Network resource mobilisation limitations and the alliance portfolio network

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Abstract

Purpose – The purpose of this study is to examine how access and mobilisation of network resources influence a firm's performance. It has been established that alliance portfolio (AP) network parameters shape the access to network resources; however, resource access understood as value creation differs from resource mobilisation understood as value capture. Hence, the paper contributes towards the comprehension of AP performance by examining the extent to which a firm's level of network resource mobilisation (NRM) plays a role in improving financial performance and how this strategy conditions the benefits obtained from a firm's AP.

Design/methodology/approach – This study employs an interorganisational network approach to describe the APs of firms; subsequently, it examines how AP network parameters and resource mobilisation determine financial performance. To this end, sequential multiple regression models are applied to a sample from the Top International Airlines database, covering 135 portfolios that correspond to 1117 codeshare partnerships.

Findings – The analyses show that the NRM level has an inverted *U*-shaped relationship with revenue performance, thereby revealing the limitations and considerations in the strategic alliance strategy. In addition, the authors show how the resource mobilisation decision moderates the faculty of AP parameters to influence a firm's financial performance, thereby exposing the nuanced relationship between AP size, diversity and redundancy. The findings convey strategic and practical implications for managers regarding how to capture value from their APs.

Practical implications – The findings suggest the need for NRM to form part of a firm's AP management capability, so that, by acquiring superior strategic knowledge in NRM, the firm is able to extract value from its AP through the optimal exploitation of complementary assets.

Originality/value – Previous research has highlighted the multidimensional nature of APs at the theoretical level; however, no simultaneous empirical analysis of various AP parameters has yet been produced. The research empirically analyses an AP network and how its parameters affect financial performance in the presence of a resource mobilisation strategy. Not only do the authors introduce the analysis of the curvilinear relationship between the level of NRM and a firm's performance, but also of its role in advancing the AP literature.

Keywords Alliance portfolio configuration, Network resource mobilisation, Airline performance, Strategic alliances, Moderation analysis, Alliance network parameters

Paper type Research paper

1. Introduction

The study of alliance portfolios (APs) continues to capture interest in management research (Castiglioni and Galán González, 2020; Van Wijk and Nadolska, 2020). Previous studies on APs have centred on AP configuration in terms of who the partners of the focal firm are and how they relate with it and to each other (Hoffmann, 2007; Wassmer, 2010). In turn, further contributions have explored the portfolio management and the process of seeking

opportunities for alliances, designing relational governance and globally coordinating the AP (Lavie, 2007; Sarkar *et al.*, 2008). Likewise, a further research stream has flourished regarding how the AP affects performance (Wassmer, 2010; Zaheer *et al.*, 2010). In particular, the confluence of the resource-based view and the study of interorganisational networks has made it clear that the choice of partners by the firm and the structure of their interorganisational relationships are crucial strategic decisions and, as a result, the AP acquires a multidimensional nature (Wassmer, 2010; Wassmer and Dussauge, 2011).

Moreover, for the sake of understanding its multidimensionality, the study of APs is linked to the study of strategic networks. Thus, portfolio size, the diversity of the firm's partners, the existence of structural holes in the network, the intensity of the links with partners and their characteristics may all be considered among its dimensions or parameters (Hoffmann, 2007). The way a firm's AP is organised is linked to the choice of partners and is therefore a topic that has been widely covered from various points of view in the literature on strategic alliances. The AP network characteristics affect the access to network resources and therefore also affect performance. Hoffmann (2007, p. 834) affirmed that the configurations of APs "determine the quality, quantity, and diversity of information and resources to which the focal company has access". Accordingly, there is evidence that shows that access to partner resources exerts positive effects on performance (Lavie, 2007; Todeva and Knoke, 2005), thereby underlining the importance of the network resources that a firm can access through its ties (Gulati *et al.*, 2000), which make up the network resources of the focal firm (Lavie, 2007).

However, not all access to partner resources is ultimately mobilised by the firm. The extant literature on AP and resource access has largely neglected the fact that the actual level of network resource mobilisation (NRM) also affects performance. Therefore, the relationship between a prominent AP and performance is conditioned by the level of resource mobilisation that the firm really achieves (Casanueva *et al.*, 2014). In spite of this, previous literature on APs has not considered the separation between access to and mobilisation of network resources (Batjargal, 2003). This separation is justified, however, provided that resource mobilisation is indeed a strategic choice of the organisation enabled by its operational capabilities to grasp the opportunities granted by the partners' resources (Wang and Rajagopalan, 2015). A question therefore arises over the interrelation between the following aspects: (1) access to partner resources derived from the composition of the AP network parameters; (2) the level of mobilisation of those resources that the focal firms achieve; and (3) its performance. Hitherto, it has been argued that a higher level of resource mobilisation exerts a positive impact on a firm's performance (Capaldo *et al.*, 2015; Thornton *et al.*, 2019). Nevertheless, since the outcomes of NRM depend on both internal skills and reliance on externally controlled resources (Casanueva *et al.*, 2015), we explore whether a threshold exists and to what extent a greater intensity of resource mobilisation implies increased profitability given different sets of APs.

The objective of this work is to gain insight into how the resource mobilisation choices of the organisations affect company performance as compared to just owning the right to access such resources and into what extent the level of NRM interacts with key parameters of the AP to influence a firm's performance. The significance of solving these issues for managerial practice lies not only in determining how partnerships provide resources, but more importantly in how the mobilisation of such resources may be seized to enhance revenue streams and to what extent the interaction between the mobilisation strategy and the AP parameters are expected to influence a firm's financial outcomes (Wang and Rajagopalan, 2015; Wassmer, 2010).

In response to this objective, access and mobilisation of an important partner resource in the airline business at an international level have been studied: the partners' city-pair destination markets, which consider that the focal firm can exploit these resources through

codeshare agreements. The airline industry is a mature industry, with intense rivalry and a wide range of competitive practices therein. These are large-sized firms that, because of the industry's own logic, are present throughout the world. It is likewise an industry with a dynamic movement towards inter-firm relationships, which range from commercial agreements to integration processes (acquisitions and mergers). This characteristic turns it into an industry that is especially appropriate for network analysis (Gimeno, 2004; Shah and Swaminathan, 2008). We therefore study the indicators of a network formed of 1,117 codeshare agreements and tested their influence on financial outcomes by means of a sequential multiple regression model to capture the main effects, its curvilinearity and the interaction between AP characteristics and NRM.

The results show that AP parameters should not be considered alone in the study of alliance network outcomes. Instead, the NRM effect is the key to understanding a firm's performance. In addition, this work contributes by clearly presenting the threshold of NRM in aiding a firm's performance, as well as showing the moderation role exerted on the AP effect; this reveals that, for an AP to be effective, it needs to be accompanied by an optimum mobilisation strategy. These implications extend to managerial practice, where, in addition to the efforts involved in obtaining access to network resources, a well-adjusted resource mobilisation strategy is needed for the capture of the value made available in a network of alliances.

2. Theory and hypotheses

Traditionally, organisational behaviour has been studied by looking at the company as an autonomous body that seeks to increase its bundle of resources and to meet the expectations of its stakeholders (Barney, 1986; Casson et al., 2016; Chen, 1996; Porter, 2000). This resource-based view emphasises that firms perform better to the extent that they build ownership advantages by means of controlling greater resources which are valuable, unique and hard to imitate (Barney, 1991). This perspective has been extended by the relational view, which stresses that firms not necessarily need to own such resources, but they may access them by means of relationships with a network of Allies (Gulati et al., 2000; Lavie, 2006; Zaheer et al., 2010). The ubiquitous implementation of this strategy, in pursuit of relational rents (Castiglioni and Galán González, 2020; Dyer and Singh, 1998), has led the network in itself to be considered as a valuable and inimitable resource, since each firm acquires a unique number of relationships, with distinctive degrees of trust, complementarity and interdependencies with its partners (Gulati, 1999; Lavie, 2006).

Like any type of resource, an AP is acquired and cultivated; in this case, by means of alliance development capability, managerial networking and by deploying relational assets (Kale and Singh, 2009; Wassmer, 2010). Once developed and available for utilisation, an AP takes the shape of an interorganisational resource network which influences a firm's performance through its multidimensional features (Castro and Roldán, 2015; Wassmer, 2010). Specifically, resource access as a theoretical mechanism is able to explain how a firm's egocentric network centrality and position provides information, learning and capabilities to influence their performance (Zaheer et al., 2010). Such an egocentric network is comprised of the focal firm, all of its partners and the dyadic ties between the members of this group, whereby the focal firm remains at the centre of such an egocentric network (Agostini et al., 2019). In turn, measuring this network enables the calculation of the four key parameters of the AP network, namely the size of the AP and its internal structure, the diversity of partners and the intensity of the relationships, which fundamentally determine the access to network resources (Hoffmann, 2007).

In this respect, Hoffman (2007) considered that the multidimensional elements of the focal firm's AP determine the quality, quantity and diversity of the resources to which it has access, as well as determining the efficiency in accessing those resources and the prominence of the

focal firm in the interorganisational network. As a result, Hoffman proposed that four parameters determine the mechanisms through which an AP influences performance: the number of alliances, dispersion, redundancy and the intensity or strength of the links. Each one of these parameters is straightforwardly measured by looking at the focal firm's egocentric network of alliances (Wassmer, 2010; Zaheer *et al.*, 2010).

The first parameter, the number of alliances or portfolio size, conditions the volume of information and the amount of resources that the focal firm can access (Koka and Prescott, 2002). Indeed, one of the main reasons firms choose to expand their number of alliances is precisely to gain access to assets, knowledge or skills for market-seeking objectives or efficiency-seeking purposes (Gulati, 1998; Pangarkar *et al.*, 2017).

The second parameter refers to the diversity of partners, defined as the degree to which partners vary in relation to their resources, capabilities, knowledge and technological foundations. Previous investigations have underlined the importance of establishing alliances with non-similar partners, particularly in global markets (Goerzen and Beamish, 2005). However, Collins and Riley (2013) reveal that there is conflicting evidence of the portfolio diversity effect on a firm's performance, which is moderated by the type of business environment. To this end, they hypothesise that there is an inverted *U*-shaped relationship between this parameter and portfolio performance. However, Jiang *et al.* (2010) have differentiated between types of diversity and suggest that organisational and functional diversity results in positive outcomes, while governance diversity results in negative outcomes. In our research, the diversity of partners (organisational)is studied, all in the context of the same type of governance mechanism: that of codeshare agreements. In addition, research in this business setting suggests that there are benefits to be gained from resource complementarity thanks to evidence that a more diversified and balanced AP generally produces a positive impact on a firm's performance (Collins and Riley, 2013; Duysters *et al.*, 2012; Jiang *et al.*, 2010).

The third parameter refers to the structural holes presented by the ego net, which represent the redundancy of the connections and rarely have a uniform structure. For example, sparse networks with few redundancies, low constraint and many structural holes imply asymmetry in access to information and other resources within the ego net (Burt, 2009; Rowley and Baum, 2004; Sapsed *et al.*, 2007). In contrast with the effect that redundancy has on innovation (Lahiri and Narayanan, 2013; Vanhaverbeke *et al.*, 2009), an ego network that is rich in structural holes provides advantages of control, fewer overlapping objectives among Allies and a better allocation of resources that favours better overall financial performance (Hoffmann, 2007). Along these lines, firms that are less constrained by the density of connections of their partners have more non-redundant contacts and therefore obtain better market information (Koka and Prescott, 2002, 2008).

Finally, the last parameter refers to the intensity of the links. In accordance with the concept of Granovetter on strong rather than weak links, these parameters of the AP condition characteristics and attributes, such as trust and the quality of relationships, which, to a large extent, stem from the history of the company and its reputation (Granovetter, 1992). Accordingly, Das and Teng (2014, 2003) point out that inter-firm trust constitutes a critical variable in partner satisfaction and alliance success; therefore, a richer mutual history signals deeper connections and relationships that facilitate trust and mitigate opportunistic behaviour perceptions, which in turn allows a firm's AP to succeed in its objectives (Collins and Riley, 2013; Gulati and Sytch, 2008).

These four parameters compose the key mechanisms that drive AP outcomes, specifically through resource access (Lavie, 2009; Wassmer and Dussauge, 2011). Through the establishment of cooperative agreements, the focal firm therefore continues to develop a relational pattern, which, if carried out with strategic intention, should benefit the ego by composing a high-performance portfolio (Castro and Roldán, 2015; Ozcan and Eisenhardt,

2009; Prashantham, 2011). In consequence, there is evidence that each of the parameters of the portfolio affects performance. AP size constitutes a significant variable in explaining performance differentials, in that a greater AP broadens the source of information, knowledge and resources to facilitate performance objectives (Mouri *et al.*, 2012; Wassmer and Dussauge, 2012). Access to varied partners can provide a major source of innovative and diverse knowledge as well as other resources for the ego firm, which can increase its performance (Phelps, 2010; Vasudeva and Anand, 2011). A higher level of structural holes in the AP, (i.e., a less constrained egocentric network), allows the focal firm to enhance the performance of its AP (Castro *et al.*, 2015; Dyer *et al.*, 2008). The strength or intensity of the nexus of contacts in the AP has a positive impact on the quality of the relationships, which in turn contributes to the performance of the AP (Sarkar *et al.*, 2008).

Finally, in order to analyse how the AP management influences the performance of the focal firm, global financial aspects were selected for the measurement of said performance (Koka and Prescott, 2008; Lavie, 2007; Wassmer and Dussauge, 2012).

Therefore,

H1. The AP network parameters are directly related to its financial performance.

H1a. The larger the AP network of the firm, the higher the financial performance.

H1b. The greater the diversity of the AP network, the higher the financial performance.

H1c. The lower the constraint of the firm (more structural holes) in the AP, the higher the financial performance.

H1d. The stronger the intensity of links (strength of ties) in the AP network, the higher the financial performance.

However, not all the resources to which a firm has access through its relationships are finally utilised or mobilised (Grant and Baden-Fuller, 2004). For instance, these resources may be dispersed through the firm's various networks (Chou, 2016). Therefore, its level of access to resources may be considered a different construct to their level of mobilisation, and it remains to be understood what role AP features play in the presence of measured NRM.

For this reason, we explore NRM, understood as the organisational strategy to capitalise on the opportunities granted by a company's partners in the context of an alliance network (Casanueva *et al.*, 2015; Gulati *et al.*, 2011). In the current stream of interorganisational research, few studies have addressed NRM beyond simply examining network ties. For instance, the first studies to address resource mobilisation started by identifying how the resources accessed and mobilised through social ties by owners of small businesses had an impact on performance (Zimmer and Aldrich, 1987). More recently, interest has been shown in how mobilising resources embedded in a network of connections (NRM) enables: the innovation leveraging of start-ups (Capaldo *et al.*, 2015); multinationals taking advantage of international alliances (Casanueva *et al.*, 2014); firms bridging technological discontinuities of industries (Chou, 2016); and knowledge acquisition for problem solving in multinational enterprises (Parker *et al.*, 2019), among other possibilities.

In practice, the level of NRM is subject to a double condition: voluntarism and capability. Voluntarism is a two-edged process, in which there must be, on one side, a focal firm that is interested in using the resources that its partners possess and, on the other, a partner that is willing to concede the use of its own resources (Casanueva *et al.*, 2014; Lin, 2003). Several authors have indicated a series of reasons for this mutual willingness, which includes both economic and social motives (Huggins and Johnston, 2010) and the power of negotiation (Kumar, 2010). Moreover, firms must deploy certain strategies to be able to mobilise the optimal level of network resources to which they potentially have access through their ties, that is, the composition of their AP (Lavie, 2009; Wang and Rajagopalan, 2015). Accordingly,

previous studies have provided evidence that not only does access to external resources cause improved performance (Acquaah, 2007), but their mobilisation also plays an leading role (Batjargal, 2003). Likewise, the skills possessed by the firm in mobilising network resources are linked to its performance (Kauppila, 2015). The rationale is that the firm succeeds in capitalising the use of complementary resources without the significant financial, marketing and operational effort involved in acquiring these resources and putting them into operation (Cobeña *et al.*, 2016; Gulati, 1999). Furthermore, NRM would allow the firm to capture value by implementing economies of scale and scope at the network level, sharing risks with the partner and by increasing operational flexibility (Lavie, 2009). Consequently, the relationship between resource mobilisation and performance has habitually been hypothesised as positive and linear (Capaldo *et al.*, 2015; Chou, 2016).

However, this relationship is expected to have its limitations, since most managerial approaches envisage proprietary resources and control as a source of competitive advantage (Prahalad and Hamel, 1997; Zhao *et al.*, 2004). For instance, the resource-based view remains wary of collaborative orientation due to risks such as deferred control (Das and Teng, 2014), exposure to opportunistic behaviour (Hill, 1990; Park and Ungson, 2001) and loss of customer focus (Luo *et al.*, 2007) and therefore prioritises a firm's independent action. In particular, we theorise that the positive impact of NRM on performance is expected to decline at a certain point for two main reasons: deferred control and loss of market orientation. Firstly, deferred control refers to the fact that by offering services that are performed by third parties, the focal firm is exposed to constraining situations, such as dependence on the quality of the partners' services or the limited availability of the resources (Czakon *et al.*, 2019). Secondly, loss of market orientation refers to the difficulty of remotely coordinating the routine activities in which the firm usually engages when serving its customer base, from market research and targeting, to operations and customer service (Luo *et al.*, 2007).

In this respect, when a high percentage of the firm's resources comes from mobilised partners' resources, the drop in the possibility of controlling and focussing on the operation undercuts its capability to produce higher returns. In consequence, very high levels of NRM may signal that the firm is becoming dependent on its partners to achieve certain objectives; the firm may also create gaps between the market needs and its own capabilities by remaining in a comfort zone (Dorn *et al.*, 2016). A balance is therefore needed to allow for performance control (Lado *et al.*, 1997; Luo, 2008). This balance is justified since organisations that isolate themselves may face constrained growth and may miss opportunities and waste complementarities by neglecting partnerships. In contrast, organisations that focus mostly on third-party resource exploitation expose themselves to external decision-making processes and constraints that may influence their performance (Kauppila, 2015; Rothaermel and Alexandre, 2009).

> *H2.* The level of network resource mobilisation has an inverted *U*-shaped relationship with financial performance.

We have shown that access is a necessary, but not sufficient, condition for the mobilisation of network resources (Kauppila, 2015), there being an inter-connection between the AP parameters and the NRM. Studies by Lavie (2009, 2006) distinguish between value creation strategies and value capture strategies, where value creation means that firms establish partnerships to pursue collective objectives in order to obtain the possibility of accessing network resources, such as human resources, financial assets, production facilities and, as in the case of airlines, flight routes. Such value is to be created due to what Lavie (2009) calls strategies for resource complementarity, enrichment, combination and absorption. Value capture, on the other hand, involves the actual benefit extracted by the focal firm by seizing partner's resources.

In this respect, we posit that the four AP network parameters analysed determine alliance value creation, since they establish the channels or conduits through which the network resources have to flow. These parameters create value in terms of the quality, quantity and diversity of the network resources available to the focal firm (Hoffmann, 2007). Moreover, the AP parameters also interact with the level of mobilisation to a certain degree, since they determine "the efficiency of the access to these network resources" (Hoffmann, 2007, p. 834). For instance, there is evidence that AP size interacts with experience to determine the depth of the focal firm's alliances (Pangarkar *et al.*, 2017).

It would therefore be expected that a higher ability and willingness to mobilise partners' resources improves the effectiveness of the pool of alliances to achieve higher performance. Parameters such as portfolio size are expected to have a steeper effect on performance at a higher level of NRM revenue (Castro and Roldán, 2015; Kale and Singh, 2009). However, as stated in Hypothesis 2, since the NRM effect is expected to revert at overly high levels, this would be reflected in the effect of the AP parameters. As a result, although higher NRM is expected to enhance the positive effect of AP parameters on performance, an optimal mobilisation strategy near the threshold would result in the greatest effectiveness in terms of all, portfolio diversity, structural holes and intensity.

In summary, the more strategically the structure of the AP is composed, and the more network resources the focal firm is able to mobilise through its AP, then the better the firm's performance. Accordingly, the AP interacts with the capabilities to mobilise resources to influence performance.

H3. The relationship between the AP parameters and financial performance is positively moderated by the firm's level of NRM in such a way that the AP parameters have stronger effects on financial performance at higher levels of NRM and reach the highest effect near the threshold level of NRM.

3. Methods
This study uses the passenger airline industry as a research setting, given its appropriateness for the analysis of alliances and networks (Gimeno, 2004). In this industry, a destination is an airline resource that includes a market, airport slots, the capability of offering land-based services (e.g. handling and maintenance) and its associated knowledge, among other aspects. It is a resource that each firm clearly controls, but that may also be used by its partners. It therefore permits the analysis of access to and mobilisation of network resources.

In this study, an alliance between two airlines was considered to exist in cases where they had entered into a codeshare agreement (Min and Mitsuhashi, 2012). A codeshare allows an airline to sell seats to its clients on the flights of another company with which it has the agreement. This means that an airline company can fly to destinations that it does not itself offer, thanks to its alliances with its partners. In a codeshare alliance, the partners can incorporate the destination in their routes, but the resource remains under the control of the firm that holds said destination. Therefore, destinations constitute an appropriate physical resource with which to analyse access to network resources and their mobilisation. In this industry, destinations are a key resource, whether understood as an element in a network structure or as a market (Wassmer and Dussauge, 2012).

When an airline enters into a codeshare agreement with another firm, we consider that there is a sufficiently close relationship such that, at least potentially, all other destinations of the partner are accessible and likely to be the object of new codeshare agreements in the future. Thus, the AP of codeshares of a focal airline will allow potential access to the destinations of all its partners. However, in practice, the start of a relationship based on a codeshare agreement between two airlines has a limited number of routes and destinations on both sides and does not have to be equal. Nonetheless, the future of those codeshare

agreements resides in the slow augmentation in the number of destinations and routes that the two airlines operate. Therefore, potential access to all the destinations of the partner is available from the time at which the first cooperative agreement enters into force. The focal firms will, for strategic motives, decide on the destinations in which they have the most interest in mobilising and those in which they have no interest in mobilising whatsoever. Over time, if the focal firm manages to fly to those destinations that were only potentially accessible at first to the relationship with the partner, then it will have increased its mobilisation of those resources. For example, Air Canada and Air China signed a codeshare agreement in April 2008 to travel to Beijing and Shanghai. Subsequently, the numbers of destinations increased for Air Canada through Air China. Therefore, by October 2013, the codeshare agreement with Air China had expanded to the following destinations: Chengdu, Chongqing, Guangzhou, Shenyang, Wuhan and Xi'An. In addition, the codeshare agreement could incorporate other Air China destinations in the future.

The sample was initially selected from a ranking of the 200 largest airlines in terms of revenue in 2009, published in 2010 by the journal Airline Business (Wassmer and Dussauge, 2012). Various business groups appear in that ranking, and a detailed analysis identified a total of 214 airlines pertaining to the listed business group, all of which with a sales volume of over 50 million dollars. Finally, the sample was filtered to work only with passenger airlines that maintained strategic alliances. Having discounted the cargo companies and the airlines without codeshare agreements, the final sample consisted of 135 firms. Their total revenue represented 75 percent of the total for the industry. The data on codeshare alliances was provided through the company Flightglobal, which extracted data from the databases of the ATI (Air Transportation Intelligence) and Airline Business-Alliance Survey and from RoutesOnline, updated in August 2011. In total, we have worked with 135 portfolios that correspond to 1,117 codeshare partnerships.

4. Variables
4.1 The dependent variable
In this work, the dependent variable is that of a firm's performance. We selected the financial performance of a firm in the airline industry in terms of revenue-passenger-kilometre (RPK); this indicator reflects the revenue generated by the airline's main passenger transport operations (Doganis, 2006; Lazzarini, 2007; Wassmer and Dussauge, 2012). In addition, we have gathered other performance measures, such as operating revenue (in US Dollars), total revenue (in US dollars) and sales volume (in number of passengers transported) in order to verify data consistency. Data over the period 2009–2012 was employed for the performance measurement and a 4-year mean average was calculated, which enables volatility to be avoided since it captures a stable alliance network.

4.2 AP network parameters
Following the work of Hoffman (2007), we built indicators for four AP parameters to explore their characteristics and further analyse their appropriateness and explanatory power. First, the size of the AP (Portfolio Size) was measured as the number of partners of the focal firm, which in a network setting would also mean the degree of centrality, thereby indicating the prominence and scale of relationships of the focal actor in the overall web of alliances in the industry (Wasserman and Faust, 1994). Diversity (Diversity Portfolio) was calculated by considering the various segments of the industry in which each airline operates (major, regional, low-cost and charter). A Blau index was employed in its calculation so as to account for the differences between the partners of the APs of the firm under consideration. The intensity of the links (Strong ties) seeks to capture the general experience undergone in the management of alliances. The value of the indicator is the average duration of each alliance in which the focal firm engages. This indicator therefore attempts to reflect the experience of the

focal firm in managing alliances over time and to indicate the way this experience allows the firm to intensify its relationships, by substituting formal governance mechanisms for other more informal mechanisms, such as trust (Koka and Prescott, 2002). Furthermore, structural holes were measured with the indicator developed by Burt (2009) known as the constraint. This indicator attempts to measure the extent to which a firm's contacts are redundant, thereby rendering it constrained by the lack of structural holes. Less constraint signals a stronger position of power in the network (Borgatti, 1997; Hanneman and Riddle, 2005).

4.3 The level of network resource mobilisation
The level of network resources mobilisation (NRM) was measured as the ratio between the number of destinations to which each focal firm actually operates flights through codeshare agreements with its partners and the total number of possible destinations to which it has access through its AP. In other words, the network resource that we consider relevant is the percentage of destinations that the airline actually mobilises from among the destinations to which it has access.

4.4 The control variables
We control for firm characteristics. First, company size is used, measured through the market reach and scope as the number of destinations served (Firm Size), Firm age is measured from the date of the establishment of the firm (Firm Age). These variables were computed in the logarithmic version. Both control variables are widely used in the literature as factors that can influence differences in the performance achieved by the firms. In addition, we control for alliance-group membership to capture the possible positive relevance of group affiliation on firm reputation and performance. We also control for country-of-origin development state (1 for firms located in advanced economies, as defined by the International Monetary Fund and 0 otherwise). It is expected that the larger countries of a more highly developed nature are able to provide better economic conditions to host companies of better performance.

5. Data analysis
We built a multiple regression model that would consider the interaction between the independent variables, following the procedure introduced by Aiken *et al.* (1991). Indicators were also built that depict the AP network parameters of each airline and an exploratory analysis was performed to assess their introduction on the model. All independent variables were mean centred to avoid multicollinearity and to facilitate interpretation. In addition, a sequential testing process was carried out to reduce the model in a way that it would allow interpretation in the light of the set of hypotheses.
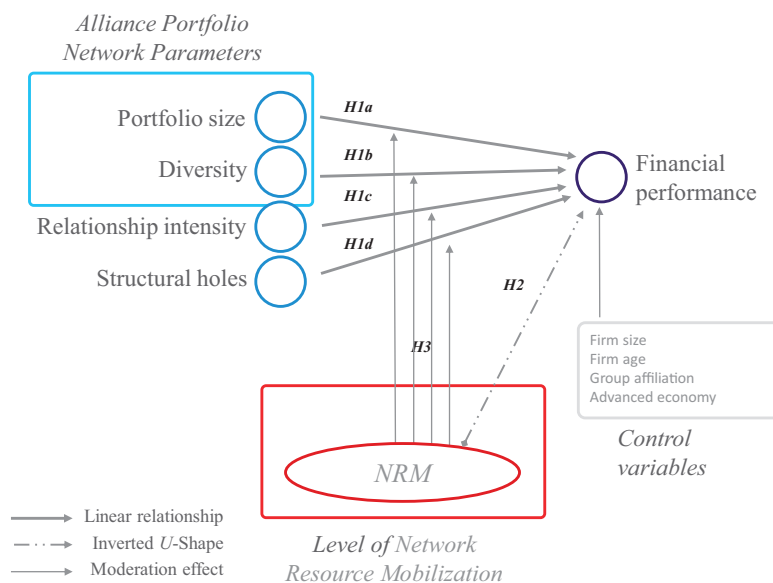
The possible endogeneity of the AP parameters can be ruled out because, first, AP is measured in terms of network-level variables and is therefore determined by both the firm and its partners' position and characteristics. Second, there is no self-selection bias in the sample since firms that choose not to have an AP are still considered. Third, we have tested these relationships in the data by following Shaver's (1998) example and Gujarati's (2012) procedure.

In our work, Hypothesis 3 posits that the extent to which AP network parameters affect financial performance is conditioned by the dimension of a moderator variable (level of NRM) once the effect of controls (e.g. size and age) has been considered (Preacher and Hayes, 2008). Thus, Figure 1 describes the total effect of the AP on the financial performance, while considering the control variables.

6. Results
6.1 Variables description and MR model
In general, the mean level of NRM in the industry is close to 11%, which reveals that the majority of resources that may be accessed by companies through their partners remain

Alliance Portfolio
Network Parameters

Portfolio size

Diversity

Relationship intensity

Structural holes

H1a
H1b
H1c
H1d

H2

H3

Financial
performance

Firm size
Firm age
Group affiliation
Advanced economy

Control
variables

NRM

Linear relationship
Inverted *U*-Shape
Moderation effect

Level of Network
Resource Mobilization

unexploited. This is especially interesting since the AP network indicators reveal that, regarding experience, airlines have an average alliance duration of 12 years as well a mean portfolio size of nearly 12 alliances per company; however, this portfolio size shows a certain redundancy, with an effective size of 9 and constraint of 0.2. On the other hand, the Blau diversity index is set at 0.15. In Table 1, the level of each variable before mean-centring is shown, as is the correlation matrix.

Following the procedure by Aiken *et al.* (1991), sequential multiple regression models were implemented to capture the linearity of the variable, as posited in Hypothesis 2 and to test the stability of the coefficients across different combinations of interaction terms. For each model, a variance inflation factor (VIF) was calculated to identify collinearity and rectify the model. These factors are reported in Appendix section. It is worth noting that none of the independent variables correlates with the error terms in the general model nor in individual regression tests. Moreover, we have tested for reversed causality and the unobserved determinants of the AP network parameters (portfolio size and constraint) using instrumental variables and found no sound evidence of endogeneity.

The models reported in Table 2 present the results of the sequential process carried out. Column 1 shows the main effect and explanatory power of the control variables. The model in Column 2 includes the main effects of all four AP parameters measured. The model in Column 3 explores the NRM effect on revenue, while the model in Column 4 includes the interaction effects between AP parameters and NRM. In this stage, we include interaction with three parameters that were found significant in Model 2. In addition to the reported models, all quadratic interaction effects were tested, although none was found to be significant. The resulting coefficients are moderately stable across estimation models; however, as expected, they are affected after introducing the interaction terms to the regression model.

6.2 Relevance of AP network parameters
In general, except for intensity, the AP variables exhibited the expected signs. In the AP Model 2, Portfolio size shows a positive and significant small effect on performance

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) NRM	0.1	0.1	1.00									
(2) P. Size	11.8	10.5	0.50***	1.00								
(3) Constraint	0.2	0.4	-0.36**	-0.48***	1.00							
(4) Intensity	12.0	12.4	0.32**	0.62***	-0.37***	1.00						
(5) Diversity	0.1	0.2	0.23*	0.34**	-0.14	0.24*	1.00					
(6) Revenue	3,411	4,681	0.56***	0.64***	-0.32**	0.36***	0.33**	1.00				
(7) Firm size	56.6	39.3	0.39***	0.45***	-0.06	0.24*	0.19	0.79***	1.00			
(8) Firm age	46.9	25.7	0.35***	0.42***	-0.31**	0.24*	0.26*	0.22*	0.11	1.00		
(9) Advanced economy	0.5	0.5	0.19	0.09	0.22*	0.13	0.04	0.16	0.25*	-0.01	1.00	
(10) Group membership	0.5	0.5	0.39***	0.58***	-0.33**	0.52***	0.18	0.49***	0.35***	0.37***	0.11	1.00

Note(s): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.
Descriptive statistics

Variables	(1) Control	(2) Portfolio	(3) Mobilisation effects	(4) Interactions
Firm size	1.396***	1.266***	1.162***	1.274***
	(0.133)	(0.132)	(0.131)	(0.132)
Firm age	0.294	−0.259	−0.326	0.0559
	(0.323)	(0.338)	(0.330)	(0.350)
Advanced country	−0.117	0.0347	−0.0108	0.0943
	(0.174)	(0.173)	(0.170)	(0.174)
Group membership	0.560***	0.335*	0.190	0.0221
	(0.195)	(0.209)	(0.210)	(0.222)
Portfolio size		0.0326***	0.0224**	0.0192*
		(0.0128)	(0.0129)	(0.0131)
Portfolio intensity		−0.00732	−0.00679	−0.00393
		(0.00796)	(0.00762)	(0.00745)
Portfolio diversity		0.934***	0.769**	1.856***
		(0.462)	(0.447)	(0.680)
Constraint		−0.626***	−0.401*	2.203***
		(0.261)	(0.260)	(1.039)
NRM			4.068***	4.941***
			(1.421)	(1.839)
NRM^2			−5.523**	−60.34***
			(3.212)	(22.16)
NRM x P. size				0.221
				(0.211)
NRM^2 x P. size				−0.606
				(0.998)
NRM x Diversity				2.991
				(5.293)
NRM^2 x Diversity				−64.27*
				(39.13)
NRM x Constraint				3.036
				(4.421)
NRM^2 x Constraint				−214.7***
				(98.03)
Constant	1.189**	2.527***	3.234***	2.768***
	(0.708)	(0.772)	(0.776)	(0.781)
R-squared	0.629	0.760	0.787	0.817

Note(s): Standard errors in parentheses. ***$p < 0.05$, **$p < 0.1$, *$p < 0.15$

Table 2.
Multiple regression
analysis

($b = 0.032$, $p = 0.013$), although this effect is less significant since we account for NRM
(Model 3: $b = 0.022$, $p = 0.086$). Hence, increasing the number of alliances may not necessarily
be accompanied by an increase in performance. As for portfolio intensity or strong ties, these
exert a small, negative and non-significant effect on a firm's performance in the sample and
these results hold across estimations. In relation to portfolio diversity, the effect of this
parameter is positive and significant in the estimation of AP effects (Model 2: $p = 0.047$) but
has a higher p-value (0.089) when estimating a model that accounts for NRM, which signals
the appropriateness of greater diversity in partnerships for performance objectives. The final
focal variable, structural holes in terms of constraint, has the expected negative sign, which
indicates that higher constraint reduces the possibility of better revenue. This effect is
significant in the AP estimation (Model 2: $b = −0.626$, $p = 0.019$), although it does lose
significance when considering NRM in parallel (Model 3: $b = −0.400$, $p = 0.128$).

6.3 NRM threshold

The variability of NRM is calculated in order to build the graphs as presented in Figure 2. Models 3 and 4 are used in which this variable is contrasted with the pivotal AP characteristics in order to illustrate the relationship between NRM and performance. In Model 3, the regression analysis shows that revenue has a significant and positive relationship with NRM (NRM: $b = 4.068$, $p = 0.005$), but has a negative and significant relationship with its quadratic term (NRM^2: $b = -5.523$, $p = 0.014$), thereby describing an inverted *U*-shaped relationship. The curvilinear relationship is also corroborated by following the steps suggested by Haans *et al.* (2016) and is reported in Appendix section. The data contains more cases to the left of the curve, yet it is still compatible with the inverted *U*-shaped principle, since most companies mobilise below the turning point. Furthermore, the turning point is above the average and well inside the data range. In this scenario, a high level of NRM allows a positive and stable revenue increase up to a threshold of 30% of mobilised partners' resources, although the relationship is negative at greater levels. After having introduced the interactions in Model 4, both NRM and NRM^2 remain significant as do the interaction terms with diversity and constraint. Therefore, a high level of NRM allows for a positive and stable revenue increase up to a threshold of 16%.

Marginal effect at P. Size and NRM levels
(a)

Marginal effects at Diversity and NRM levels
(b)

Marginal effects at constraint and NRM levels
(c)
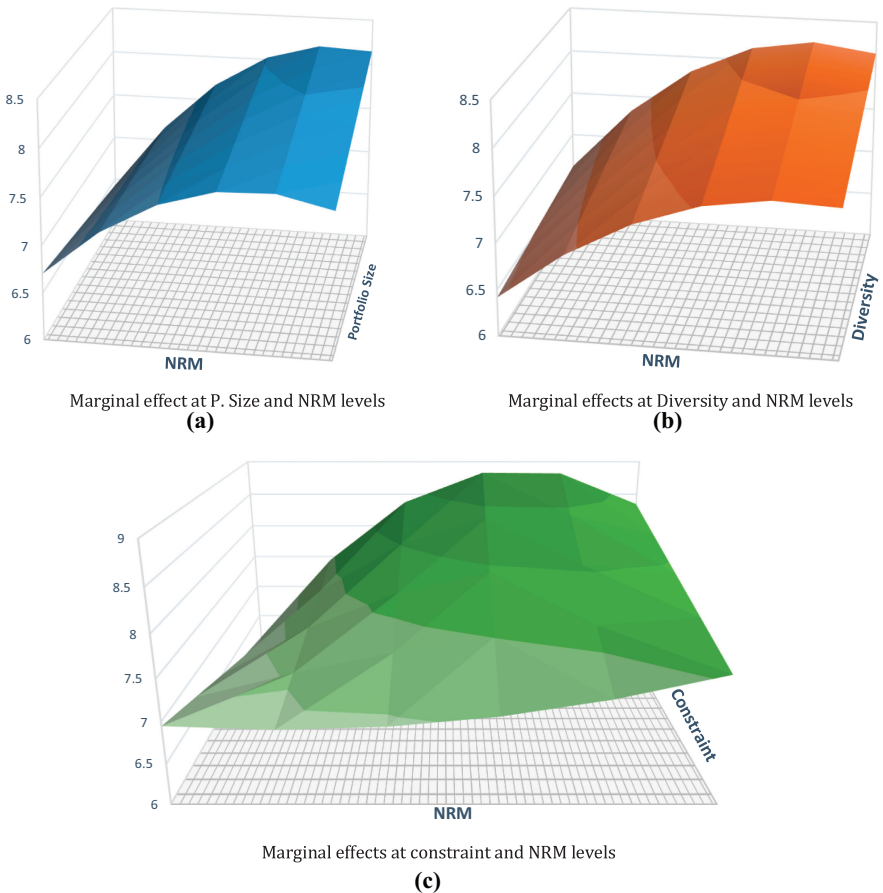
Figure 2.
AP network parameters and NRM interaction

6.4 AP parameters and NRM interaction

The introduction of the interaction terms between the three significant AP network parameters in Model 2 with NRM and NRM^2 improved the overall model fit. The sign of the interaction with the squared terms is negative for all AP parameters as expected, However, only constraint x NRM^2 is significant at the 5% level ($p = 0.032$), diversity x NRM^2 is significant at the 10% level ($p = 0.100$) and portfolio size x NRM^2 is not significant ($p = 0.546$). None of the AP parameter x NRM terms are significant, although the term is still considered in the overall effect estimation.

The sign of the coefficients is as expected for portfolio size and diversity, but it is not so for constraint. In the case of portfolio size and diversity, the interactions with NRM show that as NRM grows, the slope of these two AP parameters against revenue becomes steeper as shown in Figure 2. On the other hand, the interaction between constraint and NRM shows the same patter as the portfolio size and diversity, which was not expected, since Model 2 and Model 3 hinted a negative relationship. This means that the relationship between constraint and revenue performance is more nuanced in the sense that its negative effect on performance at low NRM levels is mitigated when the firm has higher resource mobilisation. Similarly, near the turning point of NRM it actually helps to have high constraint/few structural holes. This observed in Figure 2.c, where at higher NRM, the constraint-revenue curve changes slope.

7. Discussion and conclusions

The objective of this work was to gain insight into how the access to resources granted by firms' APs affects their performance and to what extent their mobilisation strategy plays a moderating role in the relationship between AP parameters and financial performance. We posit that a set of four key AP network parameters permit the focal firm to access valuable network resources and along with the internal capability to mobilise these resources, it is set to increase the financial performance of airlines. We used a multiple regression moderation analysis to achieve this objective.

Our analysis suggests that some of the parameters of the AP network play a role in reaching firms' performance goals; especially AP diversity (H1b) and constraint (H1c) were found to have a significant effect on revenue. In particular, on average, companies that had more diverse partners in their portfolio network were prone to obtain better results; yet the full effect of diversity is contingent on the NRM. This is true also for the structural holes' variable. On the other hand, the data shows no evidence that portfolio size (H1a) by itself exerts an important effect on performance when NRM is accounted for. Similarly, there is no evidence to consider intensity of links (H1d) as a determinant of a firm's performance, which suggests that resources may be exploited indistinctly either from recent relationships or from well-established ones.

In addition, we have hypothesised that the level of NRM has an inverted *U*-shaped relationship to company performance for which our research found enough evidence to confirm. Therefore, a firms' effort to enhance resource mobilisation beyond the mean of 11% pays increasing benefits in financial performance until reaching boundaries set at a mean level of 16% when all interactions are accounted for. In consequence, we found that it is more important for performance to have a considerable resource mobilisation capability when aiming for a better revenue performance than just having plenty of alliances; even though previous work declares the importance of having a high centrality in the overall alliances network (Casanueva *et al.*, 2014); and that such centrality is sometimes achieved via expansion of the firm's portfolio.

Moreover, we hypothesised that the relationship between the AP parameters and financial performance is moderated by the firm's level of NRM. Our findings suggest that indeed, a significant interaction exist between two AP network features and NRM. In particular, firms

seize their portfolio diversity to the extent that NRM is optimised, while at low levels of NRM, portfolio diversity has a near-null effect. On the other hand, less constraint, meaning less redundancy, is detrimental for performance when the firm mobilises little network resources and acts positively when the firm is an optimum mobiliser. In essence, in order to obtain the optimal benefits from having a bigger, diversified and less constrained AP, firms must develop an optimal level of network resources mobilisation.

7.1 Theoretical implications

The principal theoretical contributions of this work are twofold. First, the standard formulation of the relational view, borrowing from the resource-based view, is that firms must develop an AP that generates value through the resources made available by a network of partners (Zaheer et al., 2010). Hence, the larger the pool of resources available, the easier for the firm to achieve its objectives (Barney, 1991; Lavie, 2006). However, a simultaneous empirical analysis of various AP parameters that captures resource access has been neglected so far (Castro and Roldán, 2015; Wassmer, 2010). Based on the extant conceptualisation (Hoffman, 2007), our research contributes to divert the inflated focus existent on the number of alliances or portfolio size as determinant of firms' performance; we show that, instead, it is mobilisation level that plays a role in financial performance gains and not the number of alliances stablished alone. In addition, we show that for an AP to be effective, it needs to be accompanied by an optimum mobilisation strategy. Particularly, the diversity of the AP arose as one of the AP network parameters that most affect organisational performance (Goerzen and Beamish, 2005); but the biggest gains in performance are obtained when portfolio diversity is done by better mobilisers. This is also true for network constraint, which for below-average network mobilisers implies negative performance outcomes but improves performance for more strategic mobiliser firms.

A second theoretical contribution conveyed in this work resides in introducing the analysis of the curvilinear relationships between the level of NRM and a firm's performance, as well as its role in contributing to AP literature. Wang and Rajagopalan (2015, p. 251) pointed that in the post-formation phase of alliances, partners have the opportunity "to create value by leveraging complementary assets and learning from each other." In this respect, the extant literature has analysed some features that may facilitate the value creation in this phase, such as the coordination capability (Schilke and Goerzen, 2010), communication (Schreiner et al., 2009), or inter-firm learning (Simonin, 1997). However, few studies have focused on the mobilisation of partners' resources, which is an underlying strategic choice as depicted in our variable level of NRM. Thus, Wang and Rajagopalan (2015) asserts that the effects of this strategy may vary depending on the relative resource dependency over the partners' resources; and subsequently, our research reveals that the NRM level has an inverted U-shaped relationship to company performance. The rationale is that when the focal actor excessively increases its level of resource mobilisation, this leads to diminishing marginal returns, by increasing in resource dependency with respect to external alliance partners, at the time that the focal firm defers control of its operations and dilutes its market focus. This same rationale is extended to the results obtained from analysing NRM effects as a moderator of the set of AP parameters.

7.2 Managerial implications

From a practical point of view, these findings suggest the need for NRM to form part of AP management capability (Sarkar et al., 2008; Wang and Rajagopalan, 2015), in order to generate awareness of the nuances of a resource mobilisation strategy (Casanueva et al., 2014). The foundations of such capability are prior experience in alliances and the management of partner network relationships within the portfolio (Schilke and Goerzen,

2010). On the other hand, it is necessary to clearly identify which partner resources are strategic and/or complementary for the firm, which partners possess them to a greater extent and which of them are willing to permit the focal firm to use them to its own benefit. The need is also proposed for an acceptable characterisation of the resources of the focal firm. Doing so would mean that their mobilisation may contribute to performance to a greater extent, as the characteristics of such disparate resources like those linked to knowledge as opposed to other more tangible or market-related ones will condition the decision-making by the firms that are involved.

This means that acquiring superior strategic knowledge in NRM will allow the focal actor to extract value from its AP through the optimal exploitation of complementary assets (Lavie, 2009; Wang and Rajagopalan, 2015). Furthermore, our research has made clear that managers in charge of AP management within the firms must evaluate the extent to which NRM is affecting performance, provided that some operational and managerial efforts may be carried out in this process without obtaining the expected returns.

7.3 Limitations and future lines of enquiry
This work presents certain limitations. First of all, our analysis covers the interactions between NRM and each AP parameter and not between the AP parameters themselves, an analysis which may lead to discover further nuances in the effect of certain configurations on performance outcomes. In addition, the analysis of the interactions between access (because of the AP network), resource mobilisation and performance could be subjected to a dynamic and process-related analysis that has only been covered here at a particular point in time. On the other, the consideration of a single network attribute (airline destinations), despite its relevance to the industry, limits the analysis of the global effect of the AP network parameters in performance.

Future lines of research will attempt to gain a deeper theoretical understanding of what NRM capability means and how it should be managed. The relationships studied in future works will include, first, a configurational perspective on AP parameters aimed to analyse their interplay; and second, a dynamic and process-related component, by extending this type of analysis to other industries and to a larger number of relevant resources (which will also include intangible knowledge-based resources). Although previous studies have identified that AP parameters such as portfolio size (Cobeña *et al.*, 2016; Wassmer and Dussauge, 2012) or strong ties (Han, 2006; Wu, 2008) have a relevance to firms' performance, this is not necessarily true for the Airline business when accounting for resource mobilisation capabilities. Hence, we have enough evidence to assume that AP research must not ignore the organisational attributes concerning mobilisation when studying its impact on performance.

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Appendix 1

	Model 3
Firm size	1.52
Firm age	1.39
Advanced country	1.24
Group membership	1.92
Portfolio size	3.00
Portfolio intensity	1.19
Portfolio diversity	1.81
Constraint	1.66
NRM	4.80
NRM^2	3.40

Table A1.
Variance inflation factor–VIF for the base regression models

Appendix 2
Curvilinear relationship tests

	Lower bound	Upper bound
Interval	−0.1113	0.6327
Slope	18.38433	−71.46243
t-value	3.323803	−2.568915
$P > t$	0.0007034	0.0061523
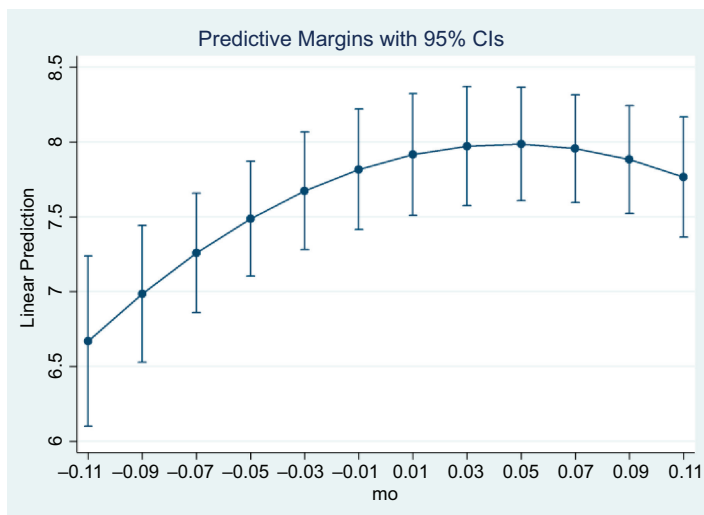
Table A2.
Results of the Stata® routine *utest*

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