NETWOK RESOURCE STOCKS AND FLOWS:

ALLIANCE PORTFOLIO EFFECTS ON THE VALUE IMPACT OF NEW ALLIANCE FORMATION

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ABSTRACT / RESUME

Does a firm's existing alliance portfolio affect the value that it derives from entering into a new strategic alliance? This paper builds on insights from the resource-based view of the firm and addresses the effect of alliance formation on firm value from an alliance portfolio perspective. We develop hypotheses that are tested using event study methodology and data from the global airline industry on code sharing agreements formed between 1994 and 1998. The results show that, on one side, the market rewards firms entering into strategic alliances with partners that contribute complementary resources that can be combined with the focal firm's own resources, as well as resources that can be combined with network resources accessed through alliance portfolios. On the other side, our results indicate that the market penalizes firms entering into alliances that increase the competitive conflict with existing alliance partners. These findings support the view that alliance portfolios affect the performance of firms entering into strategic alliances. This study concludes that network resources accessed through interfirm alliances should not only be evaluated on their standalone and dyadic attributes but also in the context of alliance portfolios.

Comment le portefeuille d'alliances dont dispose une firme affecte-t-il la valeur créée par la formation d'une nouvelle alliance ? Ce papier s'appuie sur la théorie des ressources pour formuler des hypothèses qui lient la création de valeur associée à la formation d'une nouvelle alliance : (a) à l'étendue des synergies existant entre les nouvelles ressources auxquelles accède la firme grâce à la nouvelle alliance et les autres ressources détenues par la firme ou auxquelles elle a accès par le biais de son portefeuille d'alliances et (b) à l'étendu des overlaps existant entre les nouvelles activités rendues possibles par la nouvelle alliances et les activités existantes de la firme et de tous les partenaires de son portefeuille d'alliances. Ces hypothèses sont testées sur un échantillon d'alliances formées par des compagnies aériennes entre 1994 et 1998 en utilisant une méthode d'*event study*. Les résultats confirment que la valeur créée par la formation d'une nouvelle alliance n'est pas uniquement fonction des ressources de la firme elle-même et des ressources auxquelles lui donne accès la nouvelle alliance, mais dépend aussi de l'ensemble des ressources disponibles dans le portefeuille d'alliances de la firme et qu'elle ne possède pas en propres.

KEYWORDS

Resource-based view of the firm, resource stock and flow, network resources, value creation, strategic alliances, alliance portfolios, event study method, airline industry

INTRODUCTION

How do stocks and flows of beyond firm boundary resources affect firm value? The traditional resource-based view of the firm (henceforth RBV) has long considered firms as independent entities that create value through the use and deployment of superior resources that reside within firm boundaries (Barney, 1991; Penrose, 1959; Peteraf, 1993; Rumelt, 1984; Wernerfelt, 1984). With the increasing importance of interfirm alliances as a strategic device to obtain preferential access to strategically critical resources (Ahuja, 2000; Das & Teng, 2000; Eisenhardt & Schoonhoven, 1996; Gulati, 2007) recent extensions of the RBV to "interconnected firms" - i.e. firms that participate in interfirm alliances - have started to include beyond firm boundary resources, i.e. network resources, in the analysis of competitive advantage and value creation (Dyer & Singh, 1998; Gulati, 2007; Lavie, 2006).

An important stream of empirical research has examined the influence of partner features on the extent to which a firm can create value by accessing network resources through a portfolio of interfirm alliances (Bae & Gargiulo, 2003; Gulati & Higgins, 2003; Lavie, 2007; Stuart, 2000; Stuart, Hoang, & Hybels, 1999). While these studies have identified factors on the partner level of analysis that explain value creation, they have not examined factors on the network resource level of analysis that contribute to the explanation of value creation. Furthermore, the extant literature on the value creation mechanisms involving network resources has either focused on flows (Ahuja, 2000a; Gulati, 1999; Jensen, 2003; Stuart, 1998) or stocks (Lavie, 2006, 2007) of such resources but has not considered network resource stocks and flows simultaneously (Dierickx & Cool, 1989). However, to shed new light on how new network resource flows, i.e. additions, to an interconnected firm's existing stock of own and network resources affect value creation, the simultaneous examination of resource stocks and flows is needed.

Given the nature of this gap in the literature, we examine the issue of network resource stocks and flows in the empirical context of strategic alliances – a widespread device used to obtain access to network resources (Ahuja, 2000; Chung, Singh, & Lee, 2000; Das & Teng, 2000; Eisenhardt & Schoonhoven, 1996; Gulati, 2007). In the alliance context, network resource flows can be thought of as alliance formations (Ahuja, 2000a; Gulati, 1999; Jensen, 2003; Stuart, 1998) and network resource stocks can be conceptualized through firms' alliance portfolios (Lavie, 2006, 2007). In fact, in today's business landscape, most firms no longer rely on a single alliance as a network resource access mechanism: Many firms access network resources through an

alliance portfolio comprised of multiple simultaneous strategic alliances with different partners (Bae & Gargiulo, 2004; George et al., 2001; Hoffmann, 2005; 2007; Lavie, 2006; 2007; Parise & Casher, 2003; Stuart, 2000; Vassolo et al., 2004; Wassmer, in press).

As no one firm can possess all the strategically critical resources to ensure long-term survival, growth, and success, firms often add new network resources to their existing resource stock – and thus build their alliance portfolios - in an incremental fashion over time, through the formation of individual alliances. The simultaneous examination of alliance formations and alliance portfolios are, therefore, an ideal setting to further our understanding of network resource stocks and flows. Surprisingly, prior alliance studies have treated alliance formation and alliance portfolios as two separate and unrelated research issues. The stream of alliance research that has examined the effects of alliance formations on firm value identified explanatory factors on various levels of analysis such as the individual alliance (Chan et al., 1997; Chen, Hu. & Shieh, 1991; Das, Sen, & Sengupta, 1998; Koh & Venkatraman, 1991), the focal firm (Kale et al., 2002; Reuer et al., 2002), the partner firm (Crutchley, Guo, & Hansen, 1991; Das et al., 1996), and the external environment (Madhavan & Prescott, 1995; Merchant & Schendel, 2000). However, this literature stream has not linked alliance formation to alliance portfolios and thus ignored explanatory factors on the alliance portfolio level of analysis that can further explain the effect of alliance formation on firm value.

The objective of this paper is to address these gaps in the literature by examining the effect of a newly formed alliance on firm value from the perspective of the alliance portfolio to which this new alliance is added. More specifically, we apply a focal firm[1] perspective and focus on the network resources (Gulati, 2007; Lavie, 2008) which a focal firm adds - by forming a new alliance - to its existing stock of network resources to which it has access through its alliance portfolio. Therefore, to better understand the effect of network resource stocks and flows on firm value, we simultaneously take into account new network resource flows (i.e. resources accessed through a newly formed alliance a focal firm is entering into), the focal firm's own as well as existing network resources (i.e. resources accessed through the focal firm's alliance portfolio), and the resources of the focal firm's existing alliance partners.

The remainder of this paper is structured as follows. In the next section, we briefly review prior research in three areas relevant to this study: (i) the RBV, network resources, and value

[1] By focal firm we refer to the firm that is entering into a new alliance to access new network resources.

creation, (ii) the effect of alliance formation on firm value and (iii) alliance portfolios. We then develop theory and hypotheses, which we test by using event study methodology and data from the global airline industry on code sharing agreements formed between 1994 and 1998. Lastly, we conclude the paper with a discussion of the findings, limitations of this study, and highlight avenues for future research.

LITERATURE REVIEW

The RBV, Network Resources, and Value Creation

The RBV conceptualizes firms as heterogeneous bundles of resources and aims at explaining under what conditions these resources enable firms to achieve and sustain competitive advantage (Barney 1991, Penrose 1959, Rumelt 1984, Wernerfelt 1984). While the traditional RBV does not take resources that reside beyond firm boundaries into account, recent extensions of the RBV have also included network resources in the analysis of competitive advantage and rent generation (Dyer & Singh 1998, Lavie 2006). Network resources are resources "[…] that a firm's partners may possess and are available to a focal firm through its connections with those firms" (Gulati, 2007: 8). Thus, by forming a strategic alliance a firm can obtain preferential access to network resources that can be synergistically combined with the firm's own resources and can thus create rent generating resource combinations that otherwise would not be available to the partnering firms (Chung et al., 2000; Dyer & Singh, 1998; Lavie, 2006; Rothaermel, 2001).

Although the extant literature has advanced our understanding on how network resources create value and affect firm performance (Bae & Gargiulo, 2003; Gulati & Higgins, 2003; Lavie, 2007; Stuart, 2000; Stuart, Hoang, & Hybels, 1999), it has not examined the issue of interdependencies between the network resources firms access through multiple simultaneous alliances with different partners. However, such network resource interdependencies are important factors in explaining the value creation mechanisms in alliance portfolios. Depending on whether such interdependencies are of sub- or super-additive nature, the value created by an alliance portfolio can be greater or smaller than the sum of the values created by each individual alliance in the portfolio (Vassolo et al., 2004). Moreover, from a stock and flow perspective little is known about the interdependencies that occur when new resources flow into an existing stock of network resources. Thus, to advance the understanding of the role of network resources in

value creation there is a need to further examine the types of interdependencies that can arise between these resources from both a stock and flow as well an alliance portfolio perspective.

Furthermore, the bulk of the extant RBV literature that focuses on synergistic and value creating resource alignment in strategic alliances adopts a single alliance level of analysis perspective in the sense that it focuses on synergistic alignment of the resources that a focal firm and its alliance partner contribute to an individual alliance (Arora & Gambardella 1990, Das & Teng 2000, Dyer & Singh, 1998; Chung et al. 2000, Mowery, Oxley, & Silverman 2002, Rothaermel 2001). Although this single alliance perspective has significant explanatory power, it does not tell the entire story of how network resources can create value for the focal firm because it only accounts for the services that network resources render in combination with the focal firm's own resources and assumes away any type of synergistic and value creating resource combinations on the alliance portfolio alliance level of analysis. In other words, such a single alliance level of analysis perspective captures only a fraction of a network resource's value creating capacity: a network resource may render additional services and thus create additional value when combined with some of the focal firm's network resources accessed through other alliances. Indeed, Lavie (2007: 1192) notes that a focal firm "[…] may create value by combining network resources of distinct partners, and thus enjoy synergies that are unavailable to individual partners in its alliance portfolio. For example, a firm that specializes in systems integration may combine the hardware platforms of one partner with the software development expertise of another partner in the course of system implementation projects."

Prior Research on the Effect of Alliance Formation on Firm Value

A major stream in the alliance literature is concerned with the performance consequences for firms entering into alliances (Gulati, 1998). Various researchers have measured the performance implication of alliances by taking a market-based perspective, using firm value as a proxy measure and applying event study methodology to track abnormal stock market returns following alliance formation announcements in order to isolate the performance effect of individual alliances.

Studies in this line of research show that the effect of alliance formation on firm value can be explained through a broad range of factors on different levels of analysis. By taking an alliance level perspective, various authors have identified a number of factors that explain the

differentials in the stock market's reaction to alliance announcements including the alliance's functional scope (Chan et al., 1997; Das, Sen, & Sengupta, 1998; Koh & Venkatraman, 1991), size (Chen, Hu, & Shieh, 1991), geographic scope (Chung, Koford, & Lee, 1993; Reuer & Koza, 2000), governance structure (Koh & Venkatraman, 1991), and relatedness to the parent firms' operations (Koh & Venkatraman, 1991; Merchant & Schendel, 2000; Park & Kim, 1997; Reuer & Koza, 2000). On the partner level of analysis, research has identified the following factors that determine the value that firms derive from their alliance formations: the relatedness of a partner's operation to the alliance (Park & Kim, 1997), the partner's industry domain and its relatedness to the focal firm (Chan et al., 1997; Koh & Venkatraman, 1991; Park & Kim, 1997), the relative size of the partner (Chan et al., 1997; Crutchley, Guo, & Hansen, 1991; Das et al., 1998; Koh & Venkatraman, 1991), and the degree of relational embeddedness between partner firms (Gulati & Wang, 2003). Moreover, variation in the stock market's reaction to alliance formations has also been attributed to focal firm level characteristics such as the firm's alliance experience (Anand & Khanna, 2000; Reuer, Park, & Zollo, 2002) or the existence of a dedicated alliance function (Kale, Dyer, & Singh, 2002). Lastly, some studies have examined the impact of the industry and competitive context and found that both explain the abnormal stock market returns following alliance formations (Madhavan & Prescott, 1995; Merchant & Schendel, 2000).

To summarize, the bulk of the existing studies that address the issue of how alliance formation affects firm value view strategic alliances as stand-alone transactions rather than as a part of an entire alliance portfolio and thus have ignored factors on the alliance portfolio level of analysis that can explain heterogeneity in firms' abnormal stock market gains following alliance formations.

Prior Research on Alliance Portfolios

Alliance portfolios - i.e. the engagement of firms in multiple simultaneous strategic alliances with different partners - have become a ubiquitous phenomenon in today's business landscape and an increasingly important and promising research area in the widely-researched field of strategic alliances (Anand & Khanna, 2000; Bae & Gargiulo, 2004; Bamford & Ernst, 2002; Doz & Hamel, 1998; George et al., 2001; Hoffmann, 2005; 2007; Lavie, 2006; 2007; Parise & Casher, 2003; Stuart, 2000; Vassolo et al., 2004; Wassmer, in press). Research tackling the alliance portfolio phenomenon has started to accumulate around three main issues: (i) the

emergence of alliance portfolios, (ii) the configuration of alliance portfolios, and (iii) the management of alliance portfolios (Wassmer, in press).

Especially, the configuration of alliance portfolios is a topic that has received considerable attention and existing studies have established a performance link by explaining differentials in performance through variation in firms' alliance portfolio configurations. Scholars in this line of research have examined configuration parameters such as portfolio size (Ahuja, 2000b; Baum et al., 2000; Deeds & Hill, 1996; Gulati, 1999; Shan, Walker, & Kogut, 1994; Stuart, 2000), partner characteristics (Baum et al., 2000; Goerzen & Beamish, 2005; Gulati & Higgins, 2003; Lavie, 2007; Stuart et al., 1999), as well as structure and tie strength (Bae & Gargiulo, 2004; Capaldo, 2007; Dyer, Singh, & Kale, 2008; Koka & Prescott, 2008; Rowley et al., 2000; Tiwana, 2008; Zaheer & Bell, 2005).

Despite the accumulated research on alliance portfolio configuration, there is only a limited understanding and scant empirical evidence on the performance consequences of adding a new alliance to a firm's existing alliance portfolio. More specifically, little work has examined the impact of synergistic and conflicting interdependencies between multiple alliances and alliance partners (Wassmer, in press). A notable exception is Vassolo et al.'s (2004) study of portfolios of biotechnology alliances which models super- and sub-additive interdependencies between individual alliances and shows that when firms invest in multiple and competing alliances, correlations among the outcomes of the alliances lead to a sub-additive value of the portfolio, and when firms invest in multiple projects, fungibility of shared resources with the projects leads to a super-additive value of the portfolio.

The extant literature has identified synergies and conflict in alliance portfolios on two different levels: They can occur between individual alliances (Vassolo et al., 2004) and also between the partners (Parise & Casher, 2003) within a focal firm's alliance portfolio. Such alliance portfolio level synergies and conflict create what can be referred to as the alliance portfolio effect which makes the overall value created by an alliance portfolio greater or smaller than the sum of the values created by each individual alliance in the portfolio (Vassolo et al., 2004).

On the more general level, synergies in alliance portfolios include knowledge transfer across alliances (Powell et al., 1996), economies of scale and scope (Doz & Hamel, 1998), and the development and institutionalization of firm-level alliance capability (Kale et al., 2002). More

specifically, synergies between partners in an alliance portfolio occur when partners impact one another positively because they (i) are both part of the same network, (ii) provide complementary offerings, (iii) promote similar standards or infrastructure, (iv) learn from each other, or (v) view the presence of other members in the portfolio as a way to mitigate their own risk (Parise & Casher, 2003). Conflict in alliance portfolios, on the other side, refers to redundancy or competitive overlap between alliances and partners in the portfolio (Baum et al., 2002; Gimeno, 2004, Gomes-Casseres, 1996; Lavie, 2007; Silverman & Baum, 2002). Conflict between a focal firm's alliance partners occurs when they impact one another negatively because they (i) are members of competing networks, (ii) are strong rivals in an industry, or (iii) promote competing technologies (Parise & Casher, 2003).

To sum up, synergistic and conflicting interdependencies are important concepts to better understand alliance portfolios because they are critical in determining the overall value that firms derive from their alliance portfolios.

THEORY AND HYPOTHESES DEVELOPMENT

Firm Resources, Strategic Alliances, and Value Creation

In this study, we divide an interconnected focal firm's resources conceptually into: (i) own resources - i.e. resources that reside within firm boundaries and are owned and controlled by the focal firm - and (ii) network resources - i.e. resources that reside beyond firm boundaries but which the focal firm accesses through its strategic alliances (Gulati, 2007; Lavie, 2007, 2008). We view a strategic alliance as an agreement between a focal firm and one or more partners regarding the joint coordination and deployment of one or more resource combinations (Dussauge, Garrette, & Mitchell 2000). A resource combination that is coordinated and deployed through a strategic alliance is therefore comprised of focal firm own resources as well as network resources, i.e. the resources the focal firm's partner endows to the alliance. Furthermore, we conceptualize a focal firm's alliance portfolio as all active strategic alliances at a given point in time and more specifically we exclude past and inactive strategic alliances, i.e. alliances that have become inactive due to termination, from the analysis.

In their quest to create and deploy new rent generating resource combinations, firms frequently add new network resources to their existing resource stock by adding new alliances to their alliance portfolios. We build on the existing link between network resources and value

creation (Lavie, 2007; Stuart, 2000) and argue that from an alliance portfolio perspective the network resource contribution of a new alliance can be evaluated through the new alliance's potential to (i) create synergistic resource combinations involving existing network resources that the focal firm accesses through other ongoing alliances with different partners and (ii) increase market overlap between the focal firm and its existing partners. Thus, to examine the effect of the interplay between a focal firm's existing resource stocks and inflows of new network resources, we simultaneously take into account the following resources: (i) the new network resources that a focal firm accesses through a newly formed alliance, (ii) the focal firm's own resources, (iii) the focal firm's existing network resources to which it has access through its alliance portfolio, and (iv) the resources of the focal firm's existing alliance partners.

A New Alliance's Potential to Create Synergistic Resource Combinations with Existing Network Resources

If the value an alliance creates for the focal firm is determined by the resources contributed by the alliance partner (Lavie, 2007), the value creation potential of an alliance can be conceptually partitioned in two parts: The value creation potential (i) on the single alliance level and (ii) on the alliance portfolio level. From the perspective of the focal firm, a new alliance that is added to the firm's existing alliance portfolio can therefore produce two fundamental types of synergistic and value creating resource combinations. First, and in line with the extant literature that takes a single alliance perspective, the network resources contributed by a new alliance can be synergistically combined into a value creating combination with one or more of the focal firm's own resources (Arora & Gambardella 1990, Chung et al. 2000, Mowery et al. 2002, Gulati 2007, Rothaermel 2001). In Figure 1 this is depicted through combination $R_{i1}R_{h1}$ which is deployed through new alliance *ih*. Second, by taking an alliance portfolio perspective, a network resource provided through a newly formed alliance, i.e. resource R_{h1} contributed through the new alliance *ih*, may also be synergistically combined with network resources which the focal firm accesses through a different alliance with a different partner, i.e. resource R_{j1} contributed through the existing alliance *ij*. Such synergistic alignment of new and existing network resources, i.e. combination $R_{j1}R_{h1}$, represents an opportunity to create additional value above and beyond the value that is created on the single alliance level by the resource combination $R_{i1}R_{h1}$.

Insert Figure 1 about here

To illustrate an example of such a synergistic and value creating combination of network resources in the empirical context of this study, assume that airline *i* has an existing code-sharing alliance with airline *j* regarding the access to specific network resources, i.e. both firms' domestic destinations. Consequently, the alliance results in a number of synergistic resource combinations in the form of routes connecting *i's* domestic destinations with *j's* domestic destinations and vice versa. Firm *i* can now offer the route from *j's* domestic destinations $D_{j1}…D_{jn}$ via *j's* hub to its own hub and from there to its domestic destinations $D_{i1}…D_{in}$ and international destinations $I_{i1}…I_{in}$. Let us further assume that *i* enters into a new code-sharing alliance with airline *h* regarding the access to specific network resources, i.e. both firms' domestic destinations. While *i* can now not only offer routes from/to its domestic destinations to/from *h's* domestic destinations, it has also the opportunity to leverage its existing alliance with *j*. In other words, *i* can create additional synergistic and rent generating resource combinations by recombining its existing network resources $D_{j1}…D_{jn}$ with the new network resources $D_{h1}…D_{hn}$ to offer more comprehensive route offerings from/to $D_{j1}…D_{jn}$ to/from $D_{h1}…D_{hn}$. An empirical example for such a combination is the following case. A *Lufthansa* customer in Spain who is interested in traveling from Jerez de la Frontera (Spain) to Bangkok (Thailand) can book a *Lufthansa* issued ticket via the firm's website with the trajectory Jerez de la Frontera – Madrid - Frankfurt – Bangkok. Even though all individual flight segments carry a *Lufthansa* code, for certain departure times *Lufthansa* does not operate any of the individual flight segments and instead combines some of its network resources that are provided by different partners in its alliance portfolio: the flight segments Jerez de la Frontera – Madrid and Madrid - Frankfurt are operated by *Lufthansa's* partner *Spanair* and the segment Frankfurt – Bangkok is operated by *Lufthansa's* partner *Thai Airways*. Even though the Spanish customer could book the journey through a regular travel agent, who simply combines suitable flights of various non-allied carriers[2], by buying the *Lufthansa* branded ticket the customer will be able to enjoy a series of extra benefits such as a

[2] A search on www.expedia.es for the itinerary Jerez de la Frontera (Spain) to Bankok (Thailand) displayed the following booking options comprised of individual flight segments operated by non-allied carriers: (i) Jerez de la Frontera – Barcelona (operated by *Spanair*), and Barcelona – London – Bangkok (both flights operated by *British Airways*) or (ii) Jerez de la Frontera – Madrid (operated by *Iberia*), Madrid – Munich (operated by *Spanair*), and Munich – Bangkok (operated by *LTU*).

seamless itinerary where layover times are minimized, full service support if one connection is missed, extra baggage allowance, lounge access at all airports and an executive mileage bonus if the customer is a gold or silver card holder of *Lufthansa's* frequent flyer program.

From an RBV perspective, a firm's value can be tied to its endowments of own and network resources as well as the value creating services rendered by any combinations of these resources. A resource combination comprised of new and existing network resources, such as combination $R_{j1}R_{h1}$ depicted in Figure 1, exploits the value creating capacity of the newly contributed network resource R_{h1} by increasing the number of value creating resource combinations it can produce for the focal firm. Thus, when entering into a new alliance, the focal firm may not only evaluate the new alliance's potential to create value through resource combinations on the single alliance level but also on the alliance portfolio level. Because of the efficient market hypothesis that assumes that stock prices already reflect all known information, investor expectations and consequently the stock market's reaction to the formation of a new alliance should reflect the new alliance's potential to create value on both the single alliance as well as alliance portfolio level. However, prior research has not yet disentangled and tested the value creation effects on the single alliance level from those on the alliance portfolio level of analysis. Indeed, some alliances may not posses this additional value creation potential because the network resources they contribute to the focal firm may only be aligned with the focal firm's own but not with its existing network resources due to a lack of synergies between the existing and new network resources. Thus, we expect that the higher a new alliance's potential to create value on the alliance portfolio level of analysis, i.e. value above and beyond the value that is created by resource combinations on the single alliance level of analysis, the more value this new alliance creates for the focal firm. Therefore, we hypothesize:

> *Hypothesis 1: The greater a newly formed alliance's potential to create synergistic combinations of new and existing network resources, the greater the abnormal stock market return associated with the announcement of the new alliance.*

A New Alliance's Potential to Increase Market Overlap between the Focal Firm and Its Existing Partners

Prior research has suggested that conflict between alliance partners on the single alliance level of analysis can arise through opportunistic behavior or by defecting from mutual agreement

(Hamel, 1991; Parkhe, 1993). According to this view, the cause for conflict is internal to the alliance because the opportunistic behavior or defection from agreement relates to activities performed in the alliance. However, it may also be that causes for conflict between alliance partners are external to the alliance in the sense that one of the partners undertakes a strategic move that is not related to the activities performed in the alliance, but may nonetheless spills over into the relationship between the alliance partners. For example, such conflict between alliance partners can occur when one partner imitates the other partner's technology or enters into the other partner's market domain and thus increases the market domain overlap between the two firms (Kogut, 1989).

In this paper, we adopt such an external perspective and view conflict between the focal firm and a partner in its alliance portfolio as the outcome of increased market overlap between the two firms. Generally, market overlap essentially turns two firms into competitors and arises when two firms deploy similar resource combinations that lead them to compete in the same market by offering similar products or services (Chen 1996; Kogut, 1989). More specifically, we focus on market overlap that is caused through the interplay between a new alliance the focal firm is entering into and the resource combinations that the focal firm's partners deploy privately. A newly formed alliance may be ideal from a synergy creating perspective because it provides the focal firm with access to valuable network resources that enable rent generating resource combinations but at the same time it may also be problematic because it can create or increase market overlap and thus conflict between the focal firm and one or more existing partners of other ongoing alliances in the focal firm's alliance portfolio. A newly formed alliance has the potential to create such conflict between the focal firm and an existing partner of another ongoing alliance when the new alliance enables one or more resource combinations that overlap in one or more market domains with one or more resource combinations that are privately deployed by the existing partner. Such market overlap essentially alters the competitive positioning of the focal firm vis-à-vis this partner because the resource combinations enabled by the new strategic alliance are similar and thus in direct competition with one or more resource combinations deployed by the focal firm's existing alliance partner.

Figure 2 illustrates this case. Focal firm *i* has entered into new alliance *ih* with partner firm *h* through which it deploys resource combination $R_{i1}R_{h1}$. Furthermore, focal firm *i* is also engaged in alliance *ij* with partner firm *j*. As shown in Figure 2, the resource combination $R_{i1}R_{h1}$ that focal

firm *i* deploys through new alliance *ih*, overlaps with partner *j*'s own resource combination $R_{j2}R_{j3}$ – creating market overlap between focal firm *i* and partner *j* and turning the two firms essentially into competitors. This market overlap between focal firm *i* and partner *j*, caused by alliance *ih*, can affect the relationship between *i* and *j* and spill over into their alliance *ij*.

Insert Figure 2 about here

By accessing network resources through strategic alliances firms incur both costs and benefits (Buckley & Casson, 1988; Koh & Venkatraman, 1991; Madhok & Tallman, 1998; Park & Zhou, 2005; White & Lui, 2005) and the economic value that a firm derives from an alliance can be thought of as the difference between the rents earned from all resource combinations deployed through the alliance and the costs associated with transacting through the alliance (Madhok & Tallman, 1998). Market overlap between the focal firm and an existing partner, caused by one alliance as described above and depicted in Figure 2, can increase the coordination costs for other ongoing alliances (Porter & Fuller, 1986; Koh & Venkatraman, 1991; Moxon & Geringer, 1985). Such costs can occur due to the increased competitive intensity between the focal firm and the existing partners that are affected by the newly formed alliance. Indeed, it has been argued that the greater the market domain overlap between two firms, the greater the competitive intensity between them and the higher the likelihood of a defensive move (Baum & Korn, 1996; Chen & MacMillan 1992, Chen & Miller 1994). Consequently, any increase in market domain overlap between the focal firm and an existing alliance partner caused by a newly formed alliance will exacerbate the competitive intensity between the two firms. This in turn increases the likelihood that the existing alliance partner will undertake a defensive move such as threatening to withdraw from the alliance with the focal firm (Park & Russo 1996). To address such a threat and resolve the conflict, the focal firm will have to spend more time and effort on the alliance in order to re-establish trust and goodwill with the partner (White & Lui, 2005). The focal firm will therefore incur higher transaction and coordination costs associated with this alliance due to the additional conflict resolution costs, which reduces the overall value the firm is able to derive from the alliance (Madhok & Tallman, 1998).

To summarize, when a newly formed alliance creates or increases market overlap between the focal firm and partners of other ongoing alliances, the focal firm will face increased transaction and coordination costs due to additional conflict resolution costs. Such additional costs essentially reduce the overall value the focal firm is able to derive from its alliances. Therefore, we hypothesize:

> *Hypothesis 2: The greater a newly formed alliance's potential to create resource combinations that overlap with resource combinations of existing partners, the lower the abnormal stock market return associated with the announcement of the new alliance.*

METHODS

Empirical Setting

Global air transport industry. The empirical setting for testing the hypotheses called for an industry in which firms regularly engage in strategic alliances, maintain entire alliance portfolios, and where the resources contributed through a new alliance can be clearly identified. For that reason, we chose the air transport industry as the empirical setting for this study. More precisely, we limit the study to international airlines operating in the segment of scheduled passenger air transportation corresponding to the 1987 U.S. Standard Industrial Classification (SIC) code 4512. We exclude scheduled freight air transportation, nonscheduled chartered passenger air transportation, nonscheduled chartered freight air transportation, and other nonscheduled air transportation. As various international airlines are still fully or partially owned by the government of their respective country of origin, we took a global industry focus to achieve a homogeneous and large enough sample of publicly traded airlines. Overall, the airline industry is an ideal empirical setting for this study because reliable data on airline companies, route networks, air traffic, and alliance formation is publicly available and information on airlines' newly formed alliances as well as existing alliance portfolios can be reliably constructed.

The time period chosen for this study is 1994-1998. The five year time window is in line with existing studies that have used this industry setting (e.g. Gimeno, 2004). While the 1980s in the airline industry were characterized by a reorganization of the airlines' route structures into hub-and-spoke systems, the creation of frequent flyer programs, and the emergence of computerized reservation systems (Brueckner, 2001), the 1990s were characterized by the

formation of alliances amongst airline companies in order to overcome existing regulatory restrictions concerning entry into foreign markets (Gimeno, 2004). Such alliances between air carriers evolved from dyadic code sharing agreements in the late 1980s until the mid/late 1990s to multi-partner alliances or alliance constellations such as Star Alliance, One World, or Sky Team in the late 1990s and the beginning of the new millennium. As the focus of this study lies on dyadic code sharing agreements, i.e. agreements for specific routes, rather than alliance constellations, the time period 1994-1998 is a particularly suitable period because it precedes the formation of most of the major alliance constellations and therefore eliminates confounding effects of the alliance constellation phenomenon.

Strategic alliances amongst airlines. According to Oum, Park, and Zhang (2000), cooperation between airlines focuses on a wide range of activities aiming to reduce costs as well as to enhance revenues. On the cost reducing side, airlines cooperate on joint ground handling, IT systems sharing and development, fuel purchase, maintenance, and cabin crew exchanges. To enhance revenues, cooperation mainly occurs regarding code sharing, block space agreements, flight schedule coordination, joint advertising and marketing, and frequent flyer program linkages.

For an airline the most critical resource to achieve competitive advantage is its route network, i.e. access to a wide range of destinations (Borenstein, 1992; Doganis, 2001; Holloway, 1998). Indeed, airlines that dominate service at a particular airport have a strategic advantage over its competitors serving that airport as they tend to charge higher average fares on routes from and to the airport (Borenstein, 1989) and attract a disproportionate share of passengers who originate their trips at the airport (Borenstein, 1992). As it is impossible for a single airline to create a global route network, code sharing alliances amongst air carriers are common in order to obtain access to new markets and grow globally. The *International Civil Aviation Organization (ICAO)* defines code sharing as the practice whereby one carrier *i* permits another carrier *j* to use its airline designator code on a particular flight of *i*, or where two carriers share the same designator code on a particular flight (ICAO Circular 296-AT/110, 1997). In other words, a code sharing agreement permits carrier *i* to sell a transportation service on a route branded under *i*'s name and airline designator code when the service is in fact operated by carrier *j*. Such code sharing alliances between international air carriers are essentially responses to the regulatory

restrictions on international routes and market entry on routes between given countries (Brueckner, 2001). Through code sharing with another carrier, an airline can indeed offer service to a particular destination for which it does not have route authority. However, for airlines such code sharing alliances are not only a means to expand into new markets previously inaccessible to them but also to develop existing markets through the extra traffic generated by the feed from the new destination (Doganis, 2001). For example, the Lufthansa-United alliance launched in 1993, enabled United to open up new markets in Eastern Europe via Lufthansa's hub but also offer some of their domestic destinations to connecting Lufthansa passengers.

Technically, the extant literature distinguishes between different types of strategic alliances between airlines. Oum, Park, and Zhang (1996) distinguish between two types of code sharing alliances: (i) complementary codesharing and (ii) parallel codesharing. Complementary codesharing refers to situations in which two airline partners link their route networks and establish a new complementary network. In complementary codesharing, each airline is the sole operator on a particular route within the network. For example, Delta Air Lines and Air France codeshare on the route Atlanta - Paris, but Air France is the sole operator. Parallel codesharing refers to the situation in which two airline partners serve the same route, allowing them to join their resources and operations and provide more frequent flights to passengers on that route. For example, Lufthansa and United Airlines codeshare on the route Chicago - Frankfurt and operate both on that route. In the context of this study, we empirically define a strategic alliance as an agreement between two air carriers to code share, be it complementary or parallel code sharing, on one or more routes.

Data

Sample firms. The sampling process in this study is similar to the one described by Gimeno (2004). As a first step, we started with the *Airline Business*[3] *Top 150 Airline Ranking*, which lists the world's top 150 airlines by revenues in a given year. As a first step, we created a subset of airlines by selecting all companies that have ranked in the top 100 at least once during the period of study. Moreover, as we focus on scheduled international passenger air transportation we eliminated cargo, charter/leisure, pure domestic, and low cost airlines from the subset. Next, we excluded all airlines in the subset whose shares have not been traded on the local

[3] Airline Business is the leading monthly industry magazine for strategy related issues of airlines.

public stock exchange of the airline's country of origin during any of the years of study and for which the daily stock market returns could not be obtained from the *Thomson Financial Datastream* database. Furthermore, we eliminated air carriers that did not report route statistics in the *ICAO Traffic by Flight Stage (TFS)* annual digest of statistics. This elimination process resulted in a final sample of 24 internationally operating airlines from 19 countries.

Code sharing agreements. As a first step, we identified 259 passenger traffic related code sharing agreements formed by the sample firms during the period 1994-1998 from the *Factiva* press database in which we searched major news and business publications as well as major industry specific publications. In this search, we only included announcements in which the routes and the respective operating partner were explicitly specified. In the case of multiple announcements of the same event, we selected the announcement with the earliest date to be consistent with the efficient market hypothesis which suggests that the identical subsequent news will have no additional effect on the stock price.

Next, we excluded 44 code sharing announcements that were still in the planning or memorandum of understanding phase or were awaiting government approval. we also excluded 19 announcements for which data from the *Thomson Financial Datastream* was available but did not occur reliable, i.e. for which the return index was reported as zero over a long period of time, and 35 announcements for which the route statistics for the focal firm's partner were not contained in the *ICAO Traffic by Flight Stage (TFS)* annual digest of statistics. This elimination process resulted in a total of 161 usable code sharing announcements. As expected, the sample contains more events for larger airlines and for airlines that have a larger domestic market. In line with the trends in the industry, the sample also contains more events for the later years in the observation period.

As a next step, we then identified confounding events for each of the 161 code sharing announcements (McWilliams & Siegel, 1997). Confounding events included CEO or board changes, posting of operating results, stock splits, plane crashes, mergers and acquisitions, and job cuts. A total of 18 observations were affected through confounding events. Table 1a shows the distribution of observations by year and Table 1b shows the distribution of sample firms and observations across countries.

Insert Tables 1a and 1b about here.

Alliance portfolio data. To identify and map an airline's alliance portfolio in a given year, we used the *Airline Business Alliance Survey*, which is a comprehensive survey tracking all active airline alliances and code sharing agreements up to the month prior to publication[4]. In addition, we complemented the alliance survey data with our own alliance announcement data obtained from the *Factiva* press database search. Since the focus of this study lies on passenger transportation, we included only alliances in a firm's alliance portfolio that were passenger related (e.g. code sharing agreements, blockspace agreements, pro-rate agreements etc.), marketing related (frequent flyer program partnerships, joint marketing and sales etc.), or operations related (e.g. joint ground handling, joint purchasing, joint terminals, joint maintenance etc.). We excluded all alliances that focused only on cargo cooperation. Code sharing agreements that were reported as pending for government approval were excluded in the alliance portfolio mapping. By linking the 161 code sharing announcements to the alliance portfolio of the focal firm in the year the code sharing agreement was formed, we created a final sample that consists of 161 new alliance-alliance portfolio-year observations.

Resource level data. The research design of this study requires both resource flow as well as resource stock data (Dierickx & Cool, 1989). In other words, the network resources that a focal firm accesses through a new alliance formation need to be identified as well as the focal firm's stock of own and network resources needs to be mapped. The data for modeling the inflow of new network resources contributed through a newly formed alliance was extracted from the code sharing announcements identified in the press search. The mapping of a focal firm's existing resource stock included both the identification of the focal firm's own as well as network resources accessed through its portfolio of code sharing agreements. Data for the mapping of the focal firm's own resources were obtained from the *Traffic by Flight Stage (TFS)* annual digest of statistics published by the *International Civil Aviation Organization (ICAO)*[5]. *ICAO-TFS* contains data on international city-pair markets including the carriers operating in the market, passenger seats available, revenue passengers carried, load factors, and aircrafts used.

[4] The *Airline Business Alliance Survey* is published once a year since 1994.

Furthermore, data for the mapping of the focal firm's network resources proceeded as follows. We first identified the focal firm's partners in any given year through the *Airline Business Alliance Survey* and then extracted the network resources from *ICAO-TFS* for each of the partners.

Dependent Variable

We operationalized the dependent variable through the cumulative abnormal stock market return (CAR) over a two-day event window following the press announcement of a code sharing agreement. I followed a standard event study approach (Koh & Venkatraman, 1991; Madhavan & Prescott, 1995; McWilliams & Siegel, 1997; Park & Kim, 1997) and estimated a market model for each firm and then calculated the abnormal return for each announcement. The equation for the rate of return on the stock price of firm *i* on day *t* is $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$ where R_{it} is the expected stock return of firm *i* on day *t*, R_{mt} is the rate of return on a respective market index on day *t*, α_i is the intercept term, β_i is the systematic risk of stock *i*, ε_{it} is the market model error term which is iid. As a next step, we derived estimates of the daily abnormal returns for each firm *i* on day *t* through $AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$ where R_{it} is the actual stock market return of firm *i* on day *t*, R_{mt} is the rate of return on the value weighted index on day *t*, α_i and β_i are the ordinary least squares parameter estimates obtained from the regression of R_{it} on R_{mt} over an estimation period preceding the event. The abnormal return AR_{it} is the return earned by firm *i* on day *t* after the adjustment for the normal return process, i.e. the rate of return on the stock is adjusted by subtracting the expected return from the actual return. Consequently, any difference represents the abnormal return attributable to the code sharing announcement.

For the assignment of the respective market index to each airline, we used the market indices that include airlines in their home countries. As a robustness check we also estimated the market model with a global airline industry specific market index, i.e. the DJTM World Airlines $ index, instead of the respective stock market indices. Results, however, did not change significantly.

As it is more difficult to control for confounding effects in long event windows and because there was no reason to believe that in the given context information to investors is more slowly

[5] ICAO is a specialized United Nations agency based in Montreal (Canada).

revealed than normal or leaked out before the event, we used a two-day event window during which we calculated the cumulative abnormal return. The two-day day event window consisted of the day prior to the event $t = -1$ and the day of the event itself $t = 0$. Such a two-day window is in line with previous event study-based alliance research (Koh & Venkatraman, 1991; Madhavan & Prescott, 1995; Merchant & Schendel, 2000). For the estimation period, used approximately one-year of daily stock returns, i.e. 250 trading days (Park & Kim, 1997), beginning with day $t = -260$ and ending with day $t = -11$. By excluding the 10 days prior to the announcement from the estimation of the market model, we made sure that data that may have been affected by the event was removed.

Independent Variables

Technically, the airline industry consists of so-called city-pair markets representing the demand for air travel between an origin and destination city (Bittlingmayer, 1990; Gimeno & Woo, 1999). Airlines serve city-pair markets with direct flight service as well as indirect - i.e. stop-over - service comprised of multiple connecting flight segments via airport hubs. For example, the international city-pair market Lisbon – Oslo may be served directly or indirectly with a connecting stop-over at a hub such as Frankfurt or Paris. Carriers such as *TAP Portugal* and *SAS Scandinavian Airlines* that serve the Lisbon – Oslo market directly thus compete with carriers such as *Lufthansa* or *Air France* that serve the market through stop-over connections in their respective hubs.

New alliance's potential to create synergistic combinations of new and existing network resources. In this paper, we view synergistic resource combinations on the alliance portfolio level as resource combinations comprised of a focal firm's existing network resources accessed from multiple alliances with different alliance partners. We operationalized a new alliance's potential to create synergistic combinations of new and existing network resources (SYNERGY) as the number of itineraries that could be created by combining the routes contributed by the newly formed code sharing agreement with the existing routes to which the focal firm has access to through other ongoing code sharing agreements at the time of the new alliance formation. To calculate the number of potential itineraries, we identified and counted all combinations where (i) the to-destination of the existing route matched the from-destination of the new route and (ii) the from-destination of the existing route matched the to-destination of the

new route. For example, if a focal firm had access to the route Mexico City - Atlanta through an existing code sharing agreement and the newly formed code sharing agreement contributed the route Atlanta – Paris, a new synergistic resource combination Mexico City – Atlanta – Paris could be created. To avoid theoretically possible but impractical itineraries such as for instance New York – Moscow – Mexico City, we followed Gimeno's procedure (2004) and only considered combinations for which the ratio of the total stop over flight stage length to the total direct flight stage length did not exceed 125 percent. The direct flight stage length between two cities was calculated as the surface kilometer distance of two points of latitude and longitude and the stop over flight stage length as the sum of the surface kilometers of each individual flight segment.

New alliance's potential to increase market overlap between the focal firm and existing partners. The underlying logic of operationalizing a new alliance's potential to create conflict with existing alliance partners is that a newly formed alliance can lead to an increase in market domain overlap between the focal firm and an existing partner in another alliance. To calculate the increase in market domain overlap between a given partner *j* and focal firm *i*, we followed the following process. First, we identified from the press announcements for each of the newly formed code sharing agreements the routes which the focal firm gains access to. Next, for each partner in the focal firm's alliance portfolio we identified and counted the city pair markets served by the partner through either a direct or indirect service that overlap (i) directly with the routes contributed by the newly formed code sharing agreement and/or (ii) with the city pair markets that the focal firm could serve by combining its own routes with the routes contributed by the new agreement.

To illustrate the indirect service scenario of the first case, assume that focal firm *i* forms a new code sharing agreement with partner *k* in which it code shares on the route Vancouver – Frankfurt that is operated by *k*. Further assume that one of focal firm *i*'s existing partners, firm *j*, competes in the market Vancouver – Frankfurt via an indirect stop-over service by combing two individual of its individual segments such as for instance Vancouver – Chicago and Chicago – Frankfurt. Focal firm *i*'s new code sharing agreement with *k* therefore increases the market domain overlap between partner *j* and focal firm *i* because *i* is now able to compete in a market in which *j* is already present. When identifying such indirect stop-over services, we followed

Gimeno's procedure (2004) and only considered itineraries for which the ratio of the total stop over flight stage length to the total direct flight stage length did not exceed 125 percent.

To illustrate the second case, assume that focal firm *i* operates in the city pair market Vienna – London and engages in a new code sharing agreement for the route London – Dublin. Focal firm *i* is now able to compete in the market Vienna – Dublin with an indirect stop-over service. Thus, we identified the partners in focal firm *i*'s alliance portfolio that competed in the market Vienna –Dublin through a direct service. Moreover, we also identified the partners in focal firm *i*'s alliance portfolio that competed in the market Vienna –Dublin through an indirect service. Here we identified *i*'s existing alliance partners that served the origin city, i.e. Vienna, as well as destination city, i.e. Dublin. For example, if one of focal firm *i*'s existing alliance partners operated in the markets Vienna – Paris and Paris – Dublin, we would consider this partner also as a competitor in the market Vienna – Dublin and thus the market domain overlap between the partner and focal firm *i* would increase by one market due to the newly formed alliance. Also here, we followed Gimeno's procedure (2004) and only considered indirect stop over services for which the ratio of the total stop over flight stage length to the total direct flight stage length did not exceed 125 percent.

Next, we divided the sum of the overlapping routes from both scenarios described above by the total number of markets served by partner *j*. Lastly, we then operationalized a new alliance's conflict creating potential within a given alliance portfolio (CONFLICT) as the sum of the individual market domain overlap increases between the alliance partners in the focal firm's alliance portfolio and the focal firm.

Control Variables

To ensure the robustness of the results and account for other possible explanations, we included various control variables.

Complementarity of partner resources. Resource complementarity is an important antecedent for alliance formation because firms can create synergistic and rent generating resource combinations through the joint deployment of complementary resources that would not otherwise be available to the partnering firms (Arora & Gambardella, 1990; Chung et al., 2000; Eisenhardt & Schoonhoven, 1996; Gimeno 2004; Rothaermel, 2001). Complementary partner resources to which a firm gains preferential access through an alliance can be a source for

economic rent as they may render value creating services to the firm when synergistically combined with the firm's own resources (Dyer & Singh, 1998; Lavie, 2006).

Empirically, we view access to a particular destination as a valuable and strategically critical resource for an airline company. Thus, through engaging into an alliance with another carrier, the focal firm can obtain access to new destinations that it can synergistically combine with its own route network. Therefore, we measured resource complementarity between the focal firm *i* and partner firm *j* of the newly formed alliance (COMPLEMENT) as the number of destinations served by *j* but not by *i* in year *t* in which the new alliance was formed.

Focal firm size. Firm size is widely used as a control variable in studies focusing on firm performance (e.g. Hagedoorn & Schakenraad, 1994). Moreover, the size of firms entering into strategic alliances may impact their stock prices (Chan et al., 1997). Thus, we controlled for the size of focal firm *i* in year *t* (SIZE), which we measured as the number of employees. The employee data for this variable were obtained from the *Compustat* and *Osiris* databases.

Focal firm performance. Like firm size, the performance of firms entering into strategic alliances may impact their stock market's reaction to the announcement of any alliance formation (Chan et al., 1997). Thus, in order to control for performance heterogeneity amongst the sample firms, we controlled for a focal firm's operational performance (PERFORM) which we operationalized as the load factor across all routes served by focal firm *i* in year *t* in which the new alliance was formed. Technically, the load factor is an indicator of an airline's aircraft capacity utilization and is calculated by dividing the Revenue Passenger Kilometers (RPK) by the Available Seat Kilometers (ASK). The data for this variable were obtained from the *ICAO Traffic by Flight Stage* digest of statistics.

Focal firm age. Firm age has been shown to affect firm performance because the longer a firm has been present in an industry, the more experience in the industry it has. Moreover, the older the firm, the more time it has had to build its resource stock. Therefore, to control for heterogeneity amongst the sample firms' experience in the industry and its resource endowments, we added the control variable Age_{it} (AGE). The age of focal firm *i* in year *t* is operationalized as $Age_{it} = (Year_t - Year_{Founding})^2$ Where $Year_t$ is the year in which the new alliance is formed and $Year_{Founding}$ is the year in which focal firm *i* was founded. The founding year for the focal firms was identified through the *Corporate Affiliations* and *Osiris* databases and complemented through an Internet search for the cases where these two databases did not contain any data.

Focal firm alliance experience. Firms that frequently engage in strategic alliances accumulate knowledge on about how to manage alliances (Anand & Khanna, 2000; Kale et al., 2002; Reuer et al., 2002). This accumulated alliance experience can then influence the performance of any successive alliance. Thus, we operationalized alliance experience (EXPERIENCE) as the focal firm *i*'s prior alliances over the ten year period prior to year *t* in which the new alliance was formed (Anand & Khanna, 2000; Kale et al., 2002; Reuer et al., 2002). The data on all past alliances are drawn from the *Airline Business Alliance Survey*. A firm's alliance experience reflects all alliance types that occur in the airline industry: joint ventures, marketing agreements, block space agreements, codesharing, maintenance agreements, joint frequent flyer programs, ground handling, and schedule coordination.

Previous ties with partner of new alliance. Besides the more general experience on how to manage alliances (Anand & Khanna, 2000; Kale et al., 2002; Reuer et al., 2002), the specific experience on how to work with a certain partner is particularly important (Gulati, 1995). Indeed, in alliances with repeated partners, the accumulated experience with and knowledge about a certain partner can create trust amongst the alliance partners and therefore limit the transaction costs of the alliance (Gulati, 1995). Thus, to control for experience with repeated partners, we introduce the control variable TIES, which we operationalized as a dummy variable where 0 means no experience with the partner of the newly formed alliance and 1 means that the focal firm and the partner firm of the new alliance have had at least one alliance in the past. The data on all past alliances are drawn from the *Airline Business Alliance Survey*.

ANALYSIS AND RESULTS

Table 2 reports a 14 day time series of average daily abnormal returns, average standardized abnormal returns *ASAR* (Patell, 1976), the Patell Z-statistic, the proportion of positive abnormal returns, the t-value from the t-test, and the Wilcoxon Z statistic. Table 2 reports that the average abnormal return on the announcement day, i.e. day 0, is 0.31 percent ($p < 0.05$). We also ran these test with the reduced sample, i.e. without the confounded observations ($n = 143$). The average abnormal return on the announcement day is 0.39 percent ($p < 0.05$).

Insert Table 2 about here.

Tables 3a and 3b present the descriptive statistics and the correlation matrix. The average focal firm was 58.32 years old, had 45,101 employees, a load factor of 66.1 percent, and an alliance experience of 19.3 alliances. As one could expect, larger firms on the average performed better operationally ($p < 0.001$) and had more alliance experience ($p < 0.001$). Resource complementarity between the average focal firm and its new partner tended to be higher for firms with better performance ($p < 0.05$) and less alliance experience ($p < 0.05$). Moreover, firms with more alliance experience ($p < 0.01$) and a higher age ($p < 0.1$) tended on the average to engage in alliances with a higher synergy creating potential within their alliance portfolios. Interestingly, firms with better performance ($p < 0.05$) tended on the average to engage in alliances with a lower synergy creating potential within their alliance portfolios. Lastly, firms that performed better ($p < 0.05$) tended on the average to engage in alliances with a lower conflict creating potential within their alliance portfolio.

Insert Tables 3a and 3b about here.

To test the hypotheses, we used pooled ordinary least squares (OLS) regression analysis to determine whether the potential of a focal firm's newly formed alliance to create (i) synergies and (ii) conflict with the focal firm's alliance portfolio were significant explanatory factors for abnormal stock market return following the announcement of the new alliance. In the analysis we examined whether the regression coefficients were consistent with the hypotheses and if they were significantly different from zero. To correct for heteroscedasticity, we used the robust estimates of the standard errors (White, 1980), clustered by firm (Rogers, 1993).

Table 4 provides the results of the set of regression analyses with the focal firm's cumulated abnormal stock market return over a two-day event window (CAR) as the dependent variable. The extant literature suggests adjusting or eliminating observations that were affected by confounding events (McWilliams & Siegel, 1997). Thus, we ran two sets of regression models: one for the full set of code sharing announcements (N = 161, Models 1a and 2a) and the adjusted set of code sharing announcements without the confounded events (N = 143, Models 1b

and 2b). Model 1a and 2a are significant at the 0.05 level and model 2b is significant at the 0.01 level. Model 1b is not significant.

Insert Table 4 about here.

Models 1a and 1b present a baseline model consisting of the control variables and their effect on the cumulated abnormal market return following the alliance announcement. In this baseline model only COMPLEMENT ($p < 0.05$) and PERFORM are significant ($p < 0.05$). When replicated with the reduced sample (Model 1b), the variable COMPLEMENT remains significant, although at the 0.1 level, while PERFORM becomes insignificant.

In order to test Hypotheses 1 and 2, we added the direct effects of the alliance portfolio relevant independent variables SYNERGY and CONFLICT on the abnormal stock market return following the announcement of the new alliance (CAR). By adding these two variables (Model 2), the model F-value and R^2 increases compared to Model 1, suggesting that by incorporating the alliance portfolio relevant variables SYNERGY and CONFLICT into the model, a greater explanatory power can be achieved. Results of Model 2a show that: (i) SYNERGY is significant ($p < 0.01$) in explaining CAR and positively related as hypothesized and (ii) CONFLICT is significant ($p < 0.05$) in explaining CAR and negatively related as hypothesized. When replicated with the reduced sample, the results of Model 2b indicate that: (i) SYNERGY is significant ($p < 0.05$) in explaining CAR and positively related as hypothesized, and (ii) INCOMP is negatively related as hypothesized but not significant in explaining CAR. Overall, results of Models 2a and 2b provide strong support for Hypothesis 1 but only limited support for Hypothesis 2 in the sense that the elimination of confounded events influences the significance of INCOMP to explain CAR.

Robustness checks

In order to test the robustness of the above reported results, we conducted a number of additional checks. First, we estimated the market model with a global airline industry specific market index, i.e. the DJTM World Airlines $ index, instead of the respective stock market indices. Results, however, did not change significantly. Second, we replicated the regression analyses with two different event windows. More specifically, we used a three-day, i.e. from day -1 to +1 (Park, 2004; Reuer et al., 2002) as well as a two-week event window, i.e. from day -10 to

+3 (Anand & Khanna, 2000; Kale et al., 2002). Third, we used the standardized abnormal return as the dependent variable and replicated the regression analyses.

From the results of the performed robustness checks the following can be concluded. First, the results are highly sensitive to the length of the event window. This was expected and is in line with the extant event study literature that acknowledges that the selection of the event window is a sensitive issue (Bromiley et al., 1988; Lubatkin & Shrieves, 1986; McWilliams & Siegel, 1997). While in the research setting of this study, there was no reason to believe that that information to investors leaked out that much time before the event, we interpret the fact that results changed dramatically with the employment of a long event window as not critical. Indeed, previous authors have recommended the use of short event windows instead of long windows (McWilliams & Siegel, 1997). Third, when the non-standardized cumulative abnormal return (CAR) as the dependent variable was substituted by the standardized cumulative abnormal return (SCAR) the results actually improved. Therefore, by taking CAR as the dependent variable, the reported results represent a more conservative estimate.

DISCUSSION

In this section, we discuss the implications of this study for theory on firm resources and capabilities. We also examine the implications for alliance research as well as the implications for alliance managers and practitioners. We end this discussion by highlighting some of the limitations and future avenues for empirical research.

Implications for Literature on Firm Resources and Capabilities

RBV. The theoretical framework advanced in this paper builds on prior RBV research that problematizes beyond firm boundary resources (Dyer & Singh, 1998; Lavie, 2006). By specifying which interdependencies are instrumental in value creation at such an alliance portfolio level this theorizing suggests additional resource attributes beyond the (i) single resource level of analysis (Barney, 1991) and (ii) dyad level of analysis. The critical resource characteristics on the portfolio level of analysis are: (i) combinability with other network resources and (ii) compatibility with existing partners in the sense that no additional market overlap is created. These additional resource characteristics suggest that the resources should be evaluated in the context of an entire resource system and not as standalone resources. Multilaterally connected firms are therefore challenged to pay attention to these additional

resource characteristics when they upgrade their resource system with new resources from alliance partners. This leads into the implication on the literature on dynamic capabilities.

Dynamic capabilities. The theory developed in this study has implications for the literature on dynamic capabilities, i.e. a firm's ability to reconfigure its resources (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). Resource reconfiguration is the process concerned with managing a firm's resource stock by (i) retaining valuable existing resources, (ii) bringing in new strategically critical resources, and (iii) removing existing resources that have ceased to render rent generating services (Capron et al., 1998; Karim & Mitchell, 2000; Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). According to this theory, a key issue when bringing in new network resources is their effective integration into the focal firm's resource system by taking the interdependencies with the other resources into account. Adding new network resources to a multilaterally connected firm's resource system becomes indeed a complex undertaking because these new network resources may not only create synergies with existing own and network resources but may also lead to conflict with resource combinations of existing partners. Such a conflict can make it difficult for the multilaterally connected firm to retain the network resources provided by these partners and can even lead to the deletion of the network resources provided by this partner. In other words, adding new network resources may lead to the deletion of existing valuable network resources from a multilaterally connected firm's resource system. Indeed the empirical results of this study confirm the notion that when adding new network resources to its resource system, a multilaterally connected firms need to pay close attention how the newly accessed network resources affect their alliance portfolios.

Alliance capability. An important firm level capability relevant for the success of interconnected firms is alliance capability (Simonin, 1997; Kale et al., 2002). It has also been suggested that through a dedicated alliance function, interconnected firms are able to monitor their alliance portfolio (Kale et al., 2002). This study is therefore consistent with that view because only through a central alliance function can a firm manage its alliance portfolio in a deliberate way so that it can exploit all synergies between network resources and avoid conflicts with existing partner. Such alliance capability is particularly important when a multilaterally connected firm adds new alliances to its alliance portfolio. According to the alliance capability argument, firms that institutionalize this capability in a dedicated alliance function achieve are more successful not only on the firm level but also with their alliances (Kale et al., 2002). This

suggests indeed that alliance capability may be a key antecedent in picking new alliances that are high in synergy creating potential with other network resources and low in conflict potential with existing alliance partners.

Implications for Alliance Research

As discussed earlier, the bulk of existing alliance research on has applied a dyadic perspective when studying the performance consequences for firms entering into strategic alliances. However, as firms have become increasingly multilaterally connected, i.e. maintain alliance portfolios, it has become necessary for alliance scholars to shift the attention to the alliance portfolio as the unit of analysis. This research shows that multilaterally connected firms differ quite significantly in terms of the value they derive from alliance they enter into. This research also shows that part of the explanation may lie in how these alliances interact with the firms' existing alliance portfolio, especially how newly added alliances can create synergies as well as conflict in a given alliance portfolio.

This research lays a foundation for future research on alliance portfolios and their impact on firm performance. By having identified some explanatory factors on how individual alliances interact with alliance portfolios at the time of formation and how this interaction affects firm performance, future research can take a reverse perspective and focus on how alliance terminations, i.e. the situation when alliances get deleted from an alliance portfolio, affect firm performance. Furthermore, this research also laid a foundation for research on the performance of alliance portfolios. While research on the performance of single alliances exists (Gulati, 1998), research on the performance of alliance portfolios is still rare.

Managerial Implications

Finally, what are the managerial implications of this research? While the traditional dyadic view of alliance formation has suggested that firms select new alliance partners based on the complementarity between their own and the partner's resources, we argue that alliance managers should also take a broader systems perspective and consider the complementarities between a new partner's resources and their existing network resources as potential sources for value creation. Moreover, alliance managers should not only evaluate the benefits of new network resources but also potential costs related to conflict with existing partners. Multilaterally connected firms that reconfigure their resource systems in a way that they can exploit all complementarities between their resources and minimize the release of rent generating resource

combinations with partners will have a competitive advantage over interconnected firms that are unaware of these issues. One of the managerial challenges for multilaterally connected firms lies in the performance evaluation of the alliance portfolio (Hoffmann, 2005; Parise & Casher, 2003). Thus, by taking a portfolio rather than individual alliance perspective, managers of multilaterally connected firm will have to pay close attention to the synergies and conflicts between the existing alliances in the portfolio but also to the effect any new alliance may have on the portfolio.

Limitations and Future Research

This study is conditioned by a number of limitations. Because the RBV served as the main theoretical lens in this study, a shortcoming is that such a resource focused perspective does not allow problematizing any structural characteristics of a multilaterally connected firm's alliance portfolio. Therefore, the integration with social network theories, i.e. Burt's (1992) theory on structural holes and information brokering, may provide additional insights on the synergies and conflicts in a multilaterally connected firm's resource system. Furthermore, the proposed theory does not allow making inferences about how much value is actually appropriated by the focal firm. Therefore, integration with transaction cost economics can help to develop some more fine grained theory on value appropriation in such multilateral setting. Lastly, our theory does not formalize the exact flow of different types of rents in interconnected firm as outlined by Lavie (2006). Therefore, future research should incorporate these rent types into any formalized model.

The interpretation of the empirical results of this study is also conditioned by a number of limitations, which can be addressed in future research. First, the results of this study may be influenced by the particular characteristics of the chosen empirical setting, i.e. the global passenger air transportation industry. Thus, the results presented in this study may not apply to other industries. Future research may therefore address this concern through a multi-industry sample. Second, this study is also conditioned by some data limitations. More specifically, the *ICAO Traffic by Flight Stage* digest of statistics cover only international routes and therefore domestic routes had to be excluded from the analysis. While this may not be an issue for player with a small domestic market, such as KLM of the Netherlands, it may be for players with a large domestic market, such as all U.S. airlines in the sample. Therefore, it could be useful to collect additional data and incorporate additional data on domestic traffic.

Furthermore, the fact that the research was conducted on a global scale may offer some methodological research opportunities. In this study, we conducted an event study using an

international sample but chose to follow a traditional event study approach (McWilliams & Siegel, 1997). A future research opportunity may be to repeat the analysis following an event study approach for multi-country settings as recently outlined by Park (2004).

CONCLUSION

This study started by noting that there is scarce empirical evidence on how synergies and conflict in alliance portfolios can explain abnormal stock market returns following alliance formations. Especially, little seems to be known about the dynamics and interdependencies between individual alliances and the alliance portfolios in which they are embedded. Moreover, the bulk of the event study based alliance literature is primarily devoted to single alliance and views alliances as stand-alone transactions rather than as part of an entire alliance portfolio. Consequently, existing research has not included factors on the alliance portfolio level to explain the value that firms derive from entering into strategic alliances. Therefore, this study set out to address these gaps in the literature by providing new theory and empirical evidence on value creation in alliance portfolios.

Moreover, the empirical model suggested that two specific alliance portfolio relevant features are crucial of a newly formed alliance's impact on firm valuation: (i) the new alliance's potential to create synergistic resource combinations beyond the dyadic level with other network resources and (ii) the new alliance's potential to create conflict due to market overlap with existing partners. Indeed, this study revealed that the stock market reward firms entering into strategic alliances that provide access to resources that can not only be combined with the focal firm's own resources but also with its existing network resources. On the other side, the stock market seems to penalize firms for entering into alliances that increase the market overlap between the focal firm and its existing alliance partners.

We submit that the contribution of this study rests in three main areas. First, we have drawn on an important stream of literature central to research about interconnected firms and developed an alliance portfolio based perspective of value creation. Second, this study also addresses the broader question: do alliance portfolios matter in explaining stock market reactions following alliance formations? The answer is yes they do matter, because they provide multilaterally connected firms not only with additional opportunities for value creation but they may also be a source of conflict and value destruction. Lastly, this paper provides new empirical

evidence on the role of alliance portfolios in value creation. To sum up, the theoretical analysis and empirical research in this study contribute to two important streams of strategic management research, namely the RBV and its recent extension to interconnected firms (Barney, 1991; Dyer & Singh, 1998; Lavie, 2006; Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984) as well as the performance consequences for firms entering alliances (Gulati, 1998). We are confident that this study provides a useful perspective and further understanding on some of the issues that multilaterally connected firms face.

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TABLE 1a

Distribution of Events by Year

Year	Total number of events	Confounded events
1994	16	2
1995	26	1
1996	34	3
1997	39	6
1998	46	6
	N = 161	**N = 18**

TABLE 1b

Distribution of Sample Firms and Observations by Countries

Country	Number of firms	Number of observations
Australia	1	8
Austria	1	4
Canada	1	10
Chile	1	1
Finland	1	10
France	1	5
Germany	1	15
Hong Kong	1	1
Italy	1	7
Japan	2	5
Malaysia	1	1
Netherlands	1	4
New Zealand	1	6
Singapore	1	5
South Korea	1	2
Sweden	1	2
Thailand	1	3
UK	1	12
USA	5	60
N = 19	**N = 24**	**N = 161**

TABLE 2

Time series of average daily abnormal returns

Event day	Mean AR (%)	ASAR (Patell)	Z statistic (Patell)	Proportion of positive returns (%)	t-value	Wilcoxon Z
-10	-0.21	-0.10	-1.25	42.86	-1.21	-1.67 †
-9	0.21	0.05	0.62	50.93	1.36	0.75
-8	-0.08	0.01	0.10	45.34	-0.52	-0.69
-7	-0.09	0.00	-0.03	44.72	-0.50	-0.74
-6	-0.04	0.04	0.51	54.04	-0.23	0.05
-5	0.18	0.09	1.14	52.80	1.23	0.99
-4	-0.28	-0.12	-1.56	47.20	-1.65 †	-1.45
-3	-0.19	-0.15	-1.92	44.72	-1.06	-2.13 *
-2	-0.14	-0.08	-1.07	42.86	-0.74	-0.98
-1	-0.12	-0.01	-0.11	49.07	-0.64	0.05
0	0.31	0.20	2.59	54.66	1.96 *	1.97 *
1	0.07	0.00	0.05	47.83	0.42	0.29
2	-0.04	-0.07	-0.94	42.24	-0.23	-1.62 †
3	0.18	0.08	1.06	50.31	1.05	0.01

† p-value < 0.10; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001

TABLE 3a

Descriptive Statistics

Variable	N	Mean	S.D	Min.	Max.
CAR	161	0.002	0.032	-0.145	0.096
SYNERGY	161	7.447	15.948	0	135
CONFLICT	161	0.004	0.007	0	0.045
COMPLEMENT	161	58.528	51.854	1	196
AGE	161	58.323	16.432	20	80
SIZE	161	45101	26856.7	3860	103400
PERFORM	161	0.661	0.049	0.544	0.735
TIES	161	0.584	0.495	0	1
EXPERIENCE	161	19.304	8.953	2	46

TABLE 3b

Correlation Matrix

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)
1	CAR	1.000								
2	SYNERGY	-0.0106	1.000							
3	CONFLICT	-0.1048	0.0309	1.000						
4	COMPLEMENT	0.2015 **	-0.1961 *	0.1971 *	1.000					
5	AGE	-0.0514	0.1501 †	0.0658	-0.0884	1.000				
6	SIZE	-0.0168	0.0792	-0.0360	-0.1596 *	-0.0283	1.000			
8	PERFORM	0.1177	-0.1858 *	-0.1951 *	0.1783 *	-0.1300 †	0.4116 ***	1.000		
9	EXPERIENCE	-0.1107	0.2392 **	0.0971	-0.1761 *	0.0846	0.2863 ***	0.0313	1.000	
10	TIES	0.1189	-0.0523	-0.1540 †	0.1907 *	-0.0695	0.1511 †	0.1700 *	0.0203	1.000

† p-value < 0.10; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001

TABLE 4

Effects of Alliance Portfolio Level Synergies and Conflict on Firm Value

Dependent variable: CAR	**Model 1a**	**Model 1b**	**Model 2a**	**Model 2b**
Intercept	-0.0345	-0.0333	-0.0271	-0.0293
	(0.0206)	(0.0252)	(0.0245)	(0.0297)
SYNERGY	-		0.0001 **	0.0001 *
			(0.0000)	(0.0001)
CONFLICT	-		-0.5195 *	-0.3738
			(0.2277)	(0.4187)
COMPLEMENT	0.0001 *	0.0001 †	0.0001 *	0.0001 †
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
AGE	-0.0000	-0.0000	-0.0000	-0.0001
	(0.0001)	(0.0002)	(0.0001)	(0.0001)
SIZE	-1.87e-08	2.19e-08	-1.01e-08	1.12e-08
	(1.04e-07)	(1.14e-07)	(1.04e-07)	(1.23e-07)
PERFORM	0.0547 *	0.0547	0.0434	0.0488
	(0.0268)	(0.0333)	(0.0314)	(0.0382)
TIES	0.0051	0.0016	0.0037	0.0015
	(0.0050)	(0.0049)	(0.0052)	(0.0049)
EXPERIENCE	-0.0003	-0.0003	-0.0003	-0.0003
	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Model F	2.61 *	1.99	2.72 *	1.99 †
R2	0.0602	0.0467	0.0759	0.0548
N	161	143	161	143

† p-value < 0.10; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001
Robust standard errors are in parentheses.

FIGURE 1

Types of Synergistic Resource Combinations Enabled by a New Alliance

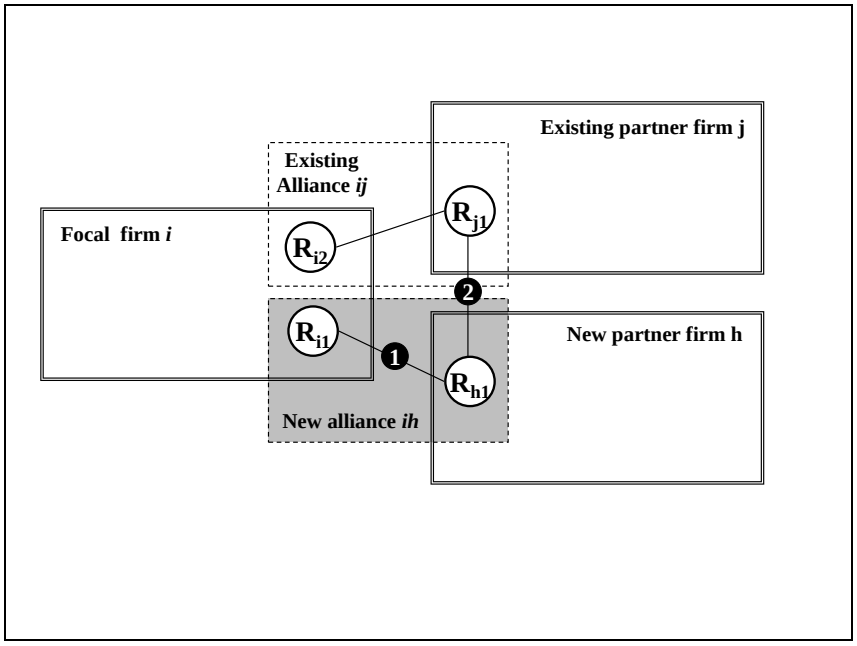

FIGURE 2

Competitive Overlap