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Alliance portfolios and shareholder value in post-IPO firms: The moderating roles of portfolio structure and firm-level uncertainty

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ABSTRACT

Using longitudinal data for initial public offering (IPO) firms, we examine the role played by structural differences between different types of alliance portfolios in the relationship between IPO firm alliance portfolios and shareholder returns. We show that because of the different signals they send to the capital market, different types of alliance portfolios affect IPO firm performance differently. Namely, financial markets seem to reward firms whose alliance portfolio is diversified across different types of alliances (a portfolio high in functional diversity), but not those who align their alliance partners into multiple functional points in the value chain (a portfolio high in vertical scope). We also examine the signaling role of alliance portfolios under different IPO firm uncertainty conditions. We note that uncertainty about the IPO firm is not limited to pre-IPO quality uncertainty. Investors also face transition uncertainty, post-IPO uncertainty about the ability of the firm to adapt to the new managerial challenges it faces and succeed post-IPO. We find that these two types of uncertainties moderate alliance portfolio effects in different ways. The beneficial effects of alliance portfolios in mitigating liabilities of newness is of greater importance for firms associated with higher quality uncertainty and for those associated with lower transition uncertainty.

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1. Executive summary

The relationship between strategic alliances and new venture performance has long been of interest to entrepreneurship researchers. Extant research shows that strategic alliances are especially important to firms that have recently undergone their IPO because they offer access to valuable resources and capabilities that help mitigate newness related vulnerabilities, thus enabling the firm to rapidly adapt to the potential changes in the firm's environment. Accordingly, several studies have shown a positive association between an IPO firm's interorganizational relationships and some measure of the IPO performance. In this study, we answer calls by scholars to move towards a portfolio view of alliances and examine how structural differences between portfolios and perceptions of firm capabilities affect the relationship between alliances and firm performance through the signaling mechanism.

Regarding the first objective, we find that financial markets reward firms whose alliance portfolios are diversified across substantive domains (a portfolio high in functional diversity), but not those who tend to have multiple touch points along the value chain with the same partner (a portfolio high in vertical scope). These findings regarding portfolio scope support the argument that for transition firms, efficiency in portfolio governance is less of a concern than knowledge appropriation by

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partners, a threat that increases in probability as scope increases, which requires proprietary knowledge to be shared across the value chain. Given that proprietary information is often the core rent yielding resource for such firms, capital markets associate increase in a portfolio's vertical scope with increased exposure and vulnerability to knowledge loss, which in turn, translates into lower shareholder value. On the other hand, the investor community values an alliance portfolio high in functional diversity, equating it with an ambidextrous strategy by the firm which balances both value creation and appropriation while providing a richer knowledge and capability base to the firm.

The second objective of this study is to examine how perceptions of firm capabilities affect the value of alliance portfolios. Extant research has mostly focused on ex-ante uncertainty (the lemons problem) relating to the intrinsic 'quality' of the firm's capabilities prior to it going public. Such quality related uncertainty arises prior to the IPO due to information asymmetry between the issuer firm and the investor community, and reflects the latter's doubts about the overall survivability of the venture and/or its readiness to go public. In addition, these firms also face transition uncertainty about their ability to adapt to new managerial and growth challenges post-IPO. We find that these two types of uncertainties focus investor attention on different sets of factors and therefore moderate alliance portfolio effects in different ways. Given the benefits that portfolio alliances confer on firms in general and new ones in particular, the investor community is likely to be particularly receptive to the firm's inter-organizational relationships when there is greater uncertainty associated with the firm. On the other hand, the value of alliance portfolios are likely to be compromised when the capital markets perceive that the firm lacks governance capabilities that will enable it to weather through the dramatic changes brought about by its transition to a publicly listed company. In such situations, alliances are likely to be perceived as an additional managerial challenge that management may not be able to fully exploit.

2. Introduction

In place of the prevalent dyadic and industry network approach, researchers have recently proposed a portfolio view to studying strategic alliances (Hoffmann, 2007; Vassolo et al., 2004). Instead of atomistic studies of individual alliances, or of holistic studies of industry players' relative structural positions within networks, the study of alliance portfolios shifts the analysis to an intermediate level by focusing on an individual firm's collection of immediate alliance relationships (Lavie and Miller, 2008). Considering the portfolio as a unit of analysis "eschews the reductionism that occurs when an analyzed pair of firms is abstracted out of their embedded context" (Sarkar et al., 2009), while enabling the study of issues that emerge from the management of multiple simultaneous alliances with different partners (Wassmer, 2010). However, "accumulated alliance research offers only limited insights into the phenomenon" (Lavie, 2007). Moving this body of work forward, we investigate the following research questions: How is the value of a firm's alliance portfolio, as perceived by the capital market, influenced by portfolio structure and uncertainty concerning firm capabilities?

We examine our research questions in the context of firms that have recently undergone their initial public offerings. Considered to be threshold companies (Zahra et al., 2009), such firms go through a major transition in their organizational lifecycle during the IPO process. While this transition phase confirms that these firms have successfully overcome the early challenges of their existence, moving to the next stage of the organizational lifecycle also raises new challenges in governance capabilities as these firms learn to operate in the spotlight of analysts and public investors (Zahra and Filatotchev, 2004). While a lot more information is publicly available post IPO, research indicates that residual uncertainty due to information asymmetry continues to exist between the firm and the investor community (Certo, 2003; Ibbotson et al., 1988; Rock, 1986). In this context, signaling theory suggests that certain visible manifestations of strategic behavior such as alliances would provide clues to the investor community about the capabilities of the firm (Deeds et al., 1997), thus impacting performance (Sanders and Boivie, 2004). In investigating alliance portfolios through the lens of signaling theory, we depart from previous research in one important way: while literature shows that alliances can serve as signals that can mitigate newness related liabilities (Stuart et al., 1999), our main premise is that the structure of the alliance portfolio and threshold firm characteristics also serve as signals communicating strengths and vulnerabilities to the capital market, thereby affecting valuation.

In anticipation, we begin by investigating how certain structural characteristics of a firm's alliance portfolio serve as signaling mechanisms to influence the relationship between alliances and shareholder returns. We find that shareholder returns are lower for firms whose alliance portfolios are characterized by higher levels of vertical scope, thus supporting our logic that capital markets are particularly concerned about the appropriation risks that are inevitably associated with increased portfolio vertical scope (Gulati and Singh, 1998) over and above the efficiency rewards that such structures may bring. Conversely, we find that shareholder returns are higher for firms with alliance portfolios characterized by higher levels of functional diversity — which serves as an indication that capital markets are particularly receptive to signals indicative of alliance portfolios spanning the exploration–exploitation continuum. We then investigate how the context of the firm itself influences the value perception of its alliance portfolios. In line with the view that uncertainty is multidimensional (Milliken, 1987) and that "different types of market uncertainty focus investor attention on different sets of factors" (Gulati and Higgins, 2003), we examine the role of alliance portfolios under different uncertainty conditions facing the IPO firm. We suggest that in addition to quality uncertainty, that is, pre-IPO uncertainty related to the intrinsic 'quality' of the firm and its readiness to go public, IPO firms also face transition uncertainty, or post-IPO uncertainty about the ability of the firm to adapt and succeed in the face of new managerial and governance challenges that arise after a firm goes public. Our findings indicate that the value of alliance portfolios vary across different types of uncertainty relating to firm capabilities. Since alliances serve as endorsements which legitimize and ratify the firm's value, they are perceived to be even more valuable to firms which suffer from greater quality uncertainty. On the other hand, alliances are perceived to be of greater value to firms associated with lower transition uncertainty since these firms are perceived

by the capital market as possessing the requisite corporate governance capabilities required to manage their transformation into public firms and thereby capitalize on the resources that their alliance portfolios bring with them. Overall, our results indicate that the perceived value of an alliance portfolio is contingent on its structure, as well as on the perceived capabilities of the firm.

3. Theory and hypothesis development

An IPO is a major event in a firm's life cycle. Recruiting the investment banker, preparing the prospectus, and pre-selling to institutional investors during the road show all consume exorbitant amounts of management time. Subsequent to the IPO, complications do not go away, but in fact compound. With the transformation from private to public ownership, the firm comes under scrutiny of shareholders, the Securities and Exchange Commission, financial analysts, and innumerable investors (Reuer and Ragozzino, 2008). Changes in governance structures, reporting requirements, and executive profiles create new roles for the top management team, and lead to economic inefficiencies (Stinchcombe, 1965). The significant amount of funds that is raised during the IPO needs to be deployed, and the competitive landscape of the firm changes as it assumes a more public profile. These changes, both pre and post-IPO, lead to renewed liability of newness (Hannan and Freeman, 1984) as these firms are required to prove not only their legitimacy as a reliable agent of investor confidence, but also internalize and learn new roles as social actors (Freeman and Hannan, 1989). Embryonic organizational routines (Eisenhardt and Schoonhoven, 1990), uncertainty about the quality of the organization's products and services (Hannan and Freeman, 1984), and a lack of social approval and stability (Boeker, 1989) raise failure risks. Facing problems comparable to those involved by new firms (Wischnevsky, 2004), firms in transition tend to "naturally suffer from a liability of newness" (Arthurs and Busenitz, 2006).

Although some research shows that there might be declining and even negative returns to increasing the number of alliances (Deeds and Hill, 1996), there is substantial literature documenting the beneficial effects of strategic alliances (see Gulati and Singh, 1998). The central argument of such research is that inter-organizational relationships benefit firms by helping them share knowledge, gain access to markets, increase speed to markets, combine resources, and reduce costs (Doz and Hamel, 1998). Alliances are especially important for firms facing survival pressures, since they offer access to valuable, complementary capabilities and resources that enable creation of value (Hite and Hesterly, 2001; Nicholson et al., 2005). For firms in transition, interorganizational relationships confer advantages that are associated with older, more stable organizations, including access to learning and knowledge (Mowery et al., 1996), innovative capabilities (Powell et al., 1996; Shan et al., 1994), external operational endorsement (Baum and Oliver, 1991), enhanced perceptions about the quality of the firm's products through status transfer (Stuart et al., 1999), and access to new geographic and customer markets (Srivastava et al., 1998). Alliances allow for rapid adaptation to the changes in the new IPO firm environment and provide a compensatory effect to newness related shortcomings. In summary, research shows that by engaging in strategic alliances, new public firms can potentially access social, technical, and marketing resources that normally require years of operating experience to acquire. Therefore,

H1. Firm performance will be positively associated with size of the alliance portfolio.

3.1. Contingent roles of alliance portfolio structure

3.1.1. Vertical scope

Typically, a direct tie to a partner has been considered a single alliance, and the cumulative number of such ties considered as the size of a firm's network (Ahuja, 2000; Baum et al., 2000; Rothaermel, 2001; Shan et al., 1994; Stuart, 2000; Stuart et al., 1999). This approach ignores the extent to which a single partnership is leveraged into multiple ties that span distinct activities along the value chain. Oxley and Sampson (2004) refer to this dimension as the vertical scope of the alliance, i.e., "to what extent the partners combine multiple and sequential functions or value chain activities within the alliance, such as R&D, manufacturing and/or marketing." Consider a firm A that collaborates with a partner X on multiple upstream and downstream activities such as R&D, product development, distribution, marketing, and after sales customer service, versus firm B that only has a distribution arrangement with partner Y. Because both A and B have one direct tie (A with partner X, and B with partner Y), they would each be considered to have a portfolio size of one. But if one considers ties at the value-chain level, A has four more than B. It may also occur that a third firm C forms single alliances with five different partners. While A and C's portfolio size would be similar, their portfolios would vary in terms of the scope of each firm's relationship with its partners. A has leveraged a single partner into a larger number of links across the value chain compared to B or C, and therefore has increased the vertical scope of its alliance portfolio. In other words, vertical scope of the portfolio refers to the extent to which a firm's engagements with its partners span different functional activities along the value chain.

Increased vertical scope of alliances within the portfolio is likely to have an effect on the costs associated with the alliances in the portfolio. Gulati and Singh (1998) differentiate between two types of costs associated with alliances, namely coordination and appropriation costs. They describe coordination costs as "the anticipated organizational complexity of decomposing tasks among partners along with ongoing coordination of activities to be completed jointly or individually across organizational boundaries and the related extent of communication and decisions that would be necessary." Coordination costs increase with the number of alliance partners since interacting with each partner involves "costs of setting up the relationship, search costs, and transaction costs" (Bakos and Brynjolfsson, 1999). As increased vertical scope of an alliance portfolio relies on leveraging discrete alliance partners into multiple value chain links, it is likely to bring in efficiencies in coordination costs.

On the other hand, appropriation costs, based on transaction costs theory, stem from the fact that firms have incentives to misappropriate the assets of alliance partners. Gulati and Singh (1998) observe that these costs "originate from the pervasive presence of behavioral uncertainty, combined with the difficulties of specifying intellectual property rights, and by the challenges of contractual monitoring and enforcement" (Gulati and Singh, 1998; Oxley, 1997). Given the large amount of knowledge sharing that is required with alliance partners when portfolio vertical scope increases, appropriation costs are likely to increase as well (Oxley and Sampson, 2004; Reuer et al., 2002). Firms that have just undergone their public issue are typically those with a particularly compelling business model, or intellectual property that has considerable rent creating potential in the market. For such firms, being able to protect their valuable knowledge from leakage and appropriate the value of their knowledge assets from the market, is likely to be more critical than squeezing out efficiency in input–output ratios. In other words, appropriation concerns are likely to be more dominant than efficiency ones. Newly public firms are especially vulnerable to appropriation concerns through leakage of proprietary information. Although firms can mitigate this vulnerability through the implementation of firewalls, trade secrets shields, and similar knowledge protection strategies, it is unlikely that such information is easily accessible by the public. In the context of this information asymmetry, increased vertical scope is likely to be viewed as increased vulnerability to appropriation risks. Therefore, even though alliance portfolio vertical scope may generate some efficiencies in the coordination aspects of the alliance management process (partner search costs, contracting costs, etc.), the overall effect is one where the value of the portfolio will be compromised. Therefore,

H2. The relationship between an IPO firm's alliance portfolio and firm performance will be negatively moderated by the portfolio's vertical scope, such that the strength of the relationship between portfolio size and firm performance will weaken as vertical scope increases.

3.1.2. Functional diversity

The compositional character of a firm's alliance portfolio is argued to impact the value of a network (Powell et al., 1996). Varadarajan and Cunningham (1995) suggest the need to adopt a "holistic view of the network … (and) see the collective as a unit that can achieve competitive advantage … (where) the whole network acts like a complex integrated firm spanning many markets" (1995, p. 152). Alliances involve different functional areas within an organization and run the gamut from upstream R&D collaborations to downstream marketing and cross-selling arrangements (Parise and Casher, 2003; Santoro and McGill, 2005). Three factors seem to suggest the importance of alliance configuration to capital markets.

Koza and Lewin (1998) view exploration alliances as involving innovation, building new capabilities, and entering new lines of business while exploitation alliances are formed to capitalize on known opportunities. They argue that a firm's decision to engage in an alliance "can be distinguished in terms of its motivation to exploit an existing capability or to explore for new opportunities" (p. 256). At a basic level, therefore, alliances can be described as either exploratory or exploitative with marketing and distribution collaborations tending to be of an exploitative nature (used to generate greater levels of returns from existing resources), whereas R&D alliances (that broaden the technological and development capabilities of the firm) are more exploratory (March, 1991; Santoro and McGill, 2005). Compared to returns from exploitation, those from exploration are systematically less certain and more remote in time (March, 1991). Although exploitation is a source of immediate revenues and profitability, "tendencies to increase exploitation and reduce exploration make adaptive processes potentially self-destructive" (March, 1991) by preventing firms from learning new skills and rendering it captive to outdated practices, knowledge and resources. Similarly, firms that overemphasize exploration risk spending scarce resources with little payback (Uotila et al., 2009). Thus "both exploration and exploitation are essential for organizations" (March, 1991).

The functional diversity of an alliance portfolio reflects the extent to which the firm's portfolio of collaborative activities is diversified across alliances which span the exploration–exploitation continuum, and thus are designed to capitalize on existing capabilities and thereby enhance short-term viability by generating predictable returns, while leading to discovery of new opportunities and longer term viability (Rothaermel and Deeds, 2004). A portfolio that is high in functional diversity signals broader search strategies which balance between exploitation (or downstream alliances) and exploration (or upstream alliances), and thus focus on both knowledge creation and appropriation (Stuart and Podolny, 1996). Such ambidexterity in search strategies as reflected through a diversified portfolio is likely to be perceived positively.

Second, an increase in the number of alliances at the same stage of the value-chain may lead to duplication, and therefore redundancy in information and capabilities (Burt, 1992; Powell et al., 1996) as well as conflicts. Therefore, an increase in the number of alliances without concomitant increase in portfolio diversity might signal inefficient arrangements where the cost of managing the alliances increase significantly in proportion to their informational benefits (Uzzi, 1996). Such duplication may also generate rivalry and conflict among partners and can undermine alliance value (Gomes-Casseres, 1994) since firms that engage in extensive alliances with numerous duplicate partners run the risk of disapproval and censure from analysts, investors and capital markets (Baum et al., 2000).

Thirdly, concerns for corporate flexibility may influence how portfolio diversity is viewed by capital markets. Research proponents of real options theory submit that firms can proactively and flexibly manage uncertainties to their advantage (Bowman and Hurry, 1993; McGrath, 2001; Sanchez, 1995). By diversifying its alliance portfolio along the value chain, the firm signals that it has the flexibility to exercise various options when necessary (Reuer and Tong, 2010). Consequently, the relationship between the IPO firm's alliance portfolio and firm performance will be stronger when the portfolio is high in functional diversity.

H3. The relationship between an IPO firm's alliance portfolio and firm performance will be positively moderated by the portfolio's functional diversity, such that the strength of the relationship between portfolio size and firm performance will strengthen as functional diversity increases.

3.2. The contingent roles of quality and transition uncertainty

Research shows that the value of alliances depends on associated uncertainties, both exogenous and endogenous to a firm. For example, the effect of networks on the outcome of the public offering depends on the receptivity of the equity market (Gulati and Higgins, 2003) and the uncertainties associated with a firm's demographics (Stuart et al., 1999). The theoretical premise for the uncertainty contingency is the proposition that "different types of market uncertainty focus investor attention on different sets of factors" (Gulati and Higgins, 2003). We extend this theme and examine the effect of two types of endogenous capability-based uncertainties that have distinct and potentially offsetting effects on the relationship between an IPO firm's alliance portfolio and performance. Quality uncertainty arise pre-IPO due to information asymmetry between the issuer firm and the investor community, and thus relates to investors' doubts about the intrinsic quality and readiness of the venture to go public. Transition uncertainty relates to concerns about the ability of the firm to adapt to the new managerial challenges it faces and succeed in the post-IPO era. Our basic premise is that these two types of uncertainty will moderate alliance portfolio effects in different ways. On one hand, the beneficial effect of portfolios in mitigating the liability of newness is likely to be of greater import for firms that are associated with greater quality uncertainty. On the other hand, alliance portfolios are likely to be of greater benefit for firms associated with lower transition uncertainty since these firms are perceived to have the requisite corporate governance capabilities to effectively transition into complex, public organizations that can create and appropriate value from alliances.

3.2.1. Quality uncertainty

Because IPOs involve the sale of securities of closely held firms, issuers are likely to possess private information, and therefore better insight into the future performance of the firm than general investors. The resulting information asymmetry creates apprehension surrounding the firm's intrinsic merits and venture quality, and the perceived risk associated with the new public firm (Welch, 1989). Quality uncertainty arises due to the information asymmetry or knowledge gaps between the issuer firm and the investor community (Certo et al., 2001; Daily et al., 2003). Investors may be wary of the venture's true motives in seeking external financing, the timing of the IPO, whether the firm is sufficiently ready to go public, and the quality of the firm's intangible resources and capabilities that will determine its success in the long run. These questions arise for a multitude of reasons. First, there are concerns that some entrepreneurs with superior information actually divest their ownerships through an IPO in anticipation of subsequent failure (Jain and Kini, 1999). Second, due to venture capitalist 'grandstanding', some portfolio companies may be brought to market "too early" before they have a sustainable business model and capabilities to weather the stringent requirements for a public firm to succeed (Gompers, 1996). Third, intangible, knowledge-based resources, which are key to competitive advantage (Itami, 1987), are typically not recognized as assets under financial accounting rules (Barth et al., 2001). As a result, such private, difficult to measure information is only partially priced in (Morck et al., 1988). The resulting information asymmetry creates a classic 'lemon' problem of adverse selection (Akerlof, 1970) and causes the investor community to be uncertain of the fundamental value of the issuing firm (Christensen, 2002).

When unequivocal indicators of quality are lacking or are unobservable, signaling theory posits that firm activities qualify as credible indicators of potential quality to other individuals in the market (Sanders and Boivie, 2004) and that firms benefit from signaling that quality to their stakeholders (Lee, 2001). Concurrently, screening theory suggests that markets use surrogate indicators of quality as effective sources of information cues that help filter and screen issuing firms (Sanders and Boivie, 2004). In this vein, extant research shows that the networks the IPO firm associates with play a legitimacy granting role. The positive attention that the IPO firm receives from potential partners enhances its legitimacy. Network endorsements serve to ratify the firm's intrinsic value and increase its perceived quality, thus alleviating misgivings that the investor community may have (Baum and Oliver, 1991; Podolny, 1994a; Pollock and Gulati, 2007; Stuart et al., 1999). Stuart et al. (1999) show that there is an "implicit transfer of status across interorganizational exchange relations (such as inter-corporate equity and alliance ties), which builds confidence about the quality of a new venture." Therefore, firms that suffer from greater degrees of uncertainty about their intrinsic quality are likely to benefit more from their alliance portfolios. Thus,

H4. The greater the quality uncertainty about an IPO firm, the greater the impact of the size of its alliance portfolio on performance.

3.2.2. Transition uncertainty

Theoretically, it has been shown that uncertainty associated with IPO firms has both ex-ante and ex-post components relative to the time of the IPO (Chen and Wilhelm, 2008). Recent research has determined that the degree of uncertainty and informational asymmetry among investors is not completely resolved post-IPO, and "remain significant during the transition to normal secondary market trading conditions" (Chen and Wilhelm, 2008; Falconieri et al., 2009). A parallel stream of literature highlights the challenges that IPO firms face in the process of transitioning from a start-up culture to that of a public one. This transition is seldom easy because "technological, administrative and organizational skills that have enabled start-ups to survive become increasingly inadequate to meet the challenges of the next phase" of their organizational life cycle (Zahra and Filatotchev, 2004). Start-ups are typified by 'empire building' entrepreneurs who would sometimes rather retain corporate control over the commercialization process of their technology even if it means less profit. This change in identity requires a transformation in

mindsets and the integration of modern management practices that may be anathema to an entrepreneur-run startup culture. This is sometimes coupled with "founder's disease" or the inability of founding CEOs to grow in a managerial and leadership capacity as rapidly as the firm's size (Roberts, 1991). Therefore, there is uncertainty surrounding whether these 'firms in transition' can successfully develop requisite degrees of corporate governance skills (Zahra and Filatotchev, 2004). Consequently, the market is likely to scrutinize for signals and clues that provide evidence of professionalization capabilities and governance skills that will enable the firm to successfully weather the inevitable challenges associated with the transition. The perception of whether a firm possesses this requisite bandwidth of managerial capabilities to successfully manage the transition will be an important factor influencing the value of the firm's strategic initiatives.

Given the uncertainty over the IPO firm's transition capabilities and the associated information asymmetry, the value of an IPO firm portfolio of alliances will be contingent upon the level of corporate governance skills of the firm. Firm managerial capabilities have been especially highlighted as playing an important role in mitigating transition uncertainty (Cohen and Dean, 2005). Prior research notes that "alliances are complex organizational arrangements that can require multiple levels of internal approval, significant search in identifying partners, detailed assessments for ratifying contracts, and considerable management attention to sustain the partnership" (Doz, 1996; Gulati, 1999). Managing a portfolio of alliances is a distinctive and complex firm level capability, one that involves a constellation of practices related to partner search, governance structuring, relationship maintenance, and knowledge coordination across the constituent nodes (Sarkar et al., 2009). Firms that are internally stable and are able to scale their capabilities through transition and growth challenges into different domains are more likely to successfully leverage alliance resources into creating and capturing value (Gulati, 1999). Institutional theory of capability development suggests that the leader's abilities to establish and maintain a network of supportive relationships determine the success of a new venture (Steier and Greenwood, 1995). Conversely, alliances have a 'dark side' (Gargiulo and Benassi, 2000), and if not managed properly, can actually constitute a liability that detracts from performance. If the market judges that the firm lacks the governance capabilities to successfully make the transition (high transition uncertainty), it will view alliances as a costly burden, a hindrance taking from management time and from the firm's resources. Alliance portfolios are therefore likely to be of greater benefit to firms associated with lower transition uncertainty.

H5. The lower the transition uncertainty about an IPO firm, the greater the impact of the size of its alliance portfolio on performance.

4. Methodology

4.1. Data collection

To test our hypotheses, we selected a cohort of companies that went public in 1996 and tracked their alliance behavior for four years. We constructed a dataset comprising the alliance activities of manufacturing firms with SIC codes 2 and 3. Focusing on manufacturing firms allowed us to study firms facing similar risks, while being able to control for industry heterogeneity and extraneous variation (Dyer, 1996). The manufacturing industry consists of a heterogeneous population of firms, from small and local manufacturers to large global corporations, which provides ample variation to test our hypotheses. We excluded from our dataset bio-technology firms due to the well documented idiosyncratic nature of the industry (DeCarolis and Deeds, 1999). We also followed prior research and excluded foreign companies from our sample since international IPO performance differs by country (Loughran et al., 1995). Although the companies in our sample are all US companies, our dataset includes these firms' alliances worldwide. We used several sources to develop the list of IPO companies including IPOResources.org, the Securities Data Corporation database on Global New Issues (SDC), the Center for Research in Security Prices (CRSP),[3] Lexis-Nexis, Edgar-Online, Yahoo Financials, and company websites. We also traced each company's history to account for any name change that might have occurred during the study period. For each firm in our sample, we generated a separate observation for each year. To illustrate, a firm that went public in 1996 and survived until 1999 would be represented by four separate observations. A firm that was acquired in 1998 would be represented by two observations. Out of our 212 firms, 40 did not survive until 1999. Thirteen firms were acquired and 27 were delisted for various other reasons, including insufficient float, insufficient assets, too low of a stock price, bankruptcy, and other failures to meet exchange requirements.

It is important for public companies to report their strategic initiatives to keep their external investors informed and keep trading interest in their stock alive (Mensah et al., 1996). We therefore collected information on alliances for the four years following the firm's IPO from Lexis-Nexis Academic Universe database, which provides news releases from all the major business news wires and newspapers. We used various keywords typically associated with such announcements such as 'alliance', 'collaboration', 'partnership', and 'joint venture'. We read all identified articles to verify that they indeed contained an announcement about an alliance. More than 6000 electronic news articles were analyzed, coded, and cross-checked before being electronically encoded. Every attempt was made to ensure that the data collection was comprehensive in its coverage of the firms' alliance activities. Inter-rater reliability was 0.87 based on the measure developed by Shrout and Fleiss (1979), which assesses reliability with values from 0 (complete lack of agreement) to 1 (complete agreement). Glick (1985) showed that ratings can be combined if inter-rater reliability is over 0.65. Accordingly, the combined codings were used to develop the final dataset, containing a total of 212 US firms involving 1035 dyadic alliances.

[3] Located at the University of Chicago's Graduate School of Business, CRSP maintains a comprehensive database of historical stock price and return data for securities trading in different markets.

4.2. Dependent measure

The strategy and finance literatures have criticized the use of accounting measures to assess the true economic rate of return (Amit and Livnat, 1989; Montgomery and Wernerfelt, 1988). Accounting measures reflect only past information, are not forward looking, not risk-adjusted and can be greatly distorted by accounting conventions, tax laws, and disequilibrium effects (Bharadwaj et al., 1999). We therefore measure firm performance using shareholder returns. Stock market valuation measures are forward-looking, risk-adjusted, and less susceptible to changes in accounting practices. According to the efficient markets hypothesis in finance (Fama, 1976), stock prices reflect the present value of all future cash flows, discounted at the firm's overall required rate of return. In addition, accounting measures are insensitive to time lags required for realizing the benefits of capital investments (Bharadwaj et al., 1999) and do not incorporate the market's perceptions about the value of the firm's intangible assets. Using a forward-looking measure that captures intangible assets is particularly appropriate when assessing the effect of a firm's alliance portfolios on performance. To measure shareholder returns, we follow Carter et al. (1998) and use monthly returns in excess of the CRSP equally weighted index, compounded annually.[4]

$$R_{i,A} = \left[\left(\prod_{t=1}^{12}(1 + r_{it})\right) - \left(\prod_{t=1}^{12}(1 + r_{mt})\right)\right]$$

where r_{it} is the return on stock i on month t, and r_{mt} is the return on the CRSP equally weighted index on month *t*.

4.3. Independent measures

4.3.1. Portfolio size

Wassmer (2010) notes in his review piece that the most popular definition of an alliance portfolio is an aggregate of all strategic alliances of a focal firm (Hoffmann, 2005, 2007; Lavie, 2007; Lavie and Miller, 2008). This egocentric view of alliance portfolio, which measures all direct ties with partner firms, has precedents in the network literature too (Baum et al., 2000). We adopt this approach with one important modification. Given the important role of portfolio structure in our study, namely scope and functional diversity, it was important for us to devise a measure which would not only be sensitive to the scope of individual alliances, but also the substantive domains they cover. Accordingly, we code each distinct area of collaboration between partners as a different alliance. For instance, if firm A announced an R&D alliance with B and one with C which involved both product development and marketing alliances, firm A was considered to have three alliances. Our alliance related independent variables are also time-varying cumulative counts of the number of alliances formed by each of the firms in the sample. In other words, the alliance matrix for year *t* for firm *i* includes all alliances that had occurred during the previous years.[5]

4.3.2. Alliance portfolio vertical scope

Portfolio vertical scope considers the extent to which a firm leverages its partners into multiple links along the value chain. When the scope of an announced alliance clearly spanned more than one activity in the value chain, we noted the number of distinct functions it covered and coded it as such in our count of alliances. We then measured vertical scope using the ratio of the number of alliances to the number of alliance partners[6]:

$$VS_{it} = \ln\left(\frac{A_{it}}{P_{it}}\right)$$

where A_i is the total number of alliances for firm i, and P_i is the total number of alliance partners for firm i (on month t).

4.3.3. Alliance portfolio functional diversity

To measure an alliance portfolio's functional diversity, we first disaggregated them into eleven categories: Product Development (9.37%), Solution-Based Alliances (7.44%), Manufacturing (7.73%), Strategic Supplier Alliance (2.71%), Distribution (23.57%), Strategic Customer Alliance (10.43%), Marketing/Promotion/Sales (19.03%), Customer Service (1.84%), Research and Development (1.74%), Technology Transfer (7.15%), Licensing and Cross-Licensing (8.99%). The second stage consisted of aggregating the data into four categories: Product development management alliances, supply chain management alliances, customer relationship management alliances, and technology management alliances. Product development management's (PDM)

[4] Since newly public firms are likely to be somewhat smaller than older well-established firms, the equally weighted index is the more appropriate measure of market performance as compared to the value weighted index, which gives greater weight to larger companies.

[5] One question that we dealt with relates to the potential lag structure associated with alliances and firm performance. After deliberation, we decided to include contemporaneous year alliances into the count. Our rationale is that while there may be a delay in recognizing accounting returns from an alliance, shareholder returns reflect market expectations. Since alliances established during the current year represent publicly available information, their anticipated value should be incorporated into the stock market valuation without delay.

[6] We tried alternative definitions of portfolio vertical scope: the ratio of the number of alliances to the number of partners (without taking the natural log), the natural log ratio scaled by the number of partners, and the Herfindahl index measuring the concentration of alliances across partners. The results are qualitatively similar to those reported in the paper.

Table 1
Alliance summary statistics.

Total alliances	1035
Alliance type	
Product development management alliances (PDM)	174
Product development	97
Solution-based alliance	77
Supply chain management alliances (SCM)	108
Manufacturing	80
Strategic supplier alliance	28
Customer relationship management alliances (CRM)	568
Distribution	244
Strategic customer alliance	108
Marketing/promotion/sales	197
Customer service	19
Technology management alliances (TM)	185
R&D	18
Technology transfer	74
Licensing/cross-licensing	93

role is to develop new customer solutions and/or to reinvigorate existing solutions (Srivastava et al., 1999). Accordingly, we included alliances that were aimed at product development and solution-based marketing in this category. Through these types of alliances, firms can either create products or solutions that satisfy existing customers' needs and wants, or combine complementary products and services to differentiate their offerings and enhance customer value. Supply chain management (SCM) alliances refer to collaborations that relate to acquisition of all physical (and increasingly informational) inputs, as well as the efficiency and effectiveness with which they are transformed into customer solutions. These alliances guarantee a steady stream of supplies at an optimal cost, rendering the raw materials transformation process more efficient. Therefore, manufacturing alliances and strategic supplier alliances are coded as supply chain management alliances. Customer relationship management (CRM) addresses all aspects of identifying customers, creating customer knowledge, building customer relationships, and shaping their perceptions of the organization and its products. Distribution, strategic customer, marketing, and customer service alliances were combined to form CRM Alliances. Technology management (TM) alliances refer to collaborations that are aimed at alleviating the pressures that firms face to create and commercialize knowledge faster. In response to these competitive pressures, firms look for alternatives to in-house R&D. Inter-firm R&D, technology transfer, and licensing collaborations represent such alternatives. Consequently, R&D, technology transfer, and licensing alliances are all facets of the technology management process and were combined to create TM alliances. Table 1 illustrates the breakdown of the number of alliances by type for our dataset.

We then used the Hirschman–Herfindahl index (Acar and Sankaran, 1999) where diversification is one minus the sum of the squared proportions of a firm's alliance type divided by the company's total number of alliances:

$$FD_{it} = 1 - \sum_{j=1}^{4} \left(\frac{Y_{ijt}}{T_{it}}\right)^2$$

where Y_j is the number of alliances of type j and T is the total number of alliances (firm i, month t).

4.3.4. Quality uncertainty

A few measures have been suggested in the literature to proxy for quality uncertainty (Clarkson and Merkley, 1994). Underwriter reputation (Carter and Manaster, 1990), firm size (Barry and Brown, 1984), age (Barry et al., 1991; Ritter, 1984), and the size of intangible assets (Marsh, 1982) have all been used to measure quality uncertainty. We follow Ritter (1984) and use firm sales to proxy for quality uncertainty. Other studies using sales as a proxy for this type of uncertainty include Wasserfallen and Wittleder (1994), Habib and Ljungqvist (2001), and Loughran and Ritter (2004). For firms with low levels of sales, Ritter (1984) notes that there "would be a great deal of uncertainty regarding the appropriate price per share, subjecting an uninformed investor to the adverse selection problem."[7] We use the natural log of firm sales. Data on firm sales was collected from Compustat.

4.3.5. Transition uncertainty

Transition uncertainty reflects concerns over whether the firm has the ability to survive and thrive post-IPO. Since "investors who are unable to discern the venture's quality from economic disclosure turn to more social indicators of value" (Cohen and Dean, 2005; Podolny, 1994b), firm managerial capabilities have been especially highlighted as playing an important role in alleviating investors' transition uncertainty (Cohen and Dean, 2005). Research indicates that venture capitalists (VCs) play a key role in sensitizing the management of young firms to the requirements of professionalization in changing business environments, thus mitigating the transition uncertainty associated with the new IPO (Daily et al., 2003a). Venture capitalists bring in substantial

[7] We thank an anonymous reviewer for this suggestion.

Table 2
Definition of variables.

Dependent measure		
Shareholder returns	Compounded monthly returns in excess of the CRSP equally weighted index	$R_{i,A} = \left[\left(\prod_{t=1}^{12}(1+r_{it})\right) - \left(\prod_{t=1}^{12}(1+r_{mt})\right)\right]$
Independent measures		
Portfolio size	Cumulative number of alliances for each company from 1996 through 1999	
Portfolio vertical scope	Ratio of the number of alliances to the number of alliance partners	$VS_{it} = \ln\left(\frac{A_{it}}{P_{it}}\right)$
Portfolio functional diversity	Hirschman–Herfindahl index, where diversification is one minus the sum of the squared proportions of an IPO company's alliance type divided by the company's total number of alliances	$FD_{it} = 1 - \sum_{j=1}^{4}\left(\frac{Y_{ijt}}{T_{it}}\right)^2$
Sales	Log of sales	
VC-backed	Dummy variable = 1 if the company received funding from a venture capitalist	
Control variables		
Lagged shareholder returns	Prior year's market-adjusted shareholder return	
R&D intensity	Ratio of research and development expenditures to sales	
Assets in place	Ratio of inventory plus gross plant and equipment to total assets	
Debt ratio	Ratio of long-term debt to total assets	
Age	Age of the firm at the IPO	
Lagged Tobin's q	Measure of firm performance or firm valuation from Chung and Pruitt (1994)	
ROA	Return on assets to control for the firm's operating performance	
Industry dummy variables	Dummy variables based on two-digit SIC codes	

operational and strategic knowledge that help shape the decision-making processes of their portfolio companies. Hence, in addition to their "monitoring" role, venture capitalists also play a "mentoring" role, specifically in developing the managerial competencies of the new firm's entrepreneurial team. Venture capitalists play a broader role than traditional financial intermediaries by acting as 'coaches' that help professionalize a start-up (Gorman and Sahlman, 1989; Hellmann and Puri, 2002) and continue their involvement even after the IPO (Jain and Kini, 1995), thereby improving a young company's chances of survival in the post-IPO period (Gulati and Higgins, 2003; Khurshed, 2000). From the capital market perspective, VC-backed firms are associated with lower transition uncertainty than their non VC-backed counterparts (Chang and Garen, 2004; Daily et al., 2003; Hellmann and Puri, 2002). We therefore use firm VC backing as a proxy for (lower) transition uncertainty. Venture capital data were collected from SDC.

4.4. Control variables

We include lagged shareholder returns to prevent specification bias due to unobserved heterogeneity. If the alliances are a result of unobserved factors related to firm performance, controlling for lagged firm performance eliminates spurious effects that might result from this endogeneity (Jacobson, 1990). The inclusion of the lagged term allows for inference of causal relationships between alliances and firm performance with increased confidence (Baum et al., 2000).[8] Ryan and Wiggins (2002) contend that firms with higher growth opportunities derive substantial value from future investments. They highlight that such firms have larger market valuations relative to their existing assets and essentially obtain value from assets not yet in place. Thus, we include as controls R&D intensity, the ratio of research and development expenditures to sales (Mowery et al., 1996), and assets in place, the ratio of inventory plus gross plant and equipment to total assets (Decarolis and Deeds, 1999). We include the debt ratio (ratio of long-term debt to total assets) to control for the fact that firms with higher leverage carry higher systematic risk. Eckbo and Norli (2005) find a link between debt levels and IPO performance. We control for age because older firms have had more time to establish alliances (Powell et al., 1996). Performance differences may also arise for younger, riskier IPOs. We include a lagged measure of Tobin's q to capture past firm performance. Firms with better past performance may be more likely to have more alliances. Bharadwaj et al. (1999) note that the q ratio is a financial market-based measure of firm performance that is forward-looking, risk-adjusted, and less susceptible to changes in accounting practices. Including this control also helps with the endogeneity issue. We include current ROA to control for contemporaneous performance. Finally, we include two-digit SIC code dummy variables to control for differences across sub-industries. Information on the various financial control variables was collected from Compustat. Table 2 provides a synopsis of our measures.

[8] To further explore the issue of causality, we performed a Granger causality test. A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also known), that those X values provide statistically significant information about future values of Y. We could not reject the hypothesis that the number of alliances leads to better firm performance thus providing additional confidence for our thesis.

Table 3
Means, standard deviations and correlations of key variables.

	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1	Shareholder returns	−0.04	0.86	1.00										
2	Portfolio size	2.73	5.95	0.22***	1.00									
3	Portfolio vertical scope	0.14	0.28	−0.02	0.43***	1.00								
4	Portfolio functional diversity	0.12	0.22	0.10**	0.43***	0.52***	1.00							
5	Sales	3.22	2.41	0.11***	0.04	−0.04	0.06*	1.00						
6	VC-backed	0.34	0.48	0.03	0.07*	0.04	−0.02	−0.16***	1.00					
7	R&D intensity	4.97	49.30	0.01	−0.01	−0.01	−0.04	−0.24***	0.08**	1.00				
8	Assets in place	0.47	0.29	−0.01	−0.05	−0.01	0.04	0.31***	−0.23***	−0.11***	1.00			
9	Debt ratio	0.14	0.22	−0.10***	−0.12***	−0.09**	−0.02	−0.00	−0.08***	−0.02	0.10***	1.00		
10	Age	13.49	18.97	−0.01	−0.07*	−0.00	0.00	0.36***	−0.18***	−0.04	0.27***	0.02	1.00	
11	Lagged Tobin's q	2.72	2.62	−0.07*	0.15***	0.06	0.11**	−0.23***	0.02	0.05	−0.19***	−0.14***	−0.17***	1.00
12	ROA	−0.24	0.57	0.12***	−0.01	−0.05	−0.02	0.24***	0.01	−0.03	−0.03	−0.80***	0.07**	−0.14***

*** $p<0.01$
** $p<0.05$.
* $p<0.10$.

Table 4
Effects of alliances on shareholder returns.

Dependent variable: Shareholder returns	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	−0.288	−0.352	−0.242	−0.348	−0.327	0.256	−0.352
	(0.712)	(0.704)	(0.708)	(0.710)	(0.701)	(0.629)	(0.672)
Portfolio size	0.035***	0.063***	0.007	0.063***	0.008	0.018	0.018
	(0.008)	(0.012)	(0.015)	(0.016)	(0.011)	(0.014)	(0.019)
Portfolio vertical scope	−0.489**	−0.225	−0.417**	−0.504**	−0.429**	0.404*	0.251
	(0.213)	(0.228)	(0.214)	(0.213)	(0.211)	(0.244)	(0.251)
Portfolio functional diversity	0.236	0.056	−0.048	0.222	0.269	−1.130***	−1.032***
	(0.253)	(0.257)	(0.282)	(0.252)	(0.249)	(0.321)	(0.329)
Sales	0.028	0.031	0.026	0.049	0.039	0.032	0.061*
	(0.033)	(0.032)	(0.033)	(0.034)	(0.032)	(0.031)	(0.033)
VC-backed	0.002	−0.009	−0.011	0.000	−0.194	−0.065	−0.162
	(0.111)	(0.110)	(0.111)	(0.111)	(0.122)	(0.106)	(0.120)
Lagged shareholder returns	0.029	0.029	0.010	0.033	−0.028	−0.033	−0.059
	(0.103)	(0.102)	(0.102)	(0.102)	(0.102)	(0.098)	(0.099)
R&D intensity	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Assets in place	−0.069	−0.077	−0.062	−0.104	−0.066	−0.067	−0.102
	(0.193)	(0.191)	(0.192)	(0.193)	(0.190)	(0.183)	(0.183)
Debt ratio	−0.357	−0.319	−0.389	−0.358	−0.420*	−0.362	−0.427*
	(0.253)	(0.250)	(0.252)	(0.252)	(0.250)	(0.240)	(0.241)
Age	−0.004	−0.003	−0.004	−0.004	−0.004	−0.004	−0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Lagged Tobin's q	−0.040*	−0.041*	−0.040*	−0.048**	−0.027	−0.043*	−0.045*
	(0.024)	(0.023)	(0.024)	(0.024)	(0.024)	(0.022)	(0.023)
ROA	0.140	0.145	0.140	0.156	0.111	0.155	0.156
	(0.103)	(0.101)	(0.102)	(0.103)	(0.101)	(0.097)	(0.098)
Portfolio size × Portfolio vertical scope		−0.052***				−0.131***	−0.097***
		(0.017)				(0.021)	(0.025)
Portfolio size × Portfolio functional diversity			0.064**			0.207***	0.211***
			(0.029)			(0.036)	(0.037)
Portfolio size × Sales				−0.007**			−0.008**
				(0.003)			(0.004)
Portfolio size × VC-backed					0.048***		0.025*
					(0.014)		(0.015)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	13.55	15.71	14.71	14.45	16.39	22.71	23.95
Number of observations	401	401	401	401	401	401	401
Wald chi^2	58.31***	69.14***	63.98***	63.98***	72.72***	108.70***	115.92***

Standard errors in parentheses.
*** p<0.01.
** p<0.05.
* p<0.10.

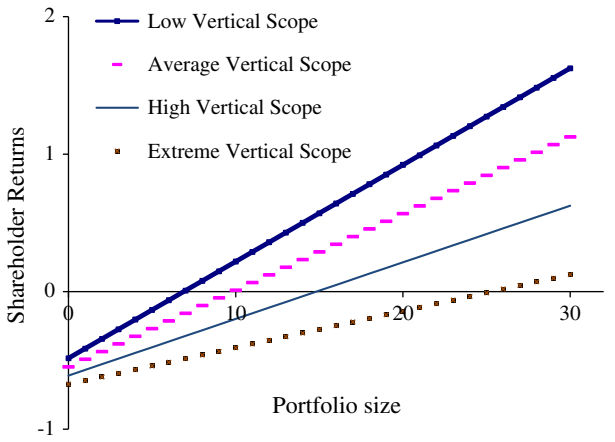

Fig. 1. Effect of alliance portfolio vertical scope on the portfolio size–performance relationship.

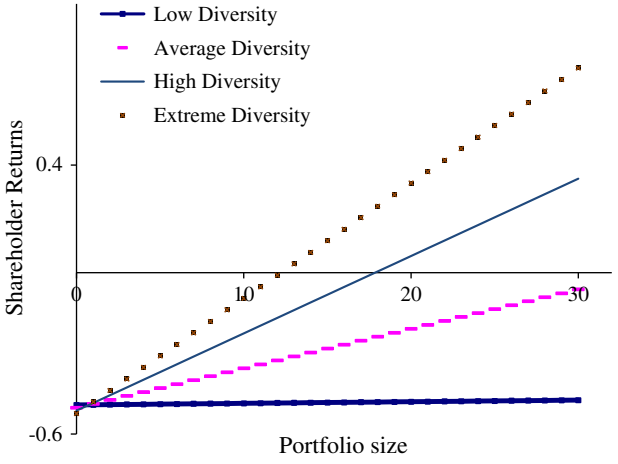

Fig. 2. Effect of alliance portfolio functional diversity on the portfolio size–performance relationship.

4.5. Analysis and results

Our dataset consists of cross-sectional time-series data. Pooling observations on the same company violates the assumption of independent observations and results in autocorrelation of the model's residuals. Since ordinary least squares is inefficient and biased in this case, we used random-effects models using the generalized least squares estimator (Greene, 1997).[9] This approach corrects for the autocorrelation of disturbances due to constant firm-specific effects (Kennedy, 1992). By including random effects, we control for endogeneity associated with neglected firm heterogeneity (Cornwell and Trumbull, 1994). Table 3 reports the descriptive statistics. The average annual market-adjusted shareholder return is −0.04%. This underperformance of the average IPO company is consistent with prior literature (Brav and Gompers, 1997). Firms have a cumulative average of 2.73 alliances, and approximately 34% of our observations are attributable to VC-backed IPOs.

We report the results in Table 4. Our baseline specification is reported in Model 1. The coefficient of portfolio size is positive and significant, providing support to our first hypothesis. Firms with a larger alliance portfolio have higher expected firm performance.[10] Models 2 and 3 add interaction terms of portfolio size with vertical scope and functional diversity, and provide support to our Hypotheses 2 and 3. Portfolio vertical scope negatively moderates the relationship between portfolio size and shareholder returns. A firm with a large number of alliances and a high degree of vertical scope is associated with lower firm performance. The interaction between portfolio size and portfolio functional diversity is positive and significant. A firm with a large number of alliances and high functional diversity is associated with better firm performance. Thus, it seems that it is the interaction between portfolio size and these moderators that is important to shareholder returns, rather than simply the number of alliances.

Models 4 and 5 introduce interaction terms of portfolio size with sales (quality uncertainty) and VC-backing (transition uncertainty). The interaction term between portfolio size and sales is negative and significant, providing support to H4. Alliance portfolios are of greater value to firms with greater quality uncertainty. The interaction term between portfolio size and VC-backed is positive and significant, thus providing support to H5. Alliance portfolios are of greater value to firms with lower transition uncertainty. Model 7 shows that the interaction terms with vertical scope and functional diversity continue to be statistically significant, but that the main effect of portfolio size is not statistically significant, suggesting that a large portfolio of alliances by itself is insufficient to garner higher shareholder returns. Alliance portfolio vertical scope, functional diversity, quality uncertainty, and transition uncertainty associated with the portfolio size are the important determinants of expected firm performance. Further analysis with standardized coefficients (not reported) indicates that functional diversity might be the most important factor to the investor community, followed by vertical scope, quality uncertainty, and transition uncertainty. Finally, Figs. 1 through 4, and in line with our hypotheses, show that as alliance portfolio size increases, firms with lower portfolio vertical scope (Fig. 1) and transition uncertainty (Fig. 4), and those with higher portfolio functional diversity (Fig. 2) and quality uncertainty (Fig. 3), reap the most benefit from their alliance portfolio.

Some of our control variables are also significant. For example, the coefficient on lagged Tobin's q ratio is negative and significant in six of the seven model specifications. IPO firms may attempt to essentially time the market and go public when

[9] Since we utilize time invariant firm-specific measures, a fixed effects model is not appropriate. A fixed-effects specification assumes that there is a fixed component across observations and is equivalent to adding a dummy variable for each firm in the sample. A random-effects specification assumes that the model residual is composed of a fixed component (fixed over time) and a second component that varies both cross-sectionally and over time. Greene (1997) suggests that a random-effects model is more appropriate than a fixed-effects model when the sampled cross-sectional units are drawn from a large population.

[10] Deeds and Hill (1996) found that there are declining returns to alliances. We ran the analysis with a squared term but the non linear term was not significant. This lack of significance is not surprising given that Deeds and Hill (1996) report that on average, problems associated with having too many alliances start becoming serious "when firms increase their number of alliances beyond about 25." The average number of alliances in our sample is 2.73.

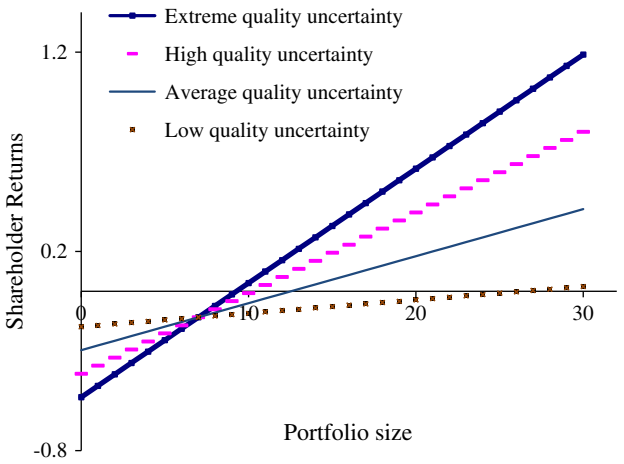

Fig. 3. Effect of quality uncertainty on the portfolio size–performance relationship.

valuations are high (Ritter and Welch, 2002), suggesting high prior performance may be associated with a reversal or lower shareholder returns. In Model 7, the debt ratio is negative and significant, suggesting that IPO firms with high levels of debt are associated with lower shareholder returns.

5. Discussion and conclusion

While the effects of inter-firm relationships on firm performance have been the focus of a flourishing stream of research, less attention has been paid to how the structure of an alliance portfolio, alongside uncertainty surrounding a firm's capabilities influence the perceived value of an alliance network. We study these questions in the context of 'threshold' firms that are undergoing transition in their organizational lifecycle (Daily and Dalton, 1992; Zahra and Filatotchev, 2004), and in the process, core transformations that subject them to renewed liabilities of newness (Jain and Kini, 1999; Welbourne and Andrews, 1996). Specifically, we adopt a signaling perspective and study how a portfolio's structure (content and scope), and uncertainty (quality and transition) surrounding a firm's capabilities condition the value of its alliance network as perceived by the capital market. Our baseline hypothesis predicts and confirms a positive main effect between the size of the alliance portfolio and performance measured by shareholder returns (Hypothesis 1). Networks therefore appear to have a mitigating effect on the various liabilities that firms in transition may experience through signaling legitimacy and potential future returns. Moving on, we study how two structural characteristics of alliance portfolios, namely vertical scope and functional diversity, condition the portfolio's value (Hypotheses 2 and 3), and how uncertainty surrounding the firm's intrinsic capabilities on one hand and its ability to manage the transition from a private firm to a cash-infused public entity on the other impinge on the value of the portfolio (Hypotheses 4 and 5). In brief, our results indicate that not all portfolios are valued equally. Shareholder returns are lower for firms whose alliance

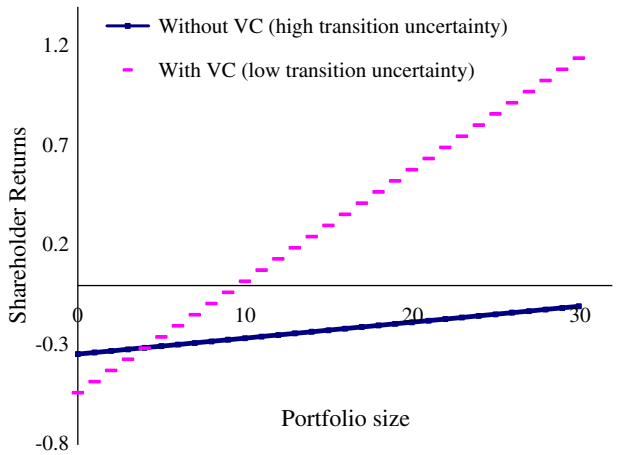

Fig. 4. Effect of transition uncertainty on the portfolio size–performance relationship.

portfolios are structured in a way that increases their vertical scope, but higher for firms with more functionally diversified alliance portfolios. Returns are also higher for firms that have greater degrees of quality related uncertainty associated with them, but lower for those that carry doubts about whether they possess the requisite governance capabilities to manage the transition successfully.

With regard to the first finding, our results demonstrate that the perceived downsides of knowledge appropriation far outweigh the benefits in reduced coordination costs that arise from increased vertical scope. While leveraging partners into multiple links along the value chain may bring in efficiencies in coordination costs (Bakos and Brynjolfsson, 1999), the greater degree of knowledge sharing entailed in alliances with greater scope renders young firms vulnerable to knowledge appropriation (Oxley and Sampson, 2004). With entrepreneurial firms' most critical resource typically being knowledge (Alvarez and Barney, 2004; Alvarez and Busenitz, 2001), capital markets are likely to be wary of vulnerabilities brought about by the potential of unintended knowledge spillovers. In the face of information asymmetry, such appropriation concerns are likely to be heightened thus rendering threshold companies particularly vulnerable. With regard to the content-related structure of a portfolio, we show that markets bestow a premium on those that are more diverse. We had theorized multiple mechanisms why this may be so, including the value attached to being ambidextrous and being able to balance value exploration with exploitation oriented alliances, lack of redundancy and concomitant access to a wider pool of resources, and the flexibility firms can derive from access to diverse options. Results demonstrate that capital markets are particularly receptive to indicators signaling firm strategies that are designed to simultaneously create new knowledge while appropriating value from existing resources.

Consistent with the perspective that uncertainty is multidimensional (Gulati and Higgins, 2003; Milliken, 1987), we examine the role of alliance portfolios under different types of endogenous uncertainty facing threshold firms. We propose that such firms face uncertainty not only about their intrinsic capabilities, but also about their ability to manage the multifarious challenges of growing while transitioning from a privately held company to a publicly listed one. While the former relates to investors' doubts about the intrinsic 'quality' of the firm and its readiness to go public, post-IPO uncertainty relates to the ability of the firm to adapt to the new managerial challenges it faces and succeed after it goes public. We predict and find that the effect on the relationship between alliance portfolios and shareholder value differs by the type of such uncertainty. For firms associated with quality uncertainty, networks serve as endorsements which legitimize and ratify the firm's value. On the other hand, alliance portfolios are of greater value to firms associated with lower transition uncertainty since these are perceived by the market as having the corporate governance capabilities required to capitalize on their alliance portfolios.

The present study extends prior research on strategic alliances and entrepreneurship in two major ways. First, while traditional alliance research has predominantly focused on single alliances, various alliance researchers have highlighted the need to analyze alliance portfolios and the important issues associated with them (Wassmer, 2010; Lavie, 2006). We extend this emerging stream of research through the lens of signaling theory and suggest that the value creating potential of networks is contingent upon the structural characteristics of the firm's portfolio, investor perceptions of the intrinsic quality of the firm, as well as perceptions of how the firm is able to professionalize its corporate governance to effectively transition into a complex organization that can appropriate value from alliances. Second, we extend nascent research exploring the uncertainty subsequent to the IPO. While the literature has examined the level of pre-IPO uncertainty over the true value of the firm and the associated information asymmetry between informed and uniformed investors (Beatty and Ritter, 1986; Corwin and Harris, 2001; Habib and Ljungqvist, 2001; Ritter, 1984), recent studies suggest that the degree of uncertainty and informational asymmetry among investors is not completely resolved at the time of IPO. Chen and Wilhelm (2008) note that in addition to pre-IPO uncertainty, "ex post value uncertainty" and associated asymmetric information persist in the IPO aftermarket. Other studies in the finance literature also suggest that uncertainty surrounding the firm continues after the IPO. Ellul and Pagano (2006) examine the relationship between underpricing and aftermarket uncertainty, and Corwin et al. (2004) examine aftermarket liquidity and associated uncertainties subsequent to the IPO. To the best of our knowledge, this study is the first to explore the role of post-IPO transition uncertainty in the relationship between alliance portfolios and firm performance.

One potential shortcoming of this research is that we assume homogeneity in partner quality. Some research argues that partner quality may lead to differences in network performance (Stuart, 2000). In other words, it is not only the structure of the alliance portfolio that would play a role in the relationship between portfolio size and performance, but also the 'quality' of the partners comprising the portfolio. One avenue for future research would be to examine the combined effects of portfolio arrangement and partner quality on performance. Along the same lines, future research could extend the present study by considering the "content of information" flowing across different partners in the alliance portfolio. Gulati and Higgins (2003) observe that interorganizational research tends to focus on the structure of relationships between actors at the expense of examining the content of information flow between actors. Future research could examine the interactions between alliance portfolio structure and the resources streaming among the portfolio actors. These interactions could potentially effect investor perceptions, and thus, IPO firm performance. Further, our results are valid to the extent that the measures used, i.e., sales and VC-backing, are suitable proxies for quality and transition uncertainty respectively. While we feel that both measures are appropriate, more direct measures (e.g., a more direct measure of firm management quality as a proxy for transition uncertainty) could lead to further insights into the relationships studied. In spite of our best efforts, our study may also be subject to a limitation that plagues much of entrepreneurship and strategy research, namely endogeneity concerns. In other words, it is possible that firms with the greatest inherent value at the pre-IPO stage (due to their being able to develop great products or technology) attract the most alliances, investors, and VCs. Therefore, the post-IPO relationship of all of these variables could be fortuitous, all driven by the fact that the core start-up was highly profitable or had very high potential. Since we cannot completely rule this out, it would be profitable for future research to understand a fundamental question that underlies this conundrum: do the best start-up ideas get

picked up by VCs, and alliance partners? We also do not account for differences in firm ability to generate value from their alliance portfolios. Sarkar et al. (2009) find evidence of heterogeneity among firms in deriving value from alliance portfolios through an alliance capability emanating from organizational processes. In other words, some firms are better able to create and capture value through their alliances than others. Future research that considers alliance portfolio structure as well as firm capabilities in appropriating value from their alliance portfolios would lend further insight into the relationship between alliance portfolios and firm performance. Finally, our study is limited by its focus on a single industry. Focusing on the manufacturing industry allows us to study an industry that witnessed a burgeoning of alliances in the last decade as well as control for industry heterogeneity. This, however, constrains our ability to generalize our findings since the results might reflect factors idiosyncratic to the industry.

References

Acar, W., Sankaran, K., 1999. The myth of the unique decomposability: specializing the Herfindahl and entropy measures? Strategic Management Journal 20 (10), 969.

Ahuja, G., 2000. The duality of collaboration: inducements and opportunities in the formation of interfirm linkages. Strategic Management Journal 21 (3), 317.

Akerlof, G., 1970. The market for lemons: quality uncertainty and the market mechanism. Quarterly Journal of Economics 84, 4889–5000.

Alvarez, S.A., Barney, J.B., 2004. Organizing rent generation and appropriation: toward a theory of the entrepreneurial firm. Journal of Business Venturing 19 (5), 621.

Alvarez, S.A., Busenitz, L.W., 2001. The entrepreneurship of resource-based theory. Journal of Management 27 (6), 755.

Amit, R., Livnat, J., 1989. Efficient corporate diversification: methods and implications. Management Science 35 (7), 879–896.

Arthurs, J.D., Busenitz, L.W., 2006. Dynamic capabilities and venture performance: the effects of venture capitalists. Journal of Business Venturing 21 (2), 195.

Bakos, Y., Brynjolfsson, E., 1999. Bundling information goods: pricing, profits, and efficiency. Management Science 45 (12), 1613.

Barry, C.B., Brown, S.J., 1984. Differential information and the small firm effect. Journal of Financial Economics 13 (2), 283.

Barry, C.B., Muscarella, C.J., Vetsuypens, M.R., 1991. Underwriter warrants, underwriter compensation, and the costs of going public. Journal of Financial Economics 29 (1), 113.

Barth, M.E., Kasznik, R., McNichols, M.F., 2001. Analyst coverage and intangible assets. Journal of Accounting Research 39 (1), 1.

Baum, J.A.C., Calabrese, T., Silverman, B.S., 2000. Don't go it alone: alliance network composition and startups' performance in Canadian biotechnology. Strategic Management Journal 21 (3), 267.

Baum, J.A.C., Oliver, C., 1991. Institutional linkages and organizational mortality. Administrative Science Quarterly 36 (2), 187.

Beatty, R.P., Ritter, J.R., 1986. Investment banking, reputation, and the underpricing of initial public offerings. Journal of Financial Economics 15 (1,2), 213.

Bharadwaj, A.S., Bharadwaj, S.G., Konsynski, B.R., 1999. Information technology effects on firm performance as measured by Tobin's q. Management Science 45 (7), 1008.

Boeker, W., 1989. Strategic change: the effects of founding and history. Academy of Management Journal 32 (3), 489.

Bowman, E.H., Hurry, D., 1993. Strategy through the option lens: an integrated view of resource investments and the incremental-choice process. Academy of Management The Academy of Management Review 18 (4), 760.

Brav, A., Gompers, P.A., 1997. Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and nonventure capital-backed companies. The Journal of Finance 52 (5), 1791.

Burt, R., 1992. Structural Holes. Harvard University Press, Cambridge.

Carter, R., Manaster, S., 1990. Initial public offerings and underwriter reputation. The Journal of Finance 45 (4), 1045.

Carter, R.B., Dark, F.H., Singh, A.K., 1998. Underwriter reputation, initial returns, and the long-run performance of IPO stocks. The Journal of Finance 53 (1), 285.

Certo, S.T., 2003. Influencing initial public offering investors with prestige: signaling with board structures. Academy of Management The Academy of Management Review 28 (3), 432.

Certo, S.T., Daily, C.M., Dalton, D.R., 2001. Signaling firm value through board structure: an investigation of initial public offerings. Entrepreneurship Theory and Practice 26 (2), 33.

Chang, K., Garen, J., 2004. Residual income claimancy, monitoring, and the R&D firm: theory with application to biotechs. Managerial and Decision Economics 25 (8), 489–508.

Chen, Z., Wilhelm Jr., W., 2008. A theory of the transition to secondary market trading of IPOs. Journal of Financial Economics 90 (3), 219.

Christensen, T.E., 2002. The effects of uncertainty on the informativeness of earnings: evidence from the insurance industry in the wake of castastrophic events. Journal of Business Finance & Accounting 29 (1/2), 223.

Chung, KH., Pruitt, SW., 1994. A Simple Approximation of Tobin's Q. Financial Management (23) 3.

Clarkson, P.M., Merkley, J., 1994. Ex ante uncertainty and the underpricing of initial public offerings: further Canadian evidence. Canadian Journal of Administrative Sciences 11 (1), 54.

Cohen, B.D., Dean, T.J., 2005. Information asymmetry and investor valuation of IPOs: top management team legitimacy as a capital market signal. Strategic Management Journal 26 (7), 683.

Cornwell, C., Trumbull, W.N., 1994. Estimating the economic model of crime with panel data. The Review of Economics and Statistics 76 (2).

Corwin, S.A., Harris, J.H., 2001. The initial listing decisions of firms that go public. Financial Management 30 (1), 35.

Corwin, S.A., Harris, J.H., Lipson, M.L., 2004. The development of secondary market liquidity for NYSE-listed IPOs. The Journal of Finance 59 (5), 2339.

Daily, C.M., Certo, S.T., Dalton, D.R., Roengpitya, R., 2003. IPO underpricing: a meta-analysis and research synthesis. Entrepreneurship Theory and Practice 27 (Spring), 272–295.

Daily, C.M., Dalton, D.R., 1992. The relationship between governance structure and corporate performance in entrepreneurial firms. Journal of Business Venturing 7 (5), 375.

DeCarolis, D.M., Deeds, D.L., 1999. The impact of stocks and flows of organizational knowledge on firm performance: an empirical investigation of the biotechnology industry. Strategic Management Journal 20 (10), 953.

Deeds, D.L., Hill, C.W.L., 1996. Strategic alliances and the rate of new product development: an empirical study of entrepreneurial biotechnology firms. Journal of Business Venturing 11 (1), 41.

Deeds, D.L., Decarolis, D., Coombs, J.E., 1997. The impact of firm-specific capabilities on the amount of capital raised in an initial public offering: evidence from the biotechnology industry. Journal of Business Venturing 12 (1), 31.

Doz, Y.L., 1996. The evolution of cooperation in strategic alliances: initial conditions or learning processes? Strategic Management Journal 17, 55.

Doz, Y.L., Hamel, G., 1998. Alliance Advantage: The Art of Creating Value Through Partnering. Harvard Business School Press, Boston.

Dyer, J.H., 1996. Specialized supplier networks as a source of competitive advantage: evidence from the auto industry. Strategic Management Journal 17 (4), 271.

Eckbo, B.E., Norli, Ø., 2005. Liquidity risk, leverage and long-run IPO returns. Journal of Corporate Finance 11 (1–2), 1–35.

Eisenhardt, K.M., Schoonhoven, C.B., 1990. Organizational growth: linking founding team, strategy, environment, and growth among U.S. semiconductor ventures, 1978–1988. Administrative Science Quarterly 35 (3), 504.

Ellul, A., Pagano, M., 2006. IPO underpricing and after-market liquidity. Review of Financial Studies 19 (2), 381.

Falconieri, S., Murphy, A., Weaver, D., 2009. Underpricing and ex post value uncertainty. Financial Management 38 (2), 285–300.

Fama, E.F., 1976. Efficient capital markets. The Journal of Finance 31 (1), 143–145.

Freeman, J., Hannan, M.T., 1989. Setting the record straight on organizational ecology: rebuttal to young. The American Journal of Sociology 95 (2), 425–439.

Gargiulo, M., Benassi, M., 2000. Trapped in your own net? Network cohesion, structural holes, and the adaptation of social capital. Organization Science 11 (2), 183.
Glick, W.H., 1985. Conceptualizing and measuring organizational and psychological climate: pitfalls in multilevel research. Academy of Management The Academy of Management Review 10 (3), 601.
Gomes-Casseres, B., 1994. Group versus group: how alliance networks compete. Harvard Business Review 72 (4), 62.
Gompers, P.A., 1996. Grandstanding in the venture capital industry. Journal of Financial Economics 42 (1), 133.
Gorman, M., Sahlman, W.A., 1989. What do venture capitalists do? Journal of Business Venturing 4 (4), 231.
Greene, W., 1997. Econometric Analysis. NJ.
Gulati, R., 1999. Network location and learning: the influence of network resources and firm capabilities on alliance formation. Strategic Management Journal 20 (5), 397.
Gulati, R., Higgins, M.C., 2003. Which ties matter when? The contingent effects of interorganizational partnerships on IPO success. Strategic Management Journal 24 (2), 127.
Gulati, R., Singh, H., 1998. The architecture of cooperation: managing coordination costs and appropriation concerns in strategic alliances. Administrative Science Quarterly 43 (4), 781.
Habib, M.A., Ljungqvist, A.P., 2001. Underpricing and entrepreneurial wealth losses in IPOs: theory and evidence. Review of Financial Studies 14 (2), 433.
Hannan, M.T., Freeman, J., 1984. Structural inertia and organizational change. American Sociological Review 49 (2), 149–164.
Hellmann, T., Puri, M., 2002. Venture capital and the professionalization of start-up firms: empirical evidence. The Journal of Finance 57 (1), 169.
Hite, J.M., Hesterly, W.S., 2001. The evolution of firm networks: from emergence to early growth of the firm. Strategic Management Journal 22 (3), 275.
Hoffmann, W.H., 2005. How to manage a portfolio of alliances. Long Range Planning 38 (2), 121.
Hoffmann, W.H., 2007. Strategies for managing a portfolio of alliances. Strategic Management Journal 28 (8), 827.
Ibbotson, R.G., Sindelar, J.L., Ritter, J.R., 1988. Initial public offerings. The Continental Bank Journal of Applied Corporate Finance 1, 37.
Itami, H., 1987. Mobilizing Invisible Assets. Harvard University Press.
Jacobson, R., 1990. Unobservable effects and business performance. Marketing Science 9 (1).
Jain, B.A., Kini, O., 1995. Venture capitalist participation and the post-issue operating performance of IPO firms. Managerial and Decision Economics 16 (6), 593.
Jain, B.A., Kini, O., 1999. The life cycle of initial public offering firms. Journal of Business Finance & Accounting 26 (9/10), 1281.
Kennedy, P., 1992. A Guide to Econometric Methods. MIT Press.
Khurshed, A., 2000. Discussion of does the presence of venture capitalists improve the survival profile of IPO firms? Journal of Business Finance & Accounting 27 (9/10).
Koza, M.P., Lewin, A.Y., 1998. The co-evolution of strategic alliances. Organization Science 9 (3), 255.
Lavie, D., 2006. The competitive advantage of interconnected firms: an extension of the resource-based view. Academy of Management Review 31 (3), 638.
Lavie, D., 2007. Alliance portfolios and firm performance: a study of value creation and appropriation in the U.S. software industry. Strategic Management Journal 28 (12), 1187.
Lavie, D., Miller, S.R., 2008. Alliance portfolio internationalization and firm performance. Organization Science 19 (4), 623.
Lee, P., 2001. What's in a name.com? The effects of '.com' name changes on stock prices and trading activity. Strategic Management Journal 22 (8), 793.
Loughran, T., Ritter, J., 2004. Why has IPO underpricing changed over time? Financial Management 33 (3), 5.
Loughran, T., Ritter, J.R., Rydqvist, K., 1995. Initial public offerings: international insights. Pacific-Basin Finance Journal 31, 139–140.
March, J.G., 1991. Exploration and exploitation in organizational learning. Organization science 2 (1), 71–87.
Marsh, P., 1982. The choice between equity and debt: an empirical study. The Journal of Finance 37 (1), 121.
McGrath, R.G., 2001. Entrepreneurship, small firms and wealth creation: a framework using real options analysis. The Handbook of Strategy and Management.
Mensah, M.O., Nguyen, H.V., Ryan, H.A., 1996. An empirical analysis of qualitative management earnings forecasts. Journal of Business Finance & Accounting 23 (9&10), 1245.
Milliken, F.J., 1987. Three types of perceived uncertainty about the environment: state, effect, and response uncertainty. Academy of Management The Academy of Management Review 12 (1), 133.
Montgomery, C.A., Wernerfelt, B., 1988. Diversification, Ricardian rents, and Tobin's q. The Rand Journal of Economics 19 (4), 623.
Morck, R., Shleifer, A., Vishny, R.W., 1988. Management ownership and market valuation: an empirical analysis. Journal of Financial Economics 20 (1,2), 293.
Mowery, D.C., Oxley, J.E., Silverman, B.S., 1996. Strategic alliances and interfirm knowledge transfer. Strategic Management Journal 17, 77.
Nicholson, S., Danzon, P.M., McCullough, J., 2005. Biotech-pharmaceutical alliances as a signal of asset and firm quality. The Journal of Business 78 (4), 1433.
Oxley, J.E., 1997. Appropriability hazards and governance in strategic alliances: a transaction cost approach. The Journal of Law, Economics, and Organization 13 (2), 387–409.
Oxley, J.E., Sampson, R.C., 2004. The scope and governance of international R&D alliances. Strategic Management Journal 25 (8/9), 723.
Parise, S., Casher, A., 2003. Alliance portfolios: designing and managing your network of business–partner relationships. The Academy of Management Executive 17 (4), 25.
Podolny, J.M., 1994a. Market uncertainty and the social character of economic exchange. Administrative Science Quarterly 39 (3), 458.
Podolny, J.M., 1994b. Organizations, occupations, and markets. Contemporary Sociology 23 (6), 868.
Pollock, T.G., Gulati, R., 2007. Standing out from the crowd: the visibility-enhancing effects of IPO-related signals on alliance formation by entrepreneurial firms. Strategic Organization 5 (4), 339–372.
Powell, W.W., Koput, K.W., Smith-Doerr, L., 1996. Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. Administrative Science Quarterly 41 (1), 116.
Reuer, J., Ragozzino, R., 2008. Adverse selection and M&A design: the roles of alliances and IPOs. Journal of Economic Behavior & Organization 66 (2), 195.
Reuer, J., Tong, T., 2010. Discovering valuable growth opportunities: an analysis of equity alliances with IPO firms. Organization Science 21 (1), 202.
Reuer, J.J., Zollo, M., Singh, H., 2002. Post-formation dynamics in strategic alliances. Strategic Management Journal 23 (2), 135.
Ritter, J.R., 1984. The "hot issue" market of 1980. The Journal of Business 57 (2), 215.
Ritter, J.R., Welch, I., 2002. A review of IPO activity, pricing, and allocations. The Journal of Finance 57 (4), 1795.
Roberts, E., 1991. Entrepreneurs in High Technology: Lessons from MIT and Beyond. Oxford University Press.
Rock, K., 1986. Why new issues are underpriced. Journal of Financial Economics 15 (1,2), 187.
Rothaermel, F.T., 2001. Incumbant's advantage through exploiting complementary assets via interfirm cooperation. Strategic Management Journal 22 (6/7), 687.
Rothaermel, F.T., Deeds, D.L., 2004. Exploration and exploitation alliances in biotechnology: a system of new product development. Strategic Management Journal 25 (3), 201.
Ryan, H.E., Wiggins, R.A., 2002. The interactions between R&D: investment decisions and compensation policy. Financial Management 31 (1), 5.
Sanchez, R., 1995. Strategic flexibility in product competition. Strategic Management Journal 16, 135.
Sanders, W.G., Boivie, S., 2004. Sorting things out: valuation of new firms in uncertain markets. Strategic Management Journal 25 (2), 167.
Santoro, M.D., McGill, J.P., 2005. The effect of uncertainty and asset co-specialization on governance in biotechnology alliances. Strategic Management Journal 26 (13), 1261.
Sarkar, M.B., Aulakh, P., Madhok, A., 2009. Process capabilities and value generation in alliance portfolios. Organization Science 20 (3), 583.
Shan, W., Walker, G., Kogut, B., 1994. Interfirm cooperation and startup innovation in the biotechnology industry. Strategic Management Journal 15 (5), 387.
Shrout, P.E., Fleiss, J., 1979. Intraclass correlations: uses in assessing rater reliability. Psychological Bulletin 86, 420–428.
Srivastava, R.K., Shervani, T.A., Fahey, L., 1998. Market-based assets and shareholder value: a framework for analysis. Journal of Marketing 62 (1), 2.
Srivastava, R.K., Shervani, T.A., Fahey, L., 1999. Marketing, business processes, and shareholder value: an organizationally embedded view of marketing activities and the discipline of marketing. Journal of Marketing 63, 168.
Steier, L., Greenwood, R., 1995. Venture capitalist relationships in the deal structuring and post-investment stages of new firm creation. The Journal of Management Studies 32 (3), 337.

Stinchcombe, A.L., 1965. Social structure and organizations. In: March, J.G. (Ed.), Handbook of Organizations. Rand McNally & Company, Chicago, pp. 142–193.
Stuart, T.E., 2000. Interorganizational alliances and the performance of firms: a study of growth and innovation rates in a high-technology industry. Strategic Management Journal 21 (8), 791.
Stuart, T.E., Hoang, H., Hybels, R.C., 1999. Interorganizational endorsements and the performance of entrepreneurial ventures. Administrative Science Quarterly 44 (2), 315.
Stuart, T.E., Podolny, J.M., 1996. Local search and the evolution of technological capabilities. Strategic Management Journal 17, 21.
Uotila, J., Maula, M., Keil, T., Zahra, S., 2009. Exploration, exploitation, and financial performance: analysis of S&P 500 corporations. Strategic Management Journal 30 (2), 221.
Uzzi, B., 1996. The sources and consequences of embeddedness for the economic performance of organizations: the network effect. American Sociological Review 61 (4), 674.
Varadarajan, P.R., Cunningham, M.H., 1995. Strategic alliances: a synthesis of conceptual foundations. Journal of The Academy of Marketing Science 23 (4), 282.
Vassolo, R.S., Anand, J., Folta, T.B., 2004. Non-additivity in portfolios of exploration activities: a real options-based analysis of equity alliances in biotechnology. Strategic Management Journal 25 (11), 1045.
Wasserfallen, W., Wittleder, C., 1994. Pricing initial public offering: evidence from Germany. European Economic Review 38 (7), 1505.
Wassmer, U., 2010. Alliance portfolios: a review and research agenda. Journal of Management 36 (1), 141.
Welbourne, T.M., Andrews, A.O., 1996. Predicting the performance of initial public offerings: should human resource management be in the equation? Academy of Management Journal 39 (4), 891.
Welch, I., 1989. Seasoned offerings, imitation costs, and the underpricing of initial public offerings. The Journal of Finance 44 (2), 421.
Wischnevsky, J.D., 2004. Change as the winds change: the impact of organizational transformation on firm survival in a shifting environment. Organizational Analysis 12 (4), 361.
Zahra, S., Filatotchev, I., Wright, M., 2009. How do threshold firms sustain corporate entrepreneurship? The role of boards and absorptive capacity. Journal of Business Venturing 24 (3), 248.
Zahra, S.A., Filatotchev, I., 2004. Corporate governance and threshold firms: a knowledge-based perspective. The Journal of Management Studies 41 (5), 885.