

## **How Does Partner Selection Affect IPO Performance?**

### **Abstract**

Owing to the significant change in the business environment, strategic alliance has become an increasingly popular way in response to the ever changing environments featured by shorter product life cycle and fiercer competition. Drawing on the resource-based view and institutional theory, this study aims to explore under what conditions a biotech start-up is able to deliver an effective signal to the investment community so as to yield a better IPO (Initial Public Offering) performance. In the sample of 283 alliances involving biotech firms with other identities of organizations, the results show that allying with different identities of partners, namely, pharmaceutical firms or prestigious academic institutions, significantly influences a young biotech firm's IPO performance. Furthermore, the study shows that the IPO performance of partner identity is subject to firm capabilities and market conditions. The study contributes to the strategy literature by shedding light on the endorsement effects of legitimate partners.

Keywords: Partner Selection, IPO Performance, Strategic Alliance

### **Introduction**

Strategic alliances have become a highly popular way to extract greater value from marketplace (Shah and Swaminathan, 2008). Under rapidly changing circumstance, how are

cooperation types between partners in strategic alliance? What are the performance implications of such exchange mechanisms for alliance members? From institutional perspective, organizational legitimacy serves as a source of strategic resource to enhance economic or competitive benefits for firms (Dacin *et al.*, 2007). From resource-based view (RBV), alliance is designed to allow partner share risk and resources, gain knowledge, and to obtain access to market (Hitt *et al.*, 2000).

Institutional perspective stresses the important of social judgment. In line with this view, Dacin *et al.* (2007) suggested that strategic activities are derive from an actor's propensity to legitimate or account rationally for such activities, and their effectiveness is judged by a range of constituents (e.g., shareholders, customers, governments, public interest groups). Suchman (1995) provided that legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions. However, more researchers are defined legitimacy as congruency between the values, norms, and expectations of society and the activities and outcomes of the organization (Zimmerman and Zeitz, 2002; Ashforth and Gibbs, 1990).

Based on economic rationale, resource endowments stand for one of the major research stream in strategic alliance (Lin *et al.*, 2009). Early, Penrose (1959) suggest that firm growth can view as a dynamic process of management interacting with resources. In light of Penrose (1959)

context, Wernerfelt (1984) developed some economic tools for analyzing a firm's resource position and look at some strategic options suggested by this analysis. Then, Barney (1991) proposed that what kind of resources lead to sustainable competitive advantage. Recently, Hitt *et al.* (2000) view resources into several types, include financial capital, technical capabilities, managerial capabilities, and other intangible assets. Simultaneously, Das and Teng (2000) synthesizing the various findings in the literature on alliances from a resource-based view, in order to put forward a general and systematic resource-based theory of strategic alliances.

Previous research on alliance suggests that perhaps the important factor in alliance success is alliance partner's reputation (Roberts and Dowling, 2002). The implicit assumption behind the relationship between reputation and success is that there are legitimate and complementary effects that enhance firms' competitive advantage. Indeed, there is ample anecdotal and case evidence suggesting that some firms, the basis of reputation in managing certain organizational forms have developed superior resource. Wilson (1985a) proposed the idea that a firm's reputation is an asset, which can generate future rents. Several studies confirm the expected benefits associated with good reputations (Podolny, 1994; Landon and Smith, 1997). A strong reputation is a key resource that provides firms with strategic advantages at both the asset and market levels and represents an important antecedent of firm performance and ultimate survival (Deepphouse, 2000; Fombrun, 1996; Rindova *et al.*, 2006; Philippe and Durand, 2011).

In biotechnology industry, there are some challenges that firms need to overcome. Such as technical uncertainty, period uncertainty of research and development (R&D), regulatory restrictions, and financial risk are challenges for firms. Due to period uncertainty of research and development, firms may spend large amount of capital on research and development process. Therefore, going public become an important activity for firms to fund more capital (Deeds *et al.*, 1996). We argues that alliance partners' reputation also allows each other to achieve greater IPO (initial public offering) performance. However, more researchers are discussed the impact of alliance with reputational industrial partner, however, there are few researches discuss that academic alliance partner matters firm's performance.

This study propose that alliance types are not consistent in their effects on firm outcomes, such as IPO success, but rather vary across different types alliance has developed as well as the capability and uncertainty associated with firms' own and the relevant equity market. Together, these dimensions, alliance types, reputation, capability and market uncertainty, form the basis of our exploration into the contingent value of inter-organizational relationships for entrepreneurial firms. The present study focus on two types of alliance: inter-firm alliance, academic organization-firm alliance. This study focus on endogenous and exogenous form of alliance with legitimate partners, firm's research and development capability, and market uncertainty as a moderator that has been few discussed in prior strategy research. Our key claim is that the

benefits of each type of alliance not only vary across each other but also moderate by internal and external factors that certain types of alliance will matter more or less under certain conditions. The theoretical underpinning for our claim is the proposition that different types of partner's reputation, firms' capability and market uncertainty focus investor attention on different sets of factors. Since legitimacy theory and resource-based theory provide important signals of alliance partner, they become more or less important, depending upon the investor concerns in the specific context.

We contributes to research on organizational strategy. Our work builds upon prior research which has emphasized the signaling value to firms of having prominent affiliations (e.g., Podolny *et al.*, 1996; Stuart *et al.*, 1999; Gulati and Higgins, 2003). The study challenges such basic assumption by examining the conditions under which more is indeed better for entrepreneurial firms and which kind of specific ties are more beneficial than others are. Our theory suggests that, depending upon the different endorsements in which a young firm performs, certain types of prominent alliance may be more or less beneficial to IPO performance. Thus, the study contributes to research on legitimacy and resource-based theory by examining the contingent value of inter-organizational performance.

## **Literature Review**

To some extent, the success of an IPO is a matter of transmitting favorable signals. Prior

research at the organization level are considered a wide variety of characteristics that can serve as informative signals in markets laden with uncertainty, in particular focusing on how specific signals can reduce uncertainty about a firm's quality and future prospects in the eyes of key stakeholders (Sanders and Boivie, 2004). The study serves alliance partners' reputation, firms' research and development capability, and market condition as important signals for investors' decision.

### **Alliance partner selection**

Once firms decided to enter strategy alliance, the critical issue is partner selection. Successful alliances are determined largely by smart partner selection (Lambe and Spekman, 1997). As companies rush to leverage the potential value of alliances, they often overlook the potentially detrimental effects of poor alliance partner selection (Hamel, 1991). Therefore, some scholars draw on resource complementarity to emphasize the partner fit of such cooperation (Nohria and Garcia-Pont, 1991; Gulati, 1995b). Some scholars exploit institutional theory to highlight the legitimacy of an organization's social position (Dancin *et al.*, 2007). According to these signals, researchers reasoned that the attributes of the organization's alliance partner affect the firm's performance.

Although alliance partners' selection is important, what are the benefits of smart partner selection? Hitt *et al.* (2000) proposed that firms can leverage resources that are complementary

by integrating them to create synergy and enhance their own competence by learning from their partners, furthermore, achieved competitive advantages. Some scholars also proposed that the ultimate purpose for firms not only include increased competitive advantage, but also environmental adaptation (Uzzi, 1997), and minimized transaction cost (Hennart, 1988; Kogut, 1988). Prior research proposed that alliance project type is an important consideration in examining the relative importance of various partner characteristics. Further research examined whether and how partner selection criteria might vary with different types of strategic alliances (e.g., Shah and Swaminathan, 2008). In accordance with this context, the present study argues that different collaborative types affect firms' performance.

### **Partner types and IPO performance**

Inter-firm alliances are becoming an increasingly pervasive mode of conducting business. Such coalitions are arrangements in which two or more independent organizations cooperate to perform business activities (BarNir and Smith, 2002). However, the ultimate purpose of alliances is to leverage firm resources along with partner firms to create synergy effects. Without the synergy effect, firms may not be able to create excellent performance (Lin *et al.*, 2009).

In an attempt to find out how difference signals from partners endowed affect alliance performance, especially for entrepreneurial firms, the study focuses on single performance measurement, IPO. We adopt IPO serve as performance index for some reasons. First, going

public is an important financing event in the life of a public firm (Alti, 2006), due to the stock price change on the first day of public trading reflects the market's initial response and evaluation of the firm (Pollock and Gulati, 2007). Second, initial market response serve as a credible, salient, and interpretable signal for investors in the short term (Pollock and Gulati, 2007). Initial market response is the best indicator to determinate whether IPO success or not (Ritter and Welch, 2002).

Prior studies of alliance performance have mainly looked at alliances with equity arrangements, for example, joint ventures (e.g., Yan and Zeng, 1999; Hennart *et al.*, 1998). For entrepreneurial firms, IPO can provide critical resources for firms' future expansion, due to IPO is a shortcut to access cash from investment of time and resources (Bruton *et al.*, 2009). Stuart *et al.* (1999) reported that total cash raised from venture capitalists reduced the time to IPO and increased the valuation achieved at time of IPO for new biotechnology firms (Sanders and Bovie, 2004).

In the context of inter-firm alliance undertaking an IPO, there can also be significant benefits to affiliations with key endorsers, which enhance the firm's involvement of inter-firm alliance, may generalized influence and help to increase firms' visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 1a: Industrial alliance partner should be beneficial to the success of a firm's IPO.*



In the past, the missions of academic organizations are educating students and advancing knowledge (Bok, 2003; Stuart *et al.*, 2007), however, academic organizations have devoted in their commercialization efforts recently (Stuart *et al.*, 2007; Rothaermel *et al.*, 2007). Under highly change environment, academic organizations put their effort on streamline and reinforce their industry collaborations by establishing centers specializing in certain subject areas with single or multiple corporate sponsors (Webster and Swain, 1991; Perkmann *et al.*, 2011). Perkmann *et al.* (2011) indicated that firms invest considerable sum on collaborative research with academic organizations in United State and OECD countries. By the year 2000, there were nearly 2000 academic organization-industrial research and development centers in the United States (Bozeman and Boardman, 2003), it displays that firm alliance with academic organizations become more and more important over time.

The motivations for firms to alliance with academic organizations can vary and maybe overlap (Perkmann *et al.*, 2011). From firms' position, there are four main reasons that firm serve academic organizations as strategic partners (Perkmann *et al.*, 2011). Firms seek to leverage their research and development funding, access basic scientific knowledge, improve problem-solving capability through academic advice and assistance in ongoing research and development programmes, and results in generic benefits beyond the narrow objectives of specific alliances by working with academic organizations (Perkmann *et al.*, 2011). Bercovitz

and Feldman (2007) mentioned that entrepreneurial firms prefer to alliance with academic organizations than large corporations, due to the fixed costs of specialist expertise and equipment, they need for external source to complement their defects (Perkmann and Walsh, 2008). The benefits of alliance with academic organizations have well documented in the literature. Such as acquiring professional knowledge, accessing physical resource (Quintas *et al.*, 1992) and technologies (MacLachlan, 1995), reducing the cost of developing new capabilities (George *et al.*, 2002) are the advantages from academic endorsement alliance. Particularly, academic endorsement serve as a strong signal can increase the confidence of investors (Mian, 1997).

Recently, the study stream of IPO performance has expanded to consider signals specific to biotech industry (e.g., Bercovitz and Feldman, 2007; Perkmann *et al.*, 2011). The significant benefits accrue from endorsements that provide strong evidence for technological legitimacy (Bonardo *et al.*, 2010). Gulati and Higgins (2003) identify technological partnerships as a signal of legitimacy and predictor of IPO success. In the biotech industry, Higgins and Gulati (2006) find that employment affiliations with prominent pharmaceutical companies also help firms attract new investors. Our paper contributes by investigating whether alliance with academic organizations affects investors' valuations. We argue that a academic organizations sends an effective signal to potential investors, and affect firms IPO performance by potential investors' decision.

In the context of academic organization-firm alliance undertaking an IPO, there can also be significant benefits to affiliations with key endorsers, which enhance the firm's involvement of academic organization-firm alliance, may generalized influence and help to increase a firm's visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 1b: Academic alliance partner should be beneficial to the success of a firm's IPO.*

### **Legitimacy of partners and the IPO performance**

From an institutional perspective, "legitimacy [is] an operational resource ... that organizations extract - often competitively - from their cultural environments and that they employ in pursuit of their goals" (Suchman, 1995, p. 575). Hybels (1995) proposed that legitimacy is an intangible resource that represents a symbolic of the collective evaluation of an organization. Galbreath (2005) provided that such reputational assets belong to intangible resources and capabilities. Such heterogeneity of resources (include tangible and intangible) are critical for firms to create competitive advantage, even sustain competitive advantage (Fernández-Alles and Valle-Cabrera, 2006). Therefore, alliance with legitimate player not only as more worthy, but also as more meaningful, predictable, and trustworthy for firms (Suchman, 1995).

Legitimacy and reputation are similar constructs at antecedents, social construction processes and consequence (Deephouse and Carter, 2005). Whereas, legitimacy focuses on social

acceptance, which comes from social norms and expectations, reputation focuses on comparisons among organizations (Deepphouse and Carter, 2005). However, reputation is still a kind of legitimacy. According to such context, we defined legitimacy stands broad scope, and reputation stands narrow scope. Therefore, we adopts reputation as legitimacy to measure the endorsement effect of reputation.

Reputation represents the firms' action and characteristics in the past, and can be expected in the future (Erdem and Swait, 1998; Houston, 2003). However, reputation is an important resource to increase cooperative opportunity (Houston, 2003; Arend, 2009). Good corporate reputations are critical because of their potential for value creation (Roberts and Dowling, 2002). Reputation not only a signal (Rindova *et al.*, 2005) that we can distinguish well-establish firms and poor firms, but also an important intangible asset (Boyd *et al.*, 2010) that competitors are hardly to imitate. This information may also display the organizations' feature, product quality, and financial status (Dollinger *et al.*, 1997). A positive reputation means highly esteemed, worthy or meritorious (Dollinger *et al.*, 1997), and contribute to alliance success (Saxton, 1997), however, bad reputation can hurt cooperation among partners (Polzer, 2004).

Above discussion illustrates the potential benefit of good reputation, therefore, reputation can serve as a critical signal to the market (Houston, 2003). Although it is a valuable yet costly asset, it takes both financial investment and time to develop (Kotha *et al.*, 2001). However,

reputation is a credible endorsement for potential alliance partners; potential investors' decision is affected by such signal. In the context of various reputational alliance partners undertaking an IPO, there can also be significant benefits to affiliations with key endorsers, which enhance the firm's involvement of alliance, may generalized influence and help to increase firms' visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 2a: Endorsement by a reputational industrial alliance partner should be beneficial to the success of a firm's IPO.*

*Hypothesis 2b: Endorsement by a reputational academic alliance partner should be beneficial to the success of a firm's IPO.*

### **Firm capability and the IPO performance**

General capabilities are easy imitate and transfer, however, firms need to possess complex, highly special skills and expertise to stay competitive. In rapid change of industries, firm may not to adopt internal develop all the capabilities and technologies, firm prefer to collaborate with other organizations, such as alliance and joint venture, to acquire critical resources (Ranft and Lord, 2002). Amit and Schoemaker (1993) defined that capabilities represent the ability of the firm to combine efficiently a number of resources to engage in productive activity and attain a certain objective (Dutta *et al.*, 2005). For firms, heterogeneity of capabilities is one of the cornerstones of resource-based theory (Helfat and Peteraf, 2003). According to resource-based

view, capability can be defined the foundation of a firm's sustainable competitive advantage. Particularly, it attempts to link superior firm performance to the capabilities (Wernerfelt, 1984; Barney, 1991; Peteraf, 1993; Dutta *et al.*, 2005). Patents protected by law, technological knowledge, and production skill are embed in firms' capability; they are valuable but difficult to imitate and transfer by competitors (Lee *et al.*, 2001). Such benefits of superior capability must be sustainable over time (Santhanam and Hartono, 2003).

The influence of research and development capability and organizational performance has widely recognized and well explored (Doyle and Hooley, 1992; Montoya-Weiss and Calantone, 1994). Mone *et al.* (1998) also proposed that capability is the most important determinant of firm performance, especially innovation capability. These factors which are more industry specific, have known to affect the profitability of all organizations (Lukas and Bell, 2000). A critical indicator of technological competence in the pharmaceutical industry is the drugs in development or in the pipeline (Deeds *et al.*, 1997). The amount and type of new drug in a firm's research pipeline reveals to the financial markets the future value of the firm's current capabilities (Deeds *et al.*, 1996). Therefore, based on main research question, the present study considers firms' internal effect that research and development capability of firm moderates the relationship of different alliance partners and firms' IPO performance.

In the context of inter-firm alliance and academic organization-firm alliance undertaking an

IPO when a firm possess greater capability, there can also be significant benefits to affiliations with key endorsers, which enhance the firm's involvement of alliance, may generalized influence and help to increase firms' visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 3a: Endorsement by an industrial alliance partner should be beneficial to the success of a firm's IPO when firm possess greater capability.*

*Hypothesis 3b: Endorsement by an academic alliance partner should be beneficial to the success of a firm's IPO when firm possess greater capability.*

However, this study extend main research question that different alliance partners matters firms performance to examine endorsement effect by a reputational alliance partner matters firms' performance when firm possess greater capability. In the context of reputational inter-firm alliance and reputational academic organization-firm alliance undertaking an IPO when a firm possess greater capability, there can also be significant benefits to affiliations with key endorsers, which enhance the firm's involvement of alliance, may generalized influence and help to increase firms' visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 3c: Endorsement by a reputational industrial alliance partner should be beneficial to the success of a firm's IPO when firm have greater capability.*

*Hypothesis 3d: Endorsement by a reputational academic alliance partner should be beneficial to the success of a firm's IPO when firm have greater capability.*

### **Market condition and the IPO performance**

We summarized causal relationship between alliance type and firms performance. Nevertheless, such relationships may not always be the case, equity market condition may alter these results (Gulati and Higgins, 2003). Refer to equity market, particularly under highly fluctuation situation, market uncertainty become the critical issue. The definition of uncertainty is an individual's perceived inability to predict something accurately (Milliken, 1987), such uncertainty comes from information asymmetry (Milliken, 1987) and incomplete knowledge (Beckman *et al.*, 2004).

Market uncertainty is widely discussed in the organizational and finance literature. Market uncertainty is a kind of systematic or market risk, it is hard to control or reduced by single firm (Beckman *et al.*, 2004). Therefore, this is also one of the reasons that firms feel like to cooperate with other organization to reduce such risk. According to the arrangement of Beckman *et al.* (2004), there are many types of market uncertainty, such as competitive uncertainty, demand uncertainty, input cost uncertainty, and firm-specific uncertainty. However, we adopt the Gulati and Higgins (2003) definition of market uncertainty, more specifically, this study focus on equity market uncertainty.



Lately, researches on venture capital decision-making extended to discuss that the characteristic of uncertainty in the equity market (Gulati and Higgins, 2003). There are big difference in market return confirms the well-documented idea that firms prefer to go public in hot market (Derrien and Womack, 2003). Scholars showed that IPO and seasoned equity issues underperform their benchmarks in the long-run, and under performance is more pronounced for hot-market IPOs (Ritter, 1991; Alti, 2006), means underpricing. Scholar also examined that market timers, identified as firms that go public when the market is hot, issue substantially more equity than cold-market firms do, and the result shows it has almost no relationship to firm- and industry-level characteristics (Alti, 2006). In hot market, double or higher digit underpricing is common phenomenon (Derrien and Womack, 2003).

In the context of inter-firm alliance and academic organization-firm alliance undertaking an IPO when the equity markets are hot, there can also be significant benefits to affiliations with key endorsers, which reduce the firm's involvement of alliance, may generalized influence and help to decrease firm's visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 4a: Endorsement by an industrial alliance partner should be beneficial to the success of a firm's IPO when the equity markets are hot.*

*Hypothesis 4b: Endorsement by an academic alliance partner should be beneficial to the success*

*of a firm's IPO when the equity markets are hot.*

However, we extend main research question that different alliance partners matters firms performance to examine endorsement effect by a reputational alliance partner matters firms' performance when the equity market is hot. In the context of reputational inter-firm alliance and reputational academic organization-firm alliance undertaking an IPO when the equity markets are hot, there can also be significant benefits to affiliations with key endorsers, which reduce the firm's involvement of alliance, may generalized influence and help to decrease firms' visibility, thereby benefits its IPO performance. The study therefore hypothesizes:

*Hypothesis 4c: Endorsement by a reputational industrial alliance partner should be beneficial to the success of a firm's IPO when the equity markets are hot.*

*Hypothesis 4d: Endorsement by a reputational academic alliance partner should be beneficial to the success of a firm's IPO when the equity markets are hot.*

## **Sample and Measurements**

### **Sample**

To test the hypotheses, this study developed a sample of alliances that had gone through an IPO in the U.S. market since 1990 to 2011. Base on research hypotheses, the sampling frame identified from RECAP database, was comprised of 1447 alliances in biotechnology industries. The initial sample of 1447 alliances has reduced to 283 due to the elimination of firms that had

(1) missing data for one or more variables, (2) firms were founded prior to the IPO date. The primary sources of data were the CRSP (Center for Research in Security Prices) new issues database, RECAP of biotechnology industry alliances database, the IPO prospectus of each firm, the Compustat Research Insight database (COMPUSTAT), and the Yahoo! finance of stock price.

## **Measurements**

To test the above hypotheses, we obtain data from several sources as follow:

### **Dependent variable.**

#### *IPO performance*

The dependent variable in this study is IPO performance. IPO can provide critical resources for expansion in the future, due to IPO is a shortcut to access cash from investment of time and resources (Bruton *et al.*, 2009). To measure the IPO performance this study calculated as the first-day closing price minus the offer price, divided by the offer price (Heeley *et al.*, 2007; Bruton *et al.*, 2009).

### **Independent variables**

#### *Alliance partners\_ Industrial and academic partners*

RECAP is a consulting firm specializing in the biotechnology industry. It collects data on biotechnology alliances from three primary sources: biotechnology and pharmaceutical company

press releases and other literature; SEC filings; and company presentations made at investment conferences and other public meetings. Alliances can be between organizations of any type, including firms, academic organizations, government laboratories, etc. One of the database's strengths is that it provides copies of the material contracts filed per the requirements of the SEC and provides some analysis of the data contained therein (approximately 40% of biotechnology agreements are filed as material contracts). The present study adopts RECAP database here to count the number of inter-firm alliance and the number of academic organization-firm alliance. Such alliances in the RECAP reported here include all co-development agreements, development agreements, and research agreements (Perkmann *et al.*, 2011).

#### *Reputational alliance partners \_ Industrial and academic partners*

In biotechnology industry, pharmaceutical firms and biotechnology firms are main players. Whereas, the scale of pharmaceutical firms is bigger than biotechnology firms. Biotechnology firms rely heavily on strategic alliances with pharmaceutical firms to finance their huge expenditures of research and development (Nicholson *et al.*, 2005). The share of biotechnology financing raised through alliances varies with the state of equity markets. When biotech stock prices were relatively low, biotech companies raised more money from pharmaceutical alliances than from all other sources combined. Based on this context, pharmaceutical firms are greater and bigger than biotechnology firms, that is, pharmaceutical firms are more reputation than

biotechnology firms. In inter-firm alliance, a firm alliance with a pharmaceutical firm can be code as 1, and a firm alliance with a biotech firm can be code as 0.

Several metrics are available to operationalize outputs from academic organization-firm alliances (Brown and Svenson, 1988; Perkmann *et al.*, 2011). First, patent applications or patents granted can be used as measures of the technological output of university-industry projects (Perkmann *et al.*, 2011). This study considers publications in peer-reviewed journals are used in academia as a major performance metric. Publications are an indicator of quality as they are subject to a peer review process (Perkmann *et al.*, 2011). The study was employed ABI inform database search engine to measure the amount of publications of an academic organization. Due to ABI/INFORM Complete search engine is one of the biggest academic search engine in business field.

#### *Firm's research and development capability*

Due to capability is the most important determinant of firm performance (Barker, 1998). Researchers frequently use research and development intensity to measure for a firm's capability on research and development expenditures (Helfat, 1997). Research and development intensity represents the research and development expenditure divided by total assets (Bae and Kim, 2003). The data collected from the IPO prospectus (DeCarolis and Deeds, 1999).

#### *Market hotness*

It had been well documented (Ibbotson and Jaffee, 1975; Ritter, 1984) that the market for IPO experiences periods in which the value of firms going public is substantially higher. Ibbotson and Jaffe (1975) first documented the existence of a number of hot markets for IPO during the last 20 years. Theoretically, what appears to happen is that investors are periodically over-optimistic about the earnings potential of young growth companies (Ritter, 1984). These so-called ‘hot markets’ are windows of opportunity which entrepreneurs may use to improve their access to capital by taking advantage of investors’ optimism. However, hot markets are characterized by high volume of IPO activity. During these periods both the number and average value of the IPOs brought to market is significantly higher than during a normal period. In the case of biotechnology, the years 1983, 1986, 1991 and 1992 show all the characteristics of a hot market and have been designated as such by industry analysts (Burrill and Lee, 1993). However, this present study employed NASDAQ index to confirm the market condition. This variable was log-transformed to reduce the effect of extreme values on the analysis.

### **Control variable**

The study included a comprehensive set of control variables to ensure the robustness of the study’s claims.

#### *Firm age*

Firm age at IPO has calculated as the years since the firm’s incorporation date. Younger

firms are subject to a greater likelihood of failure for a variety of reasons (Hannan and Freeman, 1989). Older firms typically have greater levels of slack resources and have gone through more rounds of pre- IPO financing, and may be perceived as less risky by potential alliance partners. Firm age has obtained from the RECAP and CRSP database.

#### *Firm size*

The total assets of the offering firm have used to control for the influence of size on market value. Total asset value has measured prior to the IPO. These figures were reported in the prospectus of each of the IPOs. This variable was log-transformed to reduce the effect of extreme values on the analysis.

#### *Product Stage*

We control variables for technological uncertainty: product stage. We reviewed the RECAP database to determine how advanced each firm's technology was (Pisano, 1991; Pisano and Mang, 1993). However, we categorize formulation, discovery, lead molecule into early stage, and categorize preclinical, phase I clinical trials, phase II clinical trials, phase III clinical trials, BLA/NDA filed, FDA approval into late stage.

### **Empirical Results**

In order to test the hypotheses, this study was employed an ordinary least square (OLS) regression model. Table 1 reports the means, standard deviations and inter-correlations for all

variables used in this study and Table 2 presents our findings with respect to our measures of alliance partner, reputational effect, equity market condition, and capabilities.

First, there are three control variables in our model, include firm age, firm size, and product stage.

Firm age at IPO was calculated as the years since the firm's incorporation date. This present study serve total asset value as firm size, total assets was measured prior to the IPO. There are nine clinical stage of product development in biotech industry, and the study divides product stage into early stage and late stage. As expected, Model I of Table 2 shows that product stage was negatively ( $\beta=-0.144$ ,  $p=0.017$ ) related to firms' IPO performance. However, firm age ( $\beta=-0.012$ , n.s.) and firm size ( $\beta=0.092$ , n.s.) were both non-significant.

Model II test Hypothesis 1a and 1b, which explored the different type of alliance partner. Here, the study did not find support for our hypothesis 1a ( $\beta=-0.024$ , n.s.) and hypothesis 1b ( $\beta=-0.024$ , n.s.). The result shows that industrial and academic alliance partners were non-significantly to firms' IPO performance. The empirical result shows that there is non-significant difference for the relationship between alliance partners and firms' performance. Thus, alliance with industrial or academic organizations no matters firms' performance in biotechnology industry directly.

Model III tests hypothesis 2a and 2b, which focused on the effect of legitimacy signal. Specifically, the study looked at the impact of alliance partners' reputation as a moderate



indicator. The results shown in Model III provide support for Hypothesis 2a, but not Hypothesis

Table 1 Descriptive statistics and correlation matrix (N=283)

	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Firm age	7.24	3.73	2.00	34.00																		
Firm size	9.77	0.95	7.00	12.30	-0.03																	
Product stage	0.17	0.37	0.00	1.00	-0.03	0.17**																
Academic alliance (X1)	0.28	0.45	0.00	1.00	0.01	-0.10†	0.17***															
Inter-firm alliance (X2)	0.72	0.45	0.00	1.00	-0.01	0.10†	-0.17***	-1.00***														
Reputation (R)	1.99	2.80	0.00	9.60	-0.04	-0.19***	0.19***	0.76***	-0.76***													
X1 × R	1.50	3.01	0.00	9.60	-0.03	-0.19***	0.20***	0.81***	-0.81***	0.99***												
X2 × R	0.49	0.50	0.00	1.00	-0.06	0.09	-0.14*	-0.61***	0.61***	-0.35***	-0.49***											
Market equity (M)	7.56	0.59	6.08	8.48	0.20***	0.36***	0.04	-0.10	0.10	-0.18***	-0.16*	-0.02										
X1 × M	2.06	3.35	0.00	8.48	0.03	-0.08	0.17***	1.00***	-1.00***	0.74***	0.79***	-0.60***	-0.05									
X2 × M	5.50	3.44	0.00	8.40	0.01	0.14*	-0.16*	-0.99***	0.99***	-0.75***	-0.80***	0.59***	0.22***	-0.99***								
X1 × R × M	11.01	22.22	0.00	75.61	-0.02	-0.16*	0.20***	0.81***	-0.81***	0.98***	1.00***	-0.49***	-0.12*	0.79***	-0.80***							
X2 × R × M	3.70	3.80	0.00	8.40	-0.06	0.11†	-0.13*	-0.60***	0.60***	-0.34***	-0.49***	0.99***	0.06	-0.60***	0.60***	-0.49***						
R&D (RD)	0.72	3.14	0.02	52.49	0.03	-0.07	-0.04	0.11†	-0.11†	0.09	0.10	-0.07	-0.01	0.11†	-0.11†	0.09	-0.07					
X1 × RD	0.35	3.14	0.00	52.49	0.01	-0.03	-0.03	0.18***	-0.18***	0.15*	0.15*	-0.11†	-0.03	0.18***	-0.18***	0.15*	-0.11†	0.99***				
X2 × RD	0.37	0.49	0.00	2.71	0.15	-0.23***	-0.08	-0.46***	0.46***	-0.35***	-0.37***	0.25***	0.13*	-0.46***	0.47***	-0.37***	0.26***	0.07	-0.08			
X1 × R × RD	1.97	17.16	0.00	285.00	0.00	-0.05	-0.02	0.19***	-0.19***	0.19***	0.19***	-0.11†	-0.05	0.18***	-0.19***	0.19***	-0.11†	0.98***	1.00	-0.09		
X2 × R × RD	0.24	0.41	0.00	2.71	0.04	-0.13	-0.06	-0.37***	0.37***	-0.21***	-0.30***	0.61***	0.03	-0.37***	0.36***	-0.30***	0.61***	0.04	-0.07	0.68***	-0.07	
Performance	0.00	0.12	-0.58	0.36	-0.01	0.07	-0.13†	-0.06	0.06	-0.07	-0.05	-0.09	0.18*	-0.05	0.08	-0.04	-0.08	-0.11†	-0.11†	0.00	-0.11†	-0.05

\*\*\*p<0.001 (two-tailed test); \*\* p<0.01; \* p <0.05; † <0.10

Table 2 Results of endorsement effect regression analyses (N=283)

	I	II	III a	III b	IVa	IVb	IVc	IVd	V a	Vb	V c	V d
Control Variable												
Firm age	-0.012	-0.012	-0.022	-0.022	-0.012	-0.012	-0.008	-0.012	0.028	0.028	0.04	0.024
Firm size	0.092	0.089	0.101	0.101	0.089	0.089	0.073	0.085	-0.142*	-0.142*	-0.152*	-0.148*
Product stage	-0.144*	-0.14*	-0.152*	-0.152*	-0.146*	-0.146*	-0.141*	-0.144*	-0.046	-0.046	-0.058	-0.061
Main effect												
Inter-firm alliance (X1)		-0.024	0.183†		0.002		0.026		-0.565		0.184†	
Academic alliance(X2)		-0.024		-0.183†		-0.002		0.001		0.44		-0.129
Reputation (R)			0.042	-1.156**			-0.011	-0.009			0.067	-0.74*
X1 × R			-0.214**									
X2 × R				1.288**								
Moderator effect												
R&D intensive (RD)					-0.108†	0.019	-0.102†	-0.029				
X1 × RD					0.02							
X2 × RD						-0.128						
X1 × R × RD							-0.055					
X2 × R × RD								-0.079				
M1									0.124	0.204**	0.188**	0.146*
X1 × M									0.463			
X1 × M										-0.452		
X1 × R × M											-0.208**	
X2 × R × M												0.839*
Adjust R2	0.014	0.012	0.032	0.032	0.016	0.016	0.015	0.012	0.034	0.034	0.056	0.045

\*\*\*p<0.001 (two-tailed test); \*\* p<0.01; \* p <0.05; † <0.1

2b. Reputation of academic alliance partners were positively ( $\beta=1.288$ ,  $p=0.005$ ) related to firms IPO performance, but reputation of industrial alliance partners were negatively ( $\beta=-0.214$ ,  $p=0.005$ ) related to firms IPO performance. According to our result, it shows that reputation plays an important role in alliance partner selection.

Model IV test Hypothesis 3a to 3d, which proposed that capability signal matters. Further, this present study proposed that alliance with reputational academic and industrial partners would positively relate to firms' IPO performance when firms had research and development capability. These hypotheses were both not supported. Hypothesis 3a ( $\beta=0.02$ , n.s.) and hypothesis 3b ( $\beta=-0.128$ , n.s.) are not supported, it means capability no matter the relationship between alliance partner and IPO performance. Then, the study tested the reputational endorsement effect under firm has greater capability. However, the results shows non-significant for hypothesis 3c ( $\beta=-0.055$ , n.s.) and hypothesis 3d ( $\beta=-0.079$ , n.s.), it means capability does not matter the relationship between reputational alliance partner and IPO performance. Thus, the results shows reputational partner no matters firm's performance when firm have greater capability in biotechnology industry.

Model V tests hypothesis 4a to 4d, which looked at equity market signals as a moderate indicator. Here, this present study proposed hypothesis 4a and hypothesis 4b that alliance with academic and industrial partners should be positively relate to firms' IPO performance when

equity market is hot. Further, the study proposed Hypothesis 4c and 4d that alliance with reputational academic and industrial partners would be positively relate to firms' IPO performance when equity market is hot. As shown in Model 5, the study found that there is no support in Hypothesis 4a ( $\beta=0.463$ , n.s.) and 4b ( $\beta=-0.452$ , n.s.). However, we found support for Hypothesis 4d, but not Hypothesis 4c. Alliance with reputational industrial partners is negatively ( $\beta=-0.208$ ,  $p=0.006$ ) related to firms' IPO performance when equity market is hot, but positively ( $\beta=0.839$ ,  $p=0.035$ ) related to firms' IPO performance when alliance with academic partners. Thus, the results shows reputational partner matters firm's performance when market are hot in biotechnology industry.

## **DISCUSSION**

Base on the results, we found that alliance with legitimate player matters firm's IPO performance. Reputation is not only an important intangible asset that competitors are difficult to imitate (Boyd *et al.*, 2010), but also a signal to investment community that the biotech firm's potential is somehow endorsed by its partners (Rindova *et al.*, 2005). However, why alliance with prestigious industrial partner would damage IPO performance? From legitimacy view, reputation severed as a social acceptance; in resource-based theory, reputation regarded as a valuable, rare, hard to imitate, and non-substitutable resource. Whereas, in terms of transaction cost theory, small firm can reduce cost by alliance with large and reputational firms, there are

still some potential risks for small firms. When the only resource small firm bring to alliance is a new technology, small firms are most at risk of being taken advantage of by large alliance partners (Alvarez and Barney, 2001). Two premise in this setting. First, firm is able to realize the market potential of new technology. Second, small firms are unable to grow and prosper in alliance, even if their technology has significant market potential. Thus, while these alliances often create economic value, large firms usually acquire most of this value (Alvarez and Barney, 2001). Large firms often learn small firms' new technology easily, whereas it is difficult to imitate large firms' resource and capability for small firms (Alvarez and Barney, 2001).

The findings from empirical results have several implications for strategy research on complementary resource and institutional theory. This study contributes to prior partner selection research by considering both theoretically and empirically the external value of partners' legitimacy and resources for young firms, specifically during the IPO process.

## **Conclusion**

Unlike other previous studies, where research just focus on alliance partner, this study also considers firms' capability and environment condition. Results let us observe that the factors with the highest effect on IPO performance of different alliance partners are, in the case of partners' legitimacy, firms' capability, and market condition must be highlighted. These results constitute an empirical contribution to the study of the success of cooperative agreements

between firms and research organizations.

In this way, the study has obtained a series of conclusions and implications that can be of great use. First, this present study have elaborated and tested a comprehensive theoretical model that identifies the determining factors of IPO performance between industrial and academic partner. Introducing external and internal factors makes a novel contribution to the study of the IPO performance of cooperative relationships as a way to organize and integrate previous studies. I consider that the study is more completely than literature that just discussed internal or external factors.

Another contribution of this study is the approach of academic reputation measurement by academic search engine. In academic area, publications in peer-reviewed journals are act as a major performance metric. However, ABI/INFORM Complete search engine is one of the biggest academic search engine in business field. The present study uses the amount of publications of each academic organization, and the publications act as a measurement of an organization's reputation. Base on this approach, researchers can further refine measurement approach of academic reputation.

This study opens up an array of possibilities for inquiry into the likely legitimation from alliance partner and advantageous resource from firm's own. Future studies not only enrich our understanding of alliance what kind of partner can create superior value, but also explore other

important factors to achieve superior performance in alliance.

To conclude, this study represents a starting point for future research intent to broaden theoretical and empirical evidence about success performance of alliance partner selection. We attempt to make an in-depth analysis of identified factors for success. We also think that the consideration of different alliance partner as a unit of analysis, comparing the different partner in alliance, might offer more specific results for firms' IPO performance. According to the results, it would be interesting to measure performance success for partner's new product stage, that is, comparing the performance by difference between early stage and late stage.

### **Managerial Relevance**

The results cast a series of practice recommendations that may be useful for running and management of alliance. This study argues that the performance of alliance partner selection should highlight the importance of partner's legitimacy. Legitimacy implies the competitive advantage is not only from resource holding but also from legitimacy building. The former is rationally planned while the latter is socially constructed. The study contends the necessity of partner's advantage into account in pursuing the success of any collaboration. Advising small firm should consider partner's social status when decide to enter alliance.

The study can also inform practitioners to judge legitimacy that exists in different alliance types and market condition of collaboration. Legitimacy in industrial collaboration may be



difficult to success as there are still more risks for small firm, such as large firms learn small firms' capability, stole their new technology and even merge. On the other hand, alliance with academic partner may be easy to success; due to there is no competitive or beneficial relationship between them. To fully exploit the value of legitimacy, practitioners have to identify the right contexts and right timing and with right partners.

### **Limitations**

This present study represents a first step in unraveling issues about the partner selection and performance of biotech industry. Like any other researches, the study has several limitations. Despite the construct are based on literature, there are still more refined constructs can be used to test the impact of partner selection on firm performance. For example, the study use industrial and academic alliance partner to operationalize partner types in this study. Further, the study was employ reputational alliance partner to test the impact on firm performance. For example, the study just employed research and development expenditure to represent firm's capability, but there are still many important variables can ensure the robustness of the study's model. More detail constructs may help distinguish the effect more clearly, but the present study cannot acquire more relational data in this study. Using the more refined constructs can better inform us about their impact on a firm's performance.

Further, this study focused on quantitative and directly comparable information of biotech

industry. However, other qualitative factors may also be central to the partner selection and performance of firms. For example, the study examined the amount of paper publication of an academic organization, which reflects an academic organization's reputation. However, we did not capture the effect of content and consistency of an organization's reputation. Therefore, researchers can develop more detailed perspective implications for reputation.

Finally, we adopts the alliance information from RECAP database, RECAP database mainly focus on biotech industry, therefore, this study concentrate on biotech industry, but it is worth exploring other industries. Future researchers should broaden more industries sample to have deep insight into problems.

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