

The strategic role of financial slack on alliance formation

Strategic role
of financial
slack

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Abstract

Purpose – While previous research has developed unclear positions about the role of organizational resources on alliance formation, the purpose of this paper is to focus on financial slack resources to clarify the conditions that facilitate the formation of strategic alliances. Building on the behavioral theory of the firm, this paper theorizes that internal and external financial slack resources, measured as cash holdings and financial leverage, incentivize managers to form alliances, because they protect them against the risk of alliance failure.

Design/methodology/approach – Complete data were collected from 400 biotech public companies for the period from 2000 to 2015. The data set considered alliances among over 2,200 public and private companies. Hypothesis testing relied on generalized estimating equations.

Findings – Cash holdings positively impact alliance formation; financial leverage negatively impacts alliance formation; cash holdings and financial leverage interact in the prediction of alliance formation.

Research limitations/implications – While research in financial slack resources shows equivocal results, this study illustrates that they exercise a significant effect when it comes to the choice of forming strategic alliances. Limitations include the focus on multiple forms of alliances, possible restrictions in the external validity of the findings, and a lack of measurement of explanatory mechanisms.

Practical implications – Findings help managers understand the financial conditions in which they should choose to form or avoid alliances; findings help managers select alliance partners.

Originality/value – The study contributes by proposing a new outlook on alliances; identifying financial resources as alliance predictors when previous research focused on intangible resources; offering new insights into the often equivocal outcomes of financial slack; building an uncharted bridge between the finance and alliance literatures.

Keywords Finance, Networks, Strategic alliances, Alliances, Biotechnology, Cash

Paper type Research paper

Understanding the reasons why organizations form strategic alliances is a core concern of strategic management scholars (Gulati, 1999; Rothaermel and Boeker, 2008). Academics have shown mounting interest in the formation of alliances because they have been steadily increasing in the last decades (Chung *et al.*, 2000; Kale and Singh, 2009), becoming one of the most important strategic options organizations rely on to compete in the current business environment (Ozcan and Eisenhardt, 2009). Evidence shows that forming alliances is fundamental to be competitive in the marketplace and to reap superior performance (Reuer and Koza, 2000). A core reason why alliances are formed is to acquire resources that allow organizations to develop a stronger competitive position (Chung *et al.*, 2000; Eisenhardt and Schoonhoven, 1996; Gu and Lu, 2014).

The argument that strategic alliances are important for the acquisition of resources has raised the question of how alliance formation depends on the stock of resources that organizations already have. However, authors have expressed concerns about the consistency, magnitude, and direction of the effects of organizational resources on alliance formation (Ahuja, 2000; Gu and Lu, 2014; Das and Teng, 1998, 2000). On one side,



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some authors have claimed that organizations with insufficient resources are incentivized to form alliances, because they have a higher need to acquire resources, while organizations with resources in excess are not particularly motivated to form alliances (Aldrich and Fiol, 1994; Eisenhardt and Schoonhoven, 1996). On the other side, other authors have counter-argued that organizations with abundant resources are the ones most likely to form alliances, because they can give their resources to partners and will therefore appear attractive to them (Ahuja, 2000; Baum *et al.*, 2000; Gulati, 1999). There is a tension in the literature regarding the extent to which organizational resources positively or negatively affect alliance formation (Ahuja, 2000; Eisenhardt and Schoonhoven, 1996; Gu and Lu, 2014).

Previous research is limited because it attempted to shed light on the role of resources on alliance formation by focusing primarily on critical resources that are important for competitive advantage. Critical resources that contribute to competitive advantage have value, rareness, inimitability, and non-substitutability (Eisenhardt and Schoonhoven, 1996). While this focus on critical resources reflects the dominant position in the literature (Gulati, 1999), it creates a trade-off that does not allow for a clear understanding of the role of resources on alliance formation: organizations that lack critical resources will form alliances because of need and organizations that have an abundance of critical resources will form alliances because of opportunity (Ahuja, 2000). The tension between need and opportunity makes it difficult to develop a clear position about the role of resources on alliance formation (Gu and Lu, 2014).

However, there is another role that resources play in alliance formation: resources can be important not only for competitive advantage but also to protect organizations against the risk of alliance failure. This role is highly salient for alliance formation because the risk of alliance failure may affect the decision to form alliances. Empirical evidence shows that strategic alliances are associated with a high risk of failure (Makino *et al.*, 2007; Mamavi *et al.*, 2015). Authors reported that the instability rate of alliances is about 50 percent (Inkpen and Beamish, 1997) and oscillates between 30 and 70 percent (Dyer *et al.*, 2001). In most cases, alliances fail to meet their goals (Kale and Singh, 2009) and result in shareholder value destruction (Kale *et al.*, 2002).

Building on the assumption that organizations need to protect themselves against the risk of alliance failure, this paper advances a novel argument that offers greater clarity about the role of resources on alliance formation. There is a particular type of resources that protect organizations against the risk of alliance failure: financial slack resources. Slack resources are resources in excess that allow the organization to safeguard itself against the adverse effects of risks undertaken with strategic decisions (Bourgeois, 1981). Slack resources can assume different forms, including labor, inventory, machinery, equipment, or financial resources, intended as funds readily or potentially available to organizations (Sharfman *et al.*, 1988). Financial slack resources are completely fungible and generally lack value, rareness, inimitability, or non-substitutability. However, they have a particular advantage in terms of protecting organizations against risks, because their use is highly discretionary and versatile, helping organizations cope with the unexpected consequences of failure (Sharfman *et al.*, 1988). Research in the behavioral theory of the firm by Cyert and March (1963) originally proposed that managers can pursue risky strategic decisions if they have large financial slack, because it creates a “buffer” that motivates the pursuit of risk while protecting managers against the consequences of failure. According to the behavioral perspective, financial slack resources allow managers to comfortably pursue risky decisions and remain unconcerned that failure will compromise organizational functioning (Kim and Bettis, 2014). It shall be argued that by focusing on financial slack resources, we can uncover clearer and unexplored effects of resources on alliance formation, thus improving our understanding of the role that resources play in the formation of strategic alliances. Paradoxically, while the focus on resources critical to competitive advantage does not

facilitate the emergence of a conclusive explanation for alliance formation, the focus on non-critical, financial slack resources may offer a compelling logic to explain the conditions under which alliances are formed.

Financial slack resources are divided into two types, depending on whether they relate to internal or external funding (Chatterjee and Wernerfelt, 1991). Financial slack from internal funding refers to cash holdings, which represent internally generated funds maintained liquid and unabsorbed, instead of being reinvested or redistributed to shareholders (Chatterjee and Wernerfelt, 1991; Kim and Bettis, 2014). Financial slack from external funding is captured by financial leverage, which measures the proportion of debt over equity. Low financial leverage is a form of slack because it provides the potential to access external funds through debt financing (Chatterjee and Wernerfelt, 1991). This paper offers new insights into the role of financial slack resources on alliance formation, disentangling the unique effects of cash and financial leverage.

Examining how financial slack predicts alliance formation offers a distinctive set of contributions. First, it contributes to research in strategic alliances, because it clarifies the role of resources on alliance formation, reorienting the discussion toward an unexplored type of resources. Wang and Rajagopalan (2015) underscored in a recent review that intangible resources have been identified as the main antecedents of alliance formation, while there is a lack of focus on financial resources. Although intangible resources are important, they are also more difficult to measure reliably. The focus on financial resources allows for the development of a new perspective and offers concrete implications for executives, as it gives actionable insight into what they should do to enable strategic alliances. Second, this paper contributes to research on financial slack, which has thus far reported conflicting and equivocal results (Daniel *et al.*, 2004; Fadol *et al.*, 2015; Marlin and Geiger, 2015). While early theorizations advocated for an optimal structure of cash holdings and financial leverage, new positions highlighted opposite predictions (O'Brien and Folta, 2009; O'Brien *et al.*, 2014). The effect of financial slack can be either positive or negative depending on the strategic decisions considered (Simerly and Li, 2000) as there are benefits and costs associated with financial slack. This paper increases our understanding of the conditions in which financial slack is beneficial. These contributions will be offered testing the proposed theory on the alliances formed by public companies in the pharmaceutical industry in the 2000-2014 period.

The importance of financial slack for alliance formation: a behavioral perspective

Organizational slack resources are defined as the bundle of internal and external resources available or potentially available to the organization above the minimum efficient need to achieve set goals (Bourgeois, 1981; Geiger and Cashen, 2002). According to Dimmick and Murray (1978), slack is composed of potential or actual resources in excess that are not committed to any specific expenditure. The justification for keeping resources beyond the minimum need stems from the necessity of creating a buffer that protects the organization against threats and the consequences of failures (Fadol *et al.*, 2015; Simerly and Li, 2000). Traditional economic and financial perspectives advocating for efficiency in managerial decisions suggest that organizations should not need those buffers if decisions are perfectly rational (Jensen, 1986). However, the behavioral perspective on firms raises the concern that managerial decisions are rarely perfectly rational, creating a need to maintain slack to cope with unforeseen threats and problems (Alessandri *et al.*, 2014; Fadol *et al.*, 2015; Kim and Bettis, 2014).

There are two main types of slack resources, depending on the variety of situations in which they can be used and on the options they give to managers: low discretion slack resources and high discretion slack resources (Sharfman *et al.*, 1988). Low discretion slack resources give fewer options to managers and include inventory, skilled labor and

equipment (Sharfman *et al.*, 1988). High discretion slack resources can be used in a variety of circumstances, giving several options to managers, and primarily refer to financial slack (Sharfman *et al.*, 1988; Geiger and Cashen, 2002). Financial slack can be divided into two components, depending on whether the sources of funds are internal or external. Financial slack from internal sources is composed of cash and cash equivalents, which are unabsorbed funds readily available to managers (Bromiley, 1991; Geiger and Cashen, 2002). Financial slack from external sources is identified with financial leverage – the proportion of debt over equity – and captures the potential funds that can be accessed from external sources (Bromiley, 1991; Geiger and Cashen, 2002). Organizations with low leverage have the potential to access additional funds through debt financing (Tan and Peng, 2003). Cash therefore captures available financial slack from internal sources, and financial leverage captures the potential financial slack that can be accessed from external sources (Marlin and Geiger, 2015).

In the case of alliance formation, financial slack resources become particularly salient, because these highly discretionary funds provide a specific set of benefits. First, financial slack allows for absorbing the risks associated with forming alliances. An alliance may generate higher costs than expected, because costs are difficult to estimate a priori and tend to unexpectedly manifest only after the contract is signed (Gulati and Singh, 1998). An alliance may generate significantly lower revenues than expected, because unforeseeable collaboration challenges can hamper the quality of the products or services developed (Das, 2005; Gulati *et al.*, 2012). If alliances cost more or earn less than expected, the unexpected lower profitability may create financial problems for the company. The existence of slack financial resources readily or potentially available to managers could offer a short-term solution to mitigate the deleterious financial impact of variability in costs and revenues, therefore motivating alliance formation.

Second, financial slack is beneficial to alliance formation because it renders the strategic decision partially reversible. Managers may oppose forming alliances out of a concern that the organization will be locked into the alliance and can no longer easily choose to exit after the contract is signed (McCarter *et al.*, 2011). If withdrawal from alliances is difficult, managers will be afraid to engage in a long-term and expensive commitment to a potentially wrong course of action (Makino *et al.*, 2007). The buffers of financial slack allow managers the option to exit the alliance, because the short-term costs of exit could be more easily absorbed without compromising financial stability. Financial slack resources could give the possibility of “buying” the exit option in case of need, alleviating the pressure behind the decision to enter the alliance.

Third, financial slack increases the chances of winning internal political arguments in support of forming alliances. Cyert and March (1963) argued that financial slack could be used to resolve conflict among political coalitions, as it allows top management to flexibly use financial resources as side payments that can facilitate firm adaptation and satisfy the divergent requests from different political groups. The high flexibility of financial slack helps top managers to combat internal resistance to change, which is strong for decisions, such as alliance formation, that can potentially have debilitating effects on groups with different interests in the organization (Piderit, 2000).

Fourth, financial slack allows for a stronger negotiating power *vis-à-vis* alliance partners, protecting the company from partners' value misappropriation and thus reinforcing the motivation to form alliances. Managers can be hesitant to form alliances because of the risk of opportunistic value misappropriation, in which the partners contribute less than contractually specified (Park and Russo, 1996). The negotiation power of the firm will determine its capacity to obtain compliance from alliance partners and diminish the risk of the partners' opportunistic behaviors (Das and Kumar, 2011; Zeng and Chen, 2003). If a firm has the option to exit the alliance or does not risk excessive financial exposure if the outcomes of the alliance are inferior to expectations, the firm becomes less subject to the will

of its alliance partners and can enforce partners' collaborative behavior, discouraging opportunistic actions of value misappropriation (McCarter *et al.*, 2011).

All these benefits suggest that financial slack may improve the conditions to form strategic alliances. However, financial slack comes with costs as well, because organizations could more efficiently allocate resources (Bourgeois, 1981), and because managers could opportunistically use slack to pursue self-serving goals, hampering organizational outcomes (Jensen, 1993). Holding cash does not yield any substantial return and the cost of equity is significantly larger than the cost of capital, making low financial leverage particularly costly for organizations (Jensen, 1989; Love and Nohria, 2005). Furthermore, financial slack could have deleterious effects on the attitudes of management, because the availability of a "safety net" could decrease the need for efficiency and discourage the pursuit of initiatives aimed at long-term profitability (Love and Nohria, 2005; Marlin and Geiger, 2015). There are therefore both benefits and costs associated with financial slack. The specific way in which benefits overcome costs resulting in a positive final effect of financial slack on alliance formation will be applied to the case of cash and financial leverage in the following section.

Hypothesis development

The first type of financial slack relates to internal funding and is captured by the stock of cash holdings. The argument that cash offers a buffer that positively influences alliance formation decisions develops from the recent insight of Kim and Bettis (2014), who showed that, despite previous positions, cash can be a surprisingly valuable asset for organizations. They argue that cash could be particularly advantageous for decisions involving risk and uncertainty, as managers could benefit from a buffer that protects them from the possible failure of their initiatives. This argument is echoed by other authors, who claim that cash motivates organizations to pursue risky projects, because it protects them against possible unforeseen events (O'Brien and Folta, 2009; Opler *et al.*, 1999). Indeed, an objection to this argument could be that organizations do not need internally generated funds to finance risky projects, because the capital market could efficiently provide financing as long as those projects have a clear prospect of generating value. However, Myers and Majluf (1984) argue that the frictions and imperfections in capital markets relative to internally generated funds could cause companies to lose opportunities and having financial slack from internal funds may become important for risky projects.

We can apply the previously anticipated reasons for which financial slack is beneficial to alliance formation to the specific case of cash. If organizations keep larger cash holdings, they have free cash flow which is available to compensate for eventually lower earnings from the alliance or for unexpected increased costs. Cash holdings allow the alliance decision to be partially reversible, as the firm can use cash reserves to minimize the impact of alliance withdrawal. Cash can be used as a political instrument to discretionally allocate funds to managers in order to gain internal support and overcome resistance for the alliance decision. Last, cash may allow the organization to leverage its negotiating power with alliance partners, because it grants a reservoir of liquid funds to be used in case of necessity.

One counterargument against cash could be that it entails costs. As Fadol *et al.* (2015) acknowledge, a group of previous authors have proposed that cash create inefficiencies. More specifically, cash creates opportunity costs, as managers could more efficiently employ financial resources or give money back to shareholders instead of holding it in stock (Jensen, 1986). If companies hold cash or cash equivalents, they absorb opportunity costs, because cash assets are unproductive and do not yield any significant return (Jensen, 1989). Keeping cash resources unused could be costly for an organization (Mousa *et al.*, 2013). Having large cash holdings could be an opportunistic behavior of managers who do not act to maximize the interest of shareholders and do not redistribute the internally generated funds to them (Brush *et al.*, 2000). If managers have access to a large cash reserve that protects them,

they may be encouraged to squander resources instead of using them productively (Daniel *et al.*, 2004). The large availability of cash could invite inefficiency because it encourages satisfying behaviors instead of the pursuit of excellence (Marlin and Geiger, 2015).

However, the argument against cash can be used to explain its implications for financial performance (Daniel *et al.*, 2004; Fadol *et al.*, 2015; Kim and Bettis, 2014; Mousa *et al.*, 2013) but may not be relevant to the question of alliance formation. The existence of opportunity costs incurred by holding a large cash reserve does not undermine the argument for a positive influence on alliance formation. Scholars have argued that organizational outcomes could potentially be suboptimal with large slack, because its flexibility makes organizations choose to implement more projects, even those that should have been avoided or terminated (Jensen, 1993; Marlin and Geiger, 2015). When managers opportunistically squander resources while protected by the buffer of cash, these resources are generally used in extra projects (Daniel *et al.*, 2004), possibly resulting in more frequent alliance formation. While the counterargument relating to cash may suggest that the performance or innovation outcomes of the projects could potentially be hampered, it does support the idea that organizations pursue more projects if they have large slack, suggesting a positive relationship between slack and alliance formation. For these reasons, it is anticipated that cash will positively affect alliance formation:

H1. Cash holdings are positively associated with alliance formation.

The second type of financial relates to external funding and is captured by financial leverage, which is the ratio of debt financing over equity financing. In addition to cash, the capital structure provides the buffer that organizations need to develop alliances. Stewart (1991) argues that equity is a “soft pillow” that allows companies to make mistakes, while debt is a “dagger” that strongly penalizes organizations as soon as operating profits start falling below expectations. Organizations with low debt and large equity maintain the flexibility of equity and the potential to access additional funds from debt financing in case of unexpected need (Bromiley, 1991). Keeping large debt constrains managerial discretion with regards to strategic options and does not allow managers to aggressively leverage options for expansion (O'Brien *et al.*, 2014). Large debt makes organizations undergo a significant rigidity that impairs the financial flexibility necessary to pursue risky strategic options (O'Brien, 2003). Furthermore, the rigid contractual constraints of debt are inappropriate for pursuing strategic options that entail significant risk and that do not guarantee the creation of tangible value for the organization (David *et al.*, 2008). A capital structure with large debt is not suitable for organizations aiming to pursue strategic options that entail volatility in earnings or that could lead to conditions of financial distress (Bradley *et al.*, 1984). For these reasons, according to the underlying assumption that alliances are risky strategic decisions, high financial leverage would discourage managers from forming strategic alliances.

We can also apply the previously anticipated reasons for which financial slack is beneficial to alliance formation to the specific case of financial leverage. High financial leverage would constrain the flexibility to cope with unexpected lower earnings or higher costs because of the lower access to additional funds from external sources. High financial leverage could also decrease the possibility of reversing alliance formation decisions, because if companies withdraw from the alliance in its implementation stage, after having incurred costs, the abrupt negative change in expected earnings would create problems for an organization whose financing already overly relies on debt. High financial leverage will not allow managerial discretion to overcome resistance, and high indebtedness could spur internal opposition to the decision of forming an alliance. Finally, with high financial leverage, the negotiating power of the firm *vis-à-vis* partners could be lower, as the inferior possibility to access additional funds from external sources constrains the ability to enforce demands on the collaborative behavior of partners.

Even in case of low financial leverage, the counterargument could be that low leverage is costly for organizations. Since the cost of debt is significantly lower than the cost of equity, organizations with low financial leverage will absorb a superior cost of capital (Jensen, 1989). Low financial leverage is problematic because it does not allow organizations to benefit from tax advantages. If managers can access potential slack resources in case of need, they may become self-centered and less concerned with the long-term success of the organization (Jin *et al.*, 2015). The existence of a potential buffer and the possibility of accessing extra financial resources through debt financing due to low financial leverage may foster self-serving attitudes in managers and facilitate the development of politics that damage the long-term orientation of the company (Jensen, 1989).

Yet, even in this case, while these costs may negatively impact the relationship between financial leverage and financial performance (Daniel *et al.*, 2004; Tan and Peng, 2003), they have no expected negative effect when it comes to the relationship between financial leverage and alliance formation. The higher cost of capital or the tax implications associated with a low proportion of debt over equity may matter if we focus on financial performance, but they are not likely to counterbalance the positive effects on alliance formation. The deleterious effects on managerial attitude may potentially affect long-term performance (Jin *et al.*, 2015) but not affect decisions such as alliance formation. In fact, the opportunistic attitudes fostered by low financial leverage could encourage alliance formation, because leverage motivates managers to opportunistically engage in empire-building, expanding the number of projects of the company even when it damages long-term profits (Jensen and Meckling 1976; Love and Nohria, 2005; Tan and Peng, 2003). For these reasons, financial leverage is expected to be negatively associated with alliance formation:

H2. Financial leverage is negatively associated with alliance formation.

As per the theoretical argument developed, cash holdings and leverage affect the formation of alliances. However, it is possible that the two forms of slack not only independently exercise an effect on alliance formation. To complete our understanding of the role of cash holdings and financial leverage on alliance formation, we should consider the possibility of their interactive effect, since forms of slack, besides having independent effects, could also interactively combine their effects (Marlin and Geiger, 2015). There could be arguments that support either a substitution or a synergistic effect between cash and financial leverage.

One possible argument could be that cash holdings and financial leverage are substitutes for each other. They are both likely to significantly affect alliance formation, but if firms already have low financial leverage, cash holdings become less important to form alliances, and vice versa. If sources of financial slack are substitutes, firms may start utilizing one type of funds and turn to another type of funds only after the first source is exhausted (Myers and Majluf, 1984). As a result, if one financial source can satisfy all needs, the other source will be less relevant. This logic builds on the idea that financial slack has marginally decreasing returns for companies (Kim and Bettis, 2014). However, Kim and Bettis' (2014) argument considers organizational performance as a dependent variable. The rationale that returns from financial slack are marginally decreasing expands on the idea that organizations reach a "cap" above which slack becomes less important, assuming that slack requirements are fixed. While this assumption applies to some dependent variables, it does not necessarily apply to alliance formation. In fact, the number of alliances that organizations can form varies, and the need for slack is not fixed. For instance, an organization with high leverage and no cash may form no alliances. An organization with either high cash or low leverage could form one alliance per year. An organization with both high cash and low leverage could form two, three, or more alliances per year. The argument for the substitution effect may not be compelling when it comes to the decision to form alliances.

Another argument could be that cash holdings and financial leverage are synergistically related and reinforce each other's effect on alliance formation. The types of slack could synergistically combine in specific configurations (Marlin and Geiger, 2015). When low financial leverage is matched to large cash holdings, the organization may pursue a more strategically coherent strategy that better enables the conditions for forming alliances. This rationale elaborates on the core premises of behavioral theory, according to which the lack of perfect information to inform and justify strategic decisions requires that managers send a consistent and coherent set of messages to convince stakeholders of their strategic choices (Cyert and March, 1963). It is important to note that owners or stakeholders could believe that executives are opportunistically leveraging cash or capital structure (Jensen, 1989), which may increase resistance to the executives' decisions. The choice of high financial leverage may be partially inconsistent with the choice to have large cash holdings. Being significantly indebted to finance a large stock of liquid unabsorbed assets that generate low return and entail significant opportunity costs might be difficult for managers to justify strategically and might not allow them to gain the support they need to embark upon risky decisions. Managers need to show through their strategically consistent decisions that they recognize the strategic value of financial slack (O'Brien, 2003). An internally consistent set of strategic decisions that push the organization in the same coherent direction may help managers gain support for forming alliances. For these reasons, it is anticipated that cash holdings and financial leverage interact in the prediction of alliance formation. The existence of a mismatch between large cash holdings and debt financing creates a cost that could hamper the positive effects of cash or equity on alliance formation:

- H3.* Cash holdings and financial leverage have an interactive effect on alliance formation. When financial leverage is low, the positive relationship between cash and alliance formation is weaker. Similarly, when cash is low, the negative relationship between financial leverage and alliance formation is weaker.

Methodology

Sample

The sample is composed of public biotech companies. The total window of observation spans over 15 years from 2000 to 2015. After removing those companies for which the data were missing, the final sample is composed of 400 public companies observed over the total time period. Data were collected from two main sources. The independent variables and the bulk of the control variables were collected from COMPUSTAT. Data on alliances were collected from the Bioscan database. As Schilling (2009) observes, Bioscan represents one of the best and most reliable databases used by scholars for the analysis of alliances in the biotech industry, and it has already been widely used in previous scientific manuscripts published in top academic journals. Bioscan focuses on a set of companies in many industry sectors that are categorized as biotech-related and follows the evolution of their alliances over time, offering a fairly stable population for relatively accurate analyses. Bioscan is not immune to limitations, as the nature of the strategic alliance is not specified. Nonetheless, all alliance databases have advantages and disadvantages, and Bioscan remains one of the strongest databases for alliance research (Schilling, 2009). Note that Bioscan provides information about alliances involving over 2,200 companies, both private and public. Nonetheless, since data on the independent variables are only available for public companies, the regressions will focus solely on the subset of public companies.

Measurement

Dependent variable. The dependent variable is the count of alliances formed for each single year considered in the data set. In order to extract the number of alliances formed for each

year, I used the UCINET software to create one matrix per year with all organizations in the alliance database. The alliance database did not consider the public companies alone; it includes all companies that were involved in alliances in the years under observation. I created company-by-company symmetrized matrixes in which the tie associating each pair of companies was computed as the existence or absence of an alliance formed in the year. I extracted the number of alliances formed for each company for each year from the rows of each yearly matrix. In each matrix, I extracted the subsample of public companies that constitute the focus of the regression equations. In order to better establish causality and decrease concerns for reverse causation, the dependent variable has a one-year lag.

Explanatory variables. Cash holdings were measured through the cash and short-term investment variable of COMPUSTAT. This variable is the most appropriate to measure the effects of cash for organizations, as is explained by Kim and Bettis (2014). Financial leverage was obtained by dividing total debt by total shareholder equity. The choice to use the absolute amount of cash holdings to measure one predictor and a ratio variable to measure the second predictor is justified by the need to increase the orthogonality between variables and eliminate possible concerns for multicollinearity. Two ratios or two absolute amounts would have yielded stronger correlations that could have hampered the conditions for assessing the unique effects of each variable after controlling for the effect of the other. The choice to use the absolute amount of cash holdings is not problematic, since the regression analyses control for total assets and therefore remove the effect of size that could potentially confound the effects of cash.

Control variables. I controlled for each single year considered. Since there could be significant differences across geographic regions, I added dummy variables to control for the main continents: America, Europe, Asia, and Oceania. In order to account for possible industry-level risk, I also considered industry dynamism, captured as the fluctuation of total industry revenues in a five-year moving window. An industry dynamism score was assigned to each company as a function of their SIC code. I controlled for the number of subsidiaries of each company. To remove the effect of the company's experience, which can affect the capacity for forming alliances, I controlled for the year of foundation. The most important control, which removes the effect of firm size, is total assets. To account for volume, I included cost of goods sold (COGS). I did not control for revenues, because they are highly correlated with COGS and could create multicollinearity concerns. I also controlled for the total operating expenses. Since the decision to form alliances may be considered as an alternative to the decision to acquire companies, I also controlled for the total amount of dollars spent for acquisitions. Furthermore, I controlled for capital expenditures, which is necessary to remove the effect of expenditures needed to maintain or upgrade the company's assets. Two other controls, intangible assets and R&D expenditures, are fundamental to remove two of the strongest predictors of alliance formation in the biotech industry. Intangible assets significantly determine the attractiveness of firms as partners for alliances. R&D expenditures capture the degree of innovativeness of the firm and can thus tackle a fundamental reason why companies form alliances. Last, as a further control to remove the effect of size, I controlled for the number of employees.

Analysis and results

The existence of multiple observations per company in the data set does not offer the appropriate conditions to establish the lack of independence among observations that is necessary for ordinary least square analyses. For this reason, following the same approach as Diestre and Rajagopalan (2012), I opted for generalized estimating equations (GEE) with White's heteroscedasticity-robust statistics and standard errors aggregated at the firm level of analysis (Petersen, 2009). The use of GEE for longitudinal data analysis in case of alliance

research allows for less biased and more efficient estimates when there is a lack of independence among observations. Indeed, the approach has been effectively used in strategic alliance research before (Diestre and Rajagopalan, 2012; Phelps, 2010). Since the dependent variable is a count variable, I used negative binomial regressions.

Alliance observations of the dependent variables may not be completely independent, because the formation of an alliance between company X and company Y simultaneously affects the alliance formation score of the observations for both company X and company Y. Nonetheless, this problem is unlikely to cause significant concerns for the data set. The non-independence of observations is more likely to create concerns when it comes to analyses at the alliance rather than at the organizational level of analysis (Diestre and Rajagopalan, 2012). Furthermore, the data set for the regressions is composed of 400 public companies, but the alliances in the whole database involve 2,268 firms. The sample of firms in the regressions comprises only 17 percent of the total companies considered for the alliances. The vast majority of alliances occur between a public company in the sample and one of the many private companies that is not in the sample, significantly minimizing the concern about a lack of independence among observations.

Table I shows zero-order correlations and descriptives for the variables under investigation. We can see that the number of alliances formed has the strongest correlation with R&D expenditures, as was expected, and with cash holdings, already suggesting its possibly relevant role in predicting alliance formation. While some control variables are highly correlated to each other, removing them does not affect the results relating to the predictive role of cash or financial leverage, which suggests robustness in these findings.

Table II reports the results of the GEE negative binomial regressions for the prediction of alliance formation. The predictor variables were standardized in order to facilitate interpretation. While Model 1 considers the set of controls, Model 2 introduces the two main effects. The findings provide support for both *H1* and *H2*, as we can see that cash holdings exercise a positive effect on alliance formation ($\beta = 0.09$; $p < 0.05$), while financial leverage exercises a negative effect ($\beta = -0.05$; $p < 0.001$). Model 3 adds the interaction term to the regression equation. The findings provide support for the interaction between cash holdings and financial leverage in the prediction of alliance formation ($\beta = -0.48$; $p < 0.01$), supporting *H3*. The insertion of the interaction term also improves the estimates for the main effects of cash holdings ($\beta = 0.10$; $p < 0.01$) and financial leverage ($\beta = -0.16$; $p < 0.001$). All three hypotheses are supported.

Figure 1 illustrates the interactive effects of cash and financial leverage in the prediction of alliance formation. The top figure illustrates the interactive effect of plotting financial leverage as a moderator, while the bottom figure illustrates the interactive effect of plotting cash holdings as a moderating variable. We can see that the slopes change from positive to negative in both charts, because the magnitude of the moderating effect is considerably larger than the direct effect of both cash and leverage, causing a reversal of the slopes in both cases. The positive slope in the case of cash holdings as an independent variable and the negative slope in the case of financial leverage as an independent variable have a stronger inclination, which explains why the variables have a significant main effect even though the slopes are non-monotonic and cross each other in the dataspace. In fact, for cash holdings as independent variable, the significance of the positive slope is larger than the significance of the negative slope. Similarly, for financial leverage as an independent variable, the significance of the negative slope is larger than that of the positive slope. The charts show that cash positively predicts alliance formation when matched to low financial leverage (larger equity), but the prediction becomes negative if cash holdings are matched to high financial leverage. By contrast, the negative effect of financial leverage on alliance formation occurs when cash holdings are high, while the relationship becomes positive if cash holdings are low.

| | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------------------|----------|----------|---------|---------|---------|---------|---------|---------|---------|--------|
| 1. America | 0.69 | 0.46 | -0.72** | | | | | | | |
| 2. Europe | 0.19 | 0.39 | -0.48** | -0.15** | | | | | | |
| 3. Asia | 0.10 | 0.29 | -0.23** | -0.07** | -0.05** | | | | | |
| 4. Oceania | 0.02 | 0.16 | -0.04** | -0.02* | 0.10** | -0.01 | | | | |
| 5. Industry dynamism | 52.44 | 69.00 | -0.17** | 0.06** | 0.20** | 0.04** | -0.00 | | | |
| 6. Subsidiaries | 2.25 | 6.50 | 0.29** | -0.03** | -0.45** | -0.03** | -0.01 | -0.24** | | |
| 7. Year of foundation | 1,984.30 | 32.25 | -0.20** | 0.09** | 0.21** | -0.01 | -0.07** | 0.25** | -0.43** | |
| 8. Total assets | 1.49B | 6.28B | -0.06** | 0.02 | 0.12** | -0.01 | 0.01 | 0.05** | -0.41** | 0.59** |
| 9. Cost of goods sold | 575.59 | 3,648.75 | -0.04** | 0.06** | -0.01 | -0.01 | -0.04** | 0.15** | -0.16** | 0.41** |
| 10. Acquisitions | 43.57 | 474.44 | -0.05** | 0.03* | 0.08** | -0.02 | 0.01 | 0.14** | -0.40** | 0.68** |
| 11. Capital expenditures | 46.45 | 259.70 | -0.04** | 0.06** | -0.00 | -0.01 | -0.01 | 0.28** | -0.26** | 0.80** |
| 12. Intangible assets | 288.80 | 2,122.31 | -0.03* | 0.00 | 0.07** | -0.02 | 0.01 | 0.18** | -0.37** | 0.84** |
| 13. R&D expenses | 73.44 | 431.61 | -0.07** | 0.03* | 0.12** | -0.02 | -0.05** | 0.10** | -0.47** | 0.77** |
| 14. Operating expenses | 810.08 | 4,518.80 | -0.14** | 0.06** | 0.19** | -0.01 | -0.05** | 0.16** | -0.52** | 0.79** |
| 15. Employees | 2.18 | 11.03 | -0.02 | 0.02 | 0.03* | -0.02 | -0.00 | 0.13** | -0.35** | 0.82** |
| 16. Cash | 216.54 | 1,151.43 | -0.01 | 0.01 | 0.01 | -0.00 | 0.00 | 0.00 | -0.01 | 0.01 |
| 17. Financial leverage | 0.58 | 15.80 | 0.03** | 0.00 | -0.05** | -0.01 | 0.02* | 0.01 | 0.01 | 0.03** |
| 18. Alliances | 0.12 | 0.47 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | |
| 9 | | 10 | | | | | | | | |
| 10. Acquisitions | 0.15** | | | | | | | | | |
| 11. Capital expenditures | 0.65** | 0.28** | | | | | | | | |
| 12. Intangible assets | 0.23** | 0.48** | 0.50** | | | | | | | |
| 13. R&D expenses | 0.31** | 0.39** | 0.63** | 0.73** | | | | | | |
| 14. Operating expenses | 0.94** | 0.25** | 0.77** | 0.44** | 0.59** | | | | | |
| 15. Employees | 0.57** | 0.30** | 0.70** | 0.53** | 0.76** | 0.76** | | | | |
| 16. Cash | 0.41** | 0.24** | 0.59** | 0.74** | 0.80** | 0.61** | 0.63** | | | |
| 17. Financial leverage | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | | |
| 18. Alliances | 0.00 | 0.02 | 0.06** | 0.06** | 0.11** | 0.03** | 0.04** | 0.10** | -0.02* | |

Notes: *n* ranging from 9,720 to 4,586. **p* < 0.01; ***p* < 0.05

Table I.
Descriptives and zero-
order correlations

| | Model 1 | | Model 2 | | Model 3 | |
|-----------------------------|--------------|---------------|--------------|---------------|--------------|---------------|
| | Estimate | Wald χ^2 | Estimate | Wald χ^2 | Estimate | Wald χ^2 |
| 2014 | 0.62 (0.53) | 1.37 | 0.62 (0.53) | 1.35 | 0.61 (0.53) | 1.34 |
| 2013 | 0.70 (0.52) | 1.85 | 0.70 (0.52) | 1.84 | 0.70 (0.52) | 1.82 |
| 2012 | 0.93 (0.52) | 3.18 | 0.92 (0.52) | 3.07 | 0.90 (0.52) | 2.95 |
| 2011 | 0.86 (0.53) | 2.68 | 0.85 (0.53) | 2.65 | 0.84 (0.52) | 2.55 |
| 2010 | 1.01 (0.52) | 3.88* | 1.02 (0.52) | 3.89 | 1.00 (0.51) | 3.78 |
| 2009 | 0.98 (0.55) | 3.23 | 0.98 (0.55) | 3.23 | 0.97 (0.54) | 3.15 |
| 2008 | 1.16 (0.54) | 4.55* | 1.16 (0.54) | 4.56* | 1.14 (0.54) | 4.44* |
| 2007 | 0.76 (0.55) | 1.92 | 0.75 (0.55) | 1.86 | 0.74 (0.55) | 1.82 |
| 2006 | 1.35 (0.55) | 6.10** | 1.35 (0.55) | 6.06* | 1.34 (0.55) | 5.98* |
| 2005 | 1.41 (0.52) | 7.35** | 1.40 (0.52) | 7.30** | 1.39 (0.52) | 7.17** |
| 2004 | 0.75 (0.51) | 2.16 | 0.75 (0.51) | 2.15 | 0.74 (0.51) | 2.08 |
| 2003 | 0.56 (0.55) | 1.06 | 0.56 (0.55) | 1.03 | 0.55 (0.55) | 0.99 |
| 2002 | 0.22 (0.54) | 0.17 | 0.13 (0.55) | 0.06 | 0.12 (0.54) | 0.05 |
| 2001 | 0.26 (0.60) | 0.19 | 0.26 (0.60) | 0.18 | 0.24 (0.59) | 0.17 |
| America | 1.37 (0.59) | 5.42* | 1.37 (0.59) | 5.45* | 1.36 (0.59) | 5.40* |
| Europe | 1.60 (0.87) | 3.43 | 1.62 (0.86) | 3.54 | 1.63 (0.86) | 3.55 |
| Asia | -0.41 (0.86) | 0.23 | -0.40 (0.86) | 0.21 | -0.39 (0.85) | 0.21 |
| Industry dynamism | 0.00 (0.00) | 0.21 | 0.00 (0.00) | 0.20 | 0.00 (0.00) | 0.20 |
| Subsidiaries | 0.01 (0.01) | 1.27 | 0.01 (0.01) | 1.64 | 0.01 (0.01) | 1.58 |
| Year of foundation | 0.01 (0.01) | 1.75 | 0.01 (0.01) | 1.76 | 0.01 (0.01) | 1.97 |
| Total assets | 0.00 (0.00) | 0.01 | 0.00 (0.00) | 0.59 | 0.00 (0.00) | 0.36 |
| Cost of goods sold | 0.00 (0.00) | 0.01 | 0.00 (0.00) | 0.09 | 0.00 (0.00) | 0.13 |
| Acquisitions | 0.00 (0.00) | 0.85 | 0.00 (0.00) | 0.17 | 0.00 (0.00) | 0.15 |
| Capital expenditures | 0.00 (0.00) | 0.57 | 0.00 (0.00) | 0.58 | 0.00 (0.00) | 0.56 |
| Intangible assets | 0.00 (0.00) | 0.80 | 0.00 (0.00) | 0.93 | 0.00 (0.00) | 1.79 |
| R&D expenses | 0.00 (0.00) | 7.83** | 0.00 (0.00) | 9.79** | 0.00 (0.00) | 10.98*** |
| Operating expenses | 0.00 (0.00) | 0.30 | 0.00 (0.00) | 0.53 | 0.00 (0.00) | 0.60 |
| Employees | 0.00 (0.03) | 0.02 | 0.00 (0.03) | 0.01 | 0.00 (0.03) | 0.00 |
| Cash | | | 0.09 (0.04) | 5.70* | 0.10 (0.04) | 7.18** |
| Financial leverage | | | -0.05 (0.01) | 21.22*** | -0.16 (0.04) | 13.49*** |
| Cash \times Fin. leverage | | | | | -0.48 (0.18) | 6.69** |

Table II.
Negative binomial
generalized estimating
equations for the
prediction of alliance
formation

Notes: $n = 3,978$. Standard error under parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Evidence supports the idea that both cash and financial leverage should be considered in combination for their effect on alliance formation, although they also independently exercise significant effects.

Discussion

Financial slack is not expected to affect all strategic decisions. Nonetheless, it may affect particular sets of decisions. This paper illustrates that forming strategic alliances could be one strategic decision affected by financial slack. Evidence shows that cash holdings and financial leverage interact in the prediction of alliance formation, in addition to independently affecting alliance formation. Interestingly, the evidence collected also suggests that the positive effect of cash holdings and the negative effect of financial leverage are not merely mitigated by the interaction of the variables but are reversed. The benefits of cash turn into costs when firms have high financial leverage. The costs of financial leverage turn into benefits when firms have small stocks of cash. Evidence suggests that the costs of a mismatch are superior to the benefits of large cash holdings or high equity, reversing the sign of the relationships. Nevertheless, we should be prudent in the interpretation of this evidence. The existence of a non-monotonic relationship (in which the sign of the slopes reverses) is captured because the slope for the main positive effect of

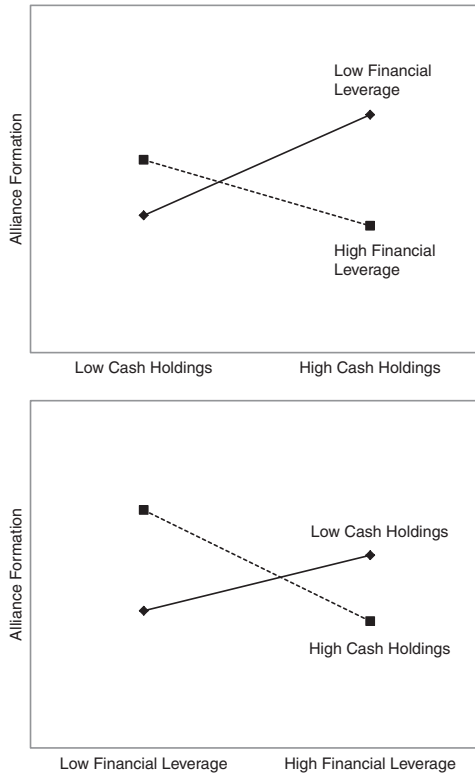


Figure 1.
The interactive effect
of cash and financial
leverage on alliance
formation

cash and the slope for the negative effect of financial leverage, while significant, are not large enough to offset the large interaction effect. Had the coefficients of cash or financial leverage been larger in magnitude or the interaction coefficient been smaller, with the very same signs, we would have seen a weakening effect of positive or negative relationships instead of the slopes' sign reversals. Evidence clearly implies that there is a significant interaction between cash and financial leverage and that this interaction is responsible for the additional costs that contrast the benefits of cash and equity on alliance formation.

This paper invites scholars to consider alliances as risky decisions for organizations. The debate over the risk of alliances is fascinating, and the topic is still under investigation. The renewed interest in strategic alliances may have been spurred by the perception that they could lead to performance benefits, but if we adjust performance outcomes by risk, the convenience of pursuing strategic alliances may need to be reconsidered. Sivadas and Dwyer (2000) argue that the major problems in alliances relate to financial issues. The proposed perspective on internal and external funding offers a new and important lens through which to view the conditions that enable the formation of alliances.

The theory presented here elaborates on the core premises of the behavioral theory of the firm, but different perspectives on both alliance formation and capital structure have appealed to distinct or competing theories. Research in capital structure has been associated with agency theory, since different capital structures allow managers more or less opportunity to behave opportunistically (Jensen and Meckling, 1976). The choice to form an alliance could also be motivated by opportunistic reasons. In addition, the transaction cost

perspective has been used for research in both capital structure (Simerly and Li, 2000) and strategic alliances (Mjoen and Tallman, 1997). Other theoretical perspectives could be used to further enrich the bridge between capital structure and alliances.

The findings illustrated could be extended in different ways. First, it is important to consider different types of alliances, since the arguments proposed may vary depending on the type of alliance. The findings can also be extended with a more nuanced view on capital structure that does not simply consider shareholder equity and debt but, for instance, investigates the effect of different types of debt (O'Brien *et al.*, 2014). It is also fundamental to acknowledge that alliance risk may depend on several firm-level or context-level factors, which offer the opportunity for the exploration of a variety of moderating conditions.

The proposed theory has significant implications for practice and informs a set of managerial recommendations. The first recommendation for managers is to avoid forming alliances if their companies have excessive debt or cannot hold sufficient cash. When it comes to alliance partner selection, there is a fundamental trade-off managers should consider: A partner with large slack resources may lower the risk of alliance failure but can also have high negotiating power, which could be leveraged to misappropriate value from the alliance. The second recommendation is that managers of both companies involved in the alliance invest time upfront to jointly define mutual expectations for collaborative behavior and acquire reciprocal trust (Hughes and Weiss, 2007). As discussed, slack protects against the risks of alliances but it entails opportunity costs. The third recommendation for managers is to clearly evaluate the need to maintain slack, investing in risk analysis and risk management for each alliance (Das and Teng, 1998). When it comes to implications for investors, redistributing cash in the form of dividends is tempting because it leads to immediate gains for investors. However, holding cash could promote sustainable growth through alliances, which may lead to long-term shareholder value. The fourth recommendation is that managers maintain constant communication with investors to ensure that long-term goals are prioritized over short-term gains. Another trade-off to consider is that managers can use cash to create immediate jobs or compensate employees, but maintaining large cash holdings could have strategic value, spurring organizational growth and creating future jobs in the long run (Kim and Bettis, 2014). The fifth recommendation is that managers spend time to communicate to employees that maintaining slack is functional to the attainment of long-term benefits for them.

This paper is qualified by certain limitations. First, although Bioscan has several valuable qualities as database, it does not specify the nature of the alliance developed by biotech companies. Second, findings from the biotech industry may not be fully generalizable. Nonetheless, the evidence provided at the beginning of this paper shows how alliances can be risky in a variety of industries and not merely in the biotech context. Furthermore, biotech companies are widely studied in the strategic alliance literature (Schilling, 2009). Third, this paper uses behavioral arguments to explain why managers are motivated to form alliances, but no direct evidence shows the actual processes managers follow when making decisions. While this limitation is significant, it is quite common in similar studies, due to the difficulty of collecting this kind of data.

In conclusion, this paper suggests that we reconsider our premises relating to alliances and examine the possible role of cash and financial leverage on alliance formation. Building on behavioral theory, it specifies that internal or external sources of funding offer buffers that protect managers in case of failure, motivating the pursuit of alliances. The evidence offers contributions to research in both strategic alliances and financial slack, entailing significant implications for practitioners and providing new stimuli for the advancement of our thinking.

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