, i.e., smaller firms may stand to gain more from proactively pursuing alliance opportunities. (Oliver 2001) even provides evidence linking a lack of strategic alliances to organizational death for young biotechnology firms.

While younger, smaller firms thus may profit from accessing more established partners' resources, the value attributed to partner resources may decline once certain resources are available internally. Along those lines, Stuart (2000) observes a significantly negative interaction effect of focal firm age and sales with partner sales. That is, the commercial capital contributed by cooperation partners becomes less valuable as firms mature and develop such resources themselves. Concurrently, (Park et al. 2002) show that focal firms' technological diversity and internal manufacturing capabilities reduce the incentive effects of growing market environments on alliance formation.[187] The adverse effect of firm development on collaborative benefits thus can be traced to its specific resource endowment.

The interrelation of firm development and alliance activity may, however, be more complex. In particular, collaborative benefits may underlie a cyclical pattern. For instance, (Oliver 2001) shows that the number of alliances formed by young biotechnology at first steeply increases with age and then declines as they mature.[188] Similarly, (Niosi 2003), while identifying alliances as the most important driver biotechnology firms' growth, also observes a significant direct effect of firm age. These findings suggest that developing firms may profit from collaborative learning, but may require periods of internalization to fully realize those benefits. In particular, (Vanhaverbeke et al. 2004) demonstrate that collaborative links more

for high-technology firms, which tend to be younger and smaller than firms in more established markets.

187 That is, firms which have developed internal resources rely less on collaboration to satisfy increasing demand, unless market growth is particularly explosive. Technically, the interaction effects of technological diversity and manufacturing facilities with linear market growth are significantly negative, those with the quadratic term are positive. Conversely, the interaction of financial resources with market demand changes are not significant.
Somewhat contrarily, Stuart (2000) observes the relevance of partners' technological resources less pronounced for younger firms as well as firms with larger prior sales.

188 Specifically, the firms studied by (Oliver 2001) experience high collaboration rates between their 2nd and 8th/9th year of existence. Moreover, evidence suggests that collaboration intensity may rise again for firms aged 13 and over. As (Oliver 2001) notes, such an 10-year cycle of alliance activity would roughly coincide with the development life-cycle for biotechnological drugs.

strongly help firms broadening their technological base than strengthening their core technologies.[189] That is, once established through collaboration, technological capabilities may need to be augmented internally.

All in all, firm development systematically appears to reduce collaborative benefits, although this effect may not be monotonous. In particular, the access to partner firm resources becomes less attractive as firms develop sufficient resources internally.

Proposition 5.3:	The value of strategic alliances is smaller for further developed firms.

Developmental Value of Alliances

With regard to corporate development, alliances may target the exploration of new opportunities or the exploitation of existing capabilities [cf. (Koza and Lewin 1998), (March 1991)]. While exploitation alliances allow to realize immediate tangible benefits, collaborative exploration may be required to build up internal capabilities and to ensure long-term organizational viability [cf. (Levinthal and March 1993)]. The relative value impact of each alliance type may hinge on organizational needs, which in return depend on firm development. In particular, three phases of development may be relevant: Start-ups, developing, and mature firms.

First, start-up firms may require exploration alliances to accumulate the technological competency required to complete their process of establishment. In addition to fostering the collaborators resource bases, (Rothaermel and Deeds 2004) show that exploration alliances are prerequisite for the formation of exploitation alliances.[190] An important function of exploration

[189] (Vanhaverbeke et al. 2004) distinguish patent classes in which firms have (not) previously received patents (over a 5-year period). Both direct and indirect links more strongly support innovation (i.e., patenting) in new classes than those previously established.

[190] More specifically, (Rothaermel and Deeds 2004) posit that alliances targeting exploration and exploitation are core components of an integrated product-development path. In their empirical analysis, they observe exploration alliances significantly increasing the firms' number of products in development, which in return increase the likelihood of entering into exploitation alliances, which finally increase the number of marketed products.
Note that (Rothaermel and Deeds 2004) also document significant influences of firm age and size on products under development, exploitation alliances, and marketed products. However, since they neither can include interaction effects in their LISREL model nor address the determinants of exploration alliance formation, the interaction of organizational and alliance-based development cannot be comprehensively assessed.

alliances thus is to pave the way for further collaboration. (Powell et al. 1996) substantiate this argument with regard to R&D alliances.[191] Consequently, exploration alliances allow start-ups to grow their internal resources bases and facilitate further collaboration, while exploitation alliances are not yet available to them.

Second, developing firms having compiled internal capabilities may benefit from leveraging them through exploitation alliances, which may provide benefits more directly related to the operating and financial performance than exploration alliances. Consequently, (Rothaermel 2001) finds exploitation alliances having a positive (although marginally decreasing) effect on new product development. Similarly, (Baum and Silverman 2004) observe that downstream alliances have a significant impact on the revenues and private equity raised by Canadian biotechnology firms. Conversely, exploration [(Rothaermel 2001)] and upstream [(Baum and Silverman 2004)] alliances have no such effects.

Third, larger established firms may possess sufficient internal capabilities to exploit its capabilities in isolation, reducing the benefits of exploitation alliances. Along these lines, (Rothaermel 2001) observes that the increased levels of new product introductions derived from exploitation alliances negatively interacts with firm age. Similarly, (Wilson and Appiah-Kubi 2002) find that older firms heavily relying on vertical relations experience lower profit growth than similar firms without such networks.[192]

In all, as the needs of firms evolve, the relative benefits of different alliances may change. In particular, exploitation alliances hold the greatest potential advantages for established, but still developing firms. Conversely, collaborative exploration most benefits start-ups and mature firms, as they try to establish themselves or to overcome organizational inertia, respectively.

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[191] Similarly, (George et al. 2002) show that alliances with universities significantly increase the number of (other) alliances formed by biotechnology firms. University alliances thus may provide the technological resources and signals of technological competence prerequisite for additional cooperative ventures.

[192] This evidence may be somewhat misleading, since (Baum and Silverman 2004) only study high-tech firms with an average age of 9 years. At the same time, (Baum and Silverman 2004) show that firm age per se does not discriminate profit or sales growth and that access to external resources generally has a significantly positive effect on both. While ‘older’ firms may thus only profit from horizontal relations, vertical network ties have a positive effect on the profit growth experienced by younger firms.

Proposition 5.4:	Alliances create firm value by contributing to the exploration and exploitation of strategic resources in line with the evolving organizational development needs of focal firms.

2.4.2.3 Individual Alliance Evolution

While industry- and firm-level influences were above primarily discussed with regard to alliance formation decisions, they also have substantial impact on existing alliances. In brief, post-formation adaptation and alliance termination may both serve to restructure and realign firms' alliance portfolios with industry conditions and corporate-level strategies. Aside from such exogenous influences, interorganizational relationships may also evolve endogenously. While the completion of initial knowledge acquisition objectives may jeopardize the continuation of an alliance [cf. subsection 2.2.2.4 on learning races], collaborative achievements may equally instill mutual trust and reinforce joint activities [cf. subsection 2.3.2.3 on the evolution of trust].

Exogenous and endogenous change (i.e., originating outside or inside the individual alliance) provides an opportunity for collaborating firms to reconsider the economic rationality (efficiency) or reciprocal benefits (equity) of an existing alliance.[193] This may in return lead to corrective action, such as revisions of firm contributions and outcome distribution (adaptation) or outright alliance termination.

In line with Reasoning 5, the possibility to modify or terminate collaboration may be valuable, since it represents the flexibility to choose the better of two outcomes at one's own discretion (long position). At the same time, the exercise of similar options by collaborating firms may negatively affect the focal firm (short position). This subsection addresses these implications of adaptation, termination, and internalization flexibilities.

Adaptation

Adaptation encompasses any modification of collaboration terms and structure, e.g., in response to changing market conditions or strategic re-

[193] For instance, (Ring and Van de Ven 1994) propose a model, which identifies alliance development as a circular process consisting of negotiations, commitments, and execution. The initial alliance conditions are the result of ex ante objectives, expectations, and negotiations leading to a preliminary commitment by the alliance partners. Earlier models, such as (Chan and Harget 1993), have a management-oriented focus but identify similar development stages.

quirements of partnering firms [cf. (Harrigan 1985), (Heide and John 1992)].[194]

As (Ariño and de la Torre 1998) point out, such actions may be unilateral or based on a mutual renegotiation of alliance terms. From the individual firm perspective, initiating, supporting, or accepting alliance modification is only rational if it yields equivalent of higher value relative to the status quo. Therefore, alliance modification should not lead to value destruction, although the benefits of adaptation may differ among collaborators. In this context, (Young-Ybarra and Wiersema 1999) suggest that post-formation flexibilities to modify alliance agreements are linked to transaction and relationship characteristics. Specifically, they find that trust, multiple collaborations, and balanced asset contributions facilitate modification. All these factors reflect a joint commitment to continued collaboration. Contrarily, alternative alliance partners, and relative power in an alliance reduce modification flexibilities.[195] Intra-alliance power and dependence thus may determine willingness to modify alliance terms.

Proposition 5.5a:	Modification of existing alliance creates collaborative value by realigning the collaboration to contextual requirements, with value appropriation depending on the collaborating firms' relative bargaining power.

[194] A variety of case-based research has attempted to document the evolution of individual alliances over time. Work by (Hamel 1991), (Ariño and de la Torre 1998), (Larsson et al. 1998), and (Davenport and Miller 2000), among others, has identified a variety of flexibilities to adapt existing relationships while continuing collaboration. With regard to joint ventures, (Reuer and Miller 1997) propose a model distinguishing within-JV ownership instability and discrete changes in JV governance. In the former case of modification, all parents remain invested, albeit with reorganized equity stakes. The latter cases encompass JV dissolution, secondary sales, as well as buyouts by parent firms.

[195] Counterintuitively, asset specificity also reduces willingness to modify. Considered together with the effect of balanced asset commitments, however, it suggests that firms will avoid modification if they are more strongly committed (possibly due to the risk of expropriation), whereas they welcome modification if that risk is offset by partners' asset commitments. (Young-Ybarra and Wiersema 1999) also provide similar evidence regarding the flexibility to exit alliances.

Termination/Dissolution

While collaboration may end due to various causes, such as the achievement of their natural end points or internalization of successful collaboration, most prior work on this issue has deemed termination to reflect failure. Conversely, alliances stability and longevity have been considered as success indicators [e.g., (Barkema et al. 1997), (Barkema and Vermeulen 1997), (Killing 1983), (Li 1995), (Park and Russo 1996), (Park and Ungson 1997)]. Indeed, unsatisfactory alliance outcomes are an empirically important determinant of alliance (in)stability. For instance, (Harrigan 1988b) and (Bleeke and Ernst 1991) observe alliance satisfaction and survival rates in the range of 40 to 50 percent, respectively.[196] Conversely, potential benefits of collaboration may instill stability. Along those lines, (Kogut 1989) observes that learning opportunities (R&D intensiveness in R&D ventures) and favorable market conditions (shipment growth) reduce the rate of JV dissolution.

In addition to collaborative (non)performance, intra-alliance rivalry may lead to alliance termination. (Kogut 1989) observes that the absolute level of industry concentration and increases therein as well as scale intensiveness (minimum efficient scale in production ventures) lead to significantly higher termination rates.[197] These findings suggest that competitive rivalry may be the source of alliance instability. Similarly, (Barkema et al. 1997) and (Barkema and Vermeulen 1997) observe that cultural differences between partners increases JV termination. Structural control may offset these risks to some extent. (Killing 1983) and (Li 1995) find that collaboration is more instable if focal firms exert majority control over collaborative ventures. Similarly, (Kogut 1989) suggests that concurrent ties among partners may stabilize a relationship. This effect is particularly strong for concurrent JVs and licensing agreements (as opposed to buyer-supplier relations).

All in all, alliance terminations appear to result when prior underperformance and intra-alliance competition outweigh the costs of dissolution

[196] (Gomes-Casseres 1987) provides evidence of IJVs being more often dissolved or sold than wholly owned subsidiaries. As both are substitute mechanisms for international market entry, IJVs may be used to learn about market conditions and the later set-up of proprietarily owned entities. (Kogut 1988c) documents lower dissolution rates for international than domestic JVs early on, whereas they peak 5 to 6 years after formation. (Das and Teng 2000a) provide an overview of earlier evidence on alliance instability.

[197] Similarly, (Kogut 1988c) observes relatively high mortality rates for marketing and after-sale service JVs as well as for service industry JVs in general. This highlights that JVs requiring comparably low investments in physical goods can be dissolved more easily, when early performance is insufficient.

and expected alliance benefits. It can therefore be considered as indicating collaborative failure.

Proposition 5.5b:	Alliance termination reduces collaborative value by eliminating collaborative benefits in reaction to insufficient performance and/or excessive rivalry among partners.

Internalization

While termination, i.e. the discontinuation, of collaborative activities may reflect failure, their internalization by one partner may be equally indicative of successful alliance progression. (Hagedoorn and Sadowski 1999) indicate that 2.6% of all contractual alliances lead to subsequent M&A transactions, which may be an economically meaningful number.[198]

The value implications of internalization depend on its relative benefits vis-à-vis continuing collaboration. In particular, by buying out alliance partners, firms exercise the flexibilities inherent in the alliance. As the flexibility (or option) value of alliances is linked to environmental uncertainty (cf. proposition 5.2 in subsection 2.4.2.1), internalization (or option exercise) may become favorable as uncertainty diminishes or the expiry of the flexibilities becomes immanent.

First, reduced environmental uncertainty makes it more appealing to trade the strategic flexibility of alliances for fully proprietary benefits. In support, (Kogut 1991) finds positive performance signals (proxied by annual growth rates and deviations from long-term growth rates) linked to venture buyouts.[199] (Folta and Miller 2002) show that firms increase their equity stakes in research partners following positive developments in sectoral stock indices, which may reflect increases in the underlying values and reductions in technological uncertainty. Conversely, (Folta and Miller 2002) observe firms less likely to expand their equity stakes, if uncertainty

[198] (Hagedoorn and Sadowski 1999) observe a higher likelihood of acquisitions for equity-based collaboration; however, the difference fails to be statistically significant. One possible explanation for this would be that firms already holding an equity stake in a target may have preferential access to value-related information.

[199] Other indicators for venture acquisitions (by one parent) include high industry concentration, which may reflect the danger of value expropriation through competitive rivalry. Furthermore, both R&D and marketing/distribution ventures are more likely to be bought out than production joint ventures.
Moreover, (Hagedoorn and Sadowski 1999) find horizontal alliances, those targeting core technologies (e.g., biotechnology, IT, new materials), and those with large partner firms being less likely to culminate in acquisitions.

is high.[200] In such cases, the flexibility value remains sufficient to render immediate exercise suboptimal.

Second, options that may be deemed secure from expiry are less likely to be immediately exercised.[201] Along those lines, (Vassolo et al. 2004) observe that firms choose to maintain their flexibility, i.e., to neither divest nor acquire, given the existence of an explicit buyout options (compared to plain minority equity stakes). Conversely, (Folta and Miller 2002) find that firms more likely increase equity stakes if other firms also hold equity in the target firm. In this case, the danger of competition for internalization reduces the value of waiting for further uncertainty resolution.

The above evidence supports the view that firms internalize collaborative ventures, when their flexibility value decreases relative to their present value. In particular, reduced environmental uncertainty and higher risks of option expiry promote internalization.

Proposition 5.5c:	Alliance internalization creates firm value by monopolizing collaborative benefits in reaction to the successful progression of activities.

2.5 Summary and Discussion of Propositions

This chapter has extensively reviewed the theoretical and empirical literature relating to the formation and performance of collaborative ventures. Figure 13 presents an overview of the different influences on collaborative value identified in this chapter.[202]

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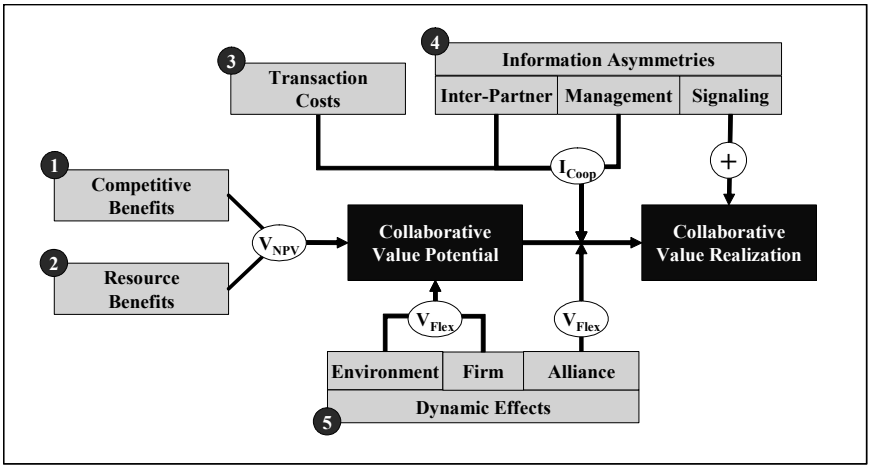
[200] Contrarily, (Vassolo et al. 2004) do not observe a significant effect of industry uncertainty on the likelihood of partner acquisitions. However, they find industry uncertainty reducing the likelihood of divestiture (i.e., termination). Consequently, the exercise of (call) options to acquire partners may be primarily driven by the underlying value (e.g., of technologies), but such options are at least maintained (i.e., put options not exercised) if uncertainty remains high.

[201] Similarly, (Doz et al. 2000) suggest that evolving networks are viewed primarily as options by their sponsoring firms. Specifically, they find expected continuity (i.e., length of network membership) not leading to stronger involvement in R&D consortia. Note, however, that (Doz et al. 2000) regard this evidence as more specific evidence for emergent formation processes leading to consortia being regarded as options by their members.

[202] Table 51 of the appendix provides a more detailed overview of the propositions derived in the present chapter.

Figure 13: Integrative Model of Collaborative Value Creation



Source: Own Illustration

Overall, five perspectives (❶ to ❺ in Figure 13) have been contrasted to provide an integrative picture of the sources and limitations of collaborative benefits. These influences differ in their mechanism of action, either by providing the basis for collaborative value creation or by affecting the realization of this potential:

- Industrial economics and strategic management (❶) approaches refer to the ability of strategic alliances to improve performance in competitive market environments. These effects include increased efficiency (e.g., through spillover internalization or economies of scale) as well as monopolistic benefits (e.g., through collusive strategies or differentiated product offerings).
- Resource-based and learning theories (❷) of strategic alliances highlight the actual objects of collaboration, i.e., the combination of firm resources. The relevant types of capital range from technological and commercial resources to social embeddedness. Additionally, collaborative competence and absorptive capacity affect the success of alliance learning.

Both competitive and resource-related effects generate the basic foundation of collaborative value. The other identified influences either moderate this potential or affect its translation into actual value creation:

- TCE (❸) explains the existence of hybrid organization as well as distinct collaborative governance structures (e.g., strategic alliances versus JVs) based on transaction and environmental characteristics. While collaborative ventures may be efficient under conditions of moderate asset

specificity, environmental uncertainty, and transaction scope, transaction costs generally reduce the net benefits of collaboration vis-à-vis the unrestricted potential for collaborative value creation.

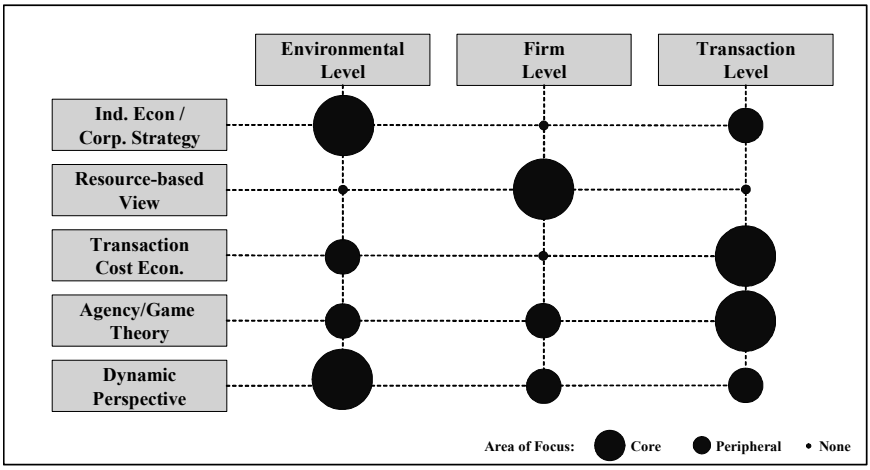
- Arguments based on agency and game theories (❹) extend the organizational design perspective to include specific information asymmetries, contractual provisions, and different sources of inter-partner trust. More specifically, information asymmetries between transaction partners as well as between managers and shareholders of collaborating firms reduce the net benefits of collaborative activity (similar to transaction costs). Conversely, alliances may also serve as signals of unobservable firm quality, which represents an additional source of collaborative value.
- The dynamic perspective (❺) explicitly considers evolutionary aspects, which moderate the value created by alliance activities. On the one hand, this relates to developments in the firm's environment and strategic needs, which may alter fundamental collaborative benefits. On the other hand, changing environments may also require the adaptation of alliances and networks. In this context, the flexibility associated with alliances may allow firms to reap greater value collaboratively (relative to other types of corporate combinations).

As its main deliverables, this chapter has presented a variety of theoretically founded and empirically validated propositions regarding the sources and limitations of collaborative benefits. These may serve as the founding stones for an assessment of specifically value-related evidence in the following chapter.

In addition to their distinct mechanisms of action, the approaches presented in this section also differ with regard to their levels of analysis. As illustrated in Figure 14, the five schools of thought refer to the firm's institutional or industry environments, its specific characteristics, and transaction characteristics.[203]

[203] This threefold structure builds on the distinction of competitive, partner-related, task-related, and institutional contexts of collaborative ventures proposed by (Merchant and Schendel 2000). It is also similar to the competitive, collaborative, organizational, and operational challenges to firms raised by (Bartlett and Ghoshal 1989). In contrast to both, it synthesizes all factors external to the collaborating firms (i.e., institutional and competitive in the (Merchant and Schendel 2000) framework).

Figure 14: Matrix linking Theoretical Foundations and Levels of Measurement



Source: Own Illustration

The differing focusses of the varied theoretical frameworks suggest that they complement each other in empirical research. At the same time, some drivers of collaborative value may not be free from overlap:

Strategic mechanisms focus on industry and firm-level sources of collaborative value.

- IO and market-based corporate strategy are founded on industry characteristics (such as concentration and competition), but also distinguish alliance functions, e.g., joint R&D activities.
- Resource-based considerations most closely focus on the individual firm. And while organizational learning essentially argues that firms may differently profit from individual transactions, indicators are generally measured on the firm level (e.g., alliance experience, absorptive capacity).

Organizational economics zoom in on transaction-level considerations:

- TCE primarily addresses the efficient choice of transaction governance. Yet, it also refers to environmental uncertainty as an institutional influence on governance choice, as well as to mimetic behavior at the industry level.
- Agency theories highlight the role of transaction-specific control structures. However, the information asymmetries underlying potential agency conflicts may be firm-specific or influenced institutional determinants (such as patent protection).

Finally, the dynamic perspective extends to all three levels of analysis, since dynamic influences may originate from environmental, firm, or

transaction-inherent sources. While industry and firm-level dynamics primarily represent modifications to strategic alliance benefits (e.g., changing relevance of partner resources across firm-lifecycle stages), transaction-level dynamics present distinct sources of collaborative value (e.g., the creation and exercise of flexibilities in reaction to environmental uncertainty).