Industry Shocks and Firm Boundaries

Tomas Mantecon[1]

ABSTRACT

I investigate why some firms expand by acquisitions or internal growth, other firms establish alliances, while other firms do not expand operations in response to industry shocks. Firm-specific miss-valuation, firm size, institutional ownership, compensation schemes that incentivize risk taking, and lower cost of capital are positively associated with the decision to acquire assets. High level of free-cash flows is the main factor explaining why firms expand by internal growth. A high level of informational asymmetries is the main factor explaining why firms establish alliances. A high cost of capital is the differential factor of firms that do not expand operations.

JEL classifications: G34, D23

Keywords: Industry shocks, Mergers and acquisitions; Alliances, Internal growth.

[1] University of North Texas, Department of Finance, Insurance, Real State, and Business Law, 1167 Union Circle, Denton, Texas 76201, phone: 940- 891-6905, fax: 940-565-3061, e-mail: tomas.mantecon@unt.edu

Industry Shocks and Firm Boundaries

ABSTRACT

I investigate why some firms expand by acquisitions or internal growth, other firms establish alliances, while other firms do not expand operations in response to industry shocks. Firm-specific miss-valuation, firm size, institutional ownership, compensation schemes that incentivize risk taking, and lower cost of capital are positively associated with the decision to acquire assets. High level of free-cash flows is the main factor explaining why firms expand by internal growth. A high level of informational asymmetries is the main factor explaining why firms establish alliances. A high cost of capital is the differential factor of firms that do not expand operations.

JEL classifications: G34, D23

Keywords: Industry shocks, Mergers and acquisitions; Alliances, Internal growth.

Economic, regulatory or technological shocks trigger drastic changes in the industry competitive environment. To adapt to the new competitive environment some firms expand their boundaries by acquiring assets or by investing in plant and equipment, other firms form alliances and share control of assets with a partner, other firms are forced to shrink their boundaries and to divest assets, and yet other firms are forced to cease operations as they cannot adapt to the new competitive environment. Which firm characteristics explain these different responses to changes in the competitive environment? Prior studies provide a partial answer to this question by analyzing the market for acquisitions of corporate assets as the response to industry shifts. A group of studies contend that firm efficiency is the main factor that explains why some firms acquire or sell assets during merger waves caused by industry shifts. This neoclassical argument predicts that the market for corporate assets serves as a channel to transfer asset from less to

more productive firms (Mitchell and Mulherin, 1996; Andrade et al., 2001; Andrade and Stafford, 2004; Harford, 2005, among others). Other groups of studies contend that industry shifts provide a relevant but incomplete explanation of merger waves, and modify the underlying assumption in the neoclassical theories that markets are efficient valuing corporate assets (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan. 2004; Rhodes-Kropf et al., 2005). Miss-valuation theories propose that firm specific misevaluation is the main factor explaining who buys and who sells assets.

Neoclassical and misvaluation theories provide a rich framework to understand the characteristics of acquirers and targets during merger waves, but these theories do not explore alternative reactions to drastic changes in the competitive environment. The objective of this paper is to determine which firm characteristics explain not only the decision to acquire assets, but also the formation of alliances, the decision to increase capital expenditures, and why some firms do not expand operations when facing industry shifts. In addition to efficiency and miss-valuation, I consider the potential impact of agency problems, overconfidence, informational asymmetries and the cost to access to external capital markets, key underlying assumptions in the neoclassical model, to explain the different responses to industry shocks.

Agency and hubris can explain firms' different responses to industry shifts that result in different degrees of control over assets. The work by Jensen (1986) and Roll (1986) has spawned a large body of literature on the consequences of managerial decisions guided by self-interest or hubris. Self-interest and hubris lead managers to expand the assets under their control, either by acquisitions or by internal growth. Private benefits from control are more difficult to attain when control is shared with other firms. Thus, managerial self-interest and hubris are less likely to be the motivations to establish alliances than expanding by acquisitions or by internal growth.

The neoclassical theory of merger waves predicts that the market of M&As serves as a channel to transfer asset from less to more productive firms. Informational asymmetries, however, cause market failures that impede the transfer of assets from less to more efficient firms (Akerlof, 1970). Alliances can be an effective mechanism to resolve market failures

caused by informational asymmetries (Lerner et al, 2003; Mantecon, 2009). Some firms with quality assets but high levels of informational asymmetries should find it beneficial to form alliances so as to convey the quality of their assets during the collaboration. Other firms characterized by high levels of informational asymmetries but with lower quality of assets, should be less likely to find suitable partners to establish alliances, and more likely to sell assets or to cease operations.

Access to external markets can reduce the set of alternative responses to industry shocks. Firms with costly access to external markets face financial constraints to expand their boundaries by acquisitions or by internal growth. Some of these financially constrained firms can form alliances with partners with better access to external capital markets or with a higher capacity to generate internal resources (Lerner et al, 2003). Other firms with costly access to external markets may not be able to survive as stand-alone entities and they may be acquired or be forced to cease operations.

These arguments suggest that efficiency considerations, market miss-valuation, agency problems, informational asymmetries and the access to external financing can be important factors to explain how firms reshape their boundaries as a consequence of industry shocks. I propose several testable hypotheses to investigate the factors that determine the response to industry shocks. I use multinomial logit models to test these hypotheses in a sample of 31 industry shocks that trigger a large scale transfer of assets.

This study is at the intersection of two bodies of research in the field of financial economics. It contributes to the corporate control literature that investigates why merger waves cluster in time (Maksimovic and Phillips, 2001; Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004; Andrade and Stafford, 2004; Yang, 2008, Maksimovic et al., 2013). The analysis in this manuscript explores alternative explanations as to why firms acquire assets during merger waves in the context of a richer set of responses to industry shifts. The results offer stronger support to the miss-valuation theories: firms that expand their boundaries by acquisitions during industry shocks exhibit a higher degree of miss-valuation than firms that expand by alliances, by internal growth, or firms that do not expand their operations. I do not

find support to the neoclassical theory. Contrary to the prediction by this theory, firms that expand by acquisitions do not exhibit a better accounting performance before the wave than other firms, and experience poor operating and stock performances during the merger wave. Compensation schemes that promote risk taking are an important factor to explain why firms acquire assets. The findings offer limited support that agency problems and overvaluation are motivations to acquire assets in response to industry shocks.

This analysis contributes to a rich body of work in financial-economics on the theory of the firm. The work by Coase (1937) has spawned a rich body of theoretical work. Holmstrom and Tirole (1989) and Coase (1998) complain that the evidence/theory ratio on the factors that explain the boundaries of firms is low; this remains true today. A problem with conducting empirical research on the factors that affect a firm's boundaries is that, in response to competitive changes that take place over long periods of time, the same firm engages in acquisitions, divest assets, forms alliances and expands capital expenditures. Thus, it is difficult to link a firm's characteristics to specific decisions that alter its boundaries. Some researchers analyze project characteristics, instead of the firm characteristics, to explain why firms adopt specific institutional operative arrangements. These authors face scarcity of information on projects, so they have to rely on surveys, which can be tainted by subjectivity and self-selection problems, or they are confined to the analysis of small samples, which create difficulties in the generalization of the results (Brickley, and Dark, 1987; Elfenbein and Lerner, 2003; Lerner, Shane, and Tsai, 2003; Mantecon, 2015).[2] I analyze firms' responses to industry shocks followed by large scale reallocation of assets in short periods of time. Thus, industry shocks are unique events to identify the factors that affect specific alternatives that determine the boundaries of a firm. The results in this manuscript indicate that firm size, miss-valuation, incentives that

[2] Brickley, and Dark (1987) use survey data to investigate the choice between owning and franchising operations and they find that agency problems explain this choice in a sample of 36 franchise companies. Elfenbein and Lerner (2003) analyze the ownership in a sample 100 alliances by internet portals and find that the allocation of control rights is affected by the relative bargaining power of the parties. Lerner, et al., (2003) analyze the allocation of control in a sample of 200 alliance agreements by biotechnology firms and large pharmaceutical firms. They report that when public financial markets are less accessible, the control is more likely to be assigned to the pharmaceutical partner. Mantecon (2015) finds that assets operating in a sample of 171 joint ventures generate higher returns than assets in fully controlled subsidiaries.

promote risk taking and the access to external capital markets are positively associated with the decision to expand operations by acquiring assets. Abundant free-cash flows, easier access to capital markets explain why firms expand their boundaries using internal resources. Informational asymmetries, and costly access to external capital markets are the main reasons why firms share control of assets in alliances. In spite of high levels of informational asymmetries and cost of capital, firms that find a suitable partner to form alliances experience better stock and operating performance than other firms. This finding highlight the role of alliances in resolving market failures induced by informational asymmetries. The results do not support agency problems as motivation to establish alliances, findings that differ from the arguments in Robinson (2008) and Bodnaruk et al., (2013).

I find little support that agency explanations affect the decisions to alter firms' boundaries during merger waves. However, the superior operating and stock performance of firms that establish alliances is consistent with the value created by cross-monitoring among partners in alliances (Robinson, 2008), and the poor performance of firms that engage in acquisitions is consistent with lack of monitoring during the merger waves (Duchin and Schmidt, 2013).

The rest of the paper is organized as follows: Section 2 summarizes prior literature and proposes testable hypotheses. Section 3 presents the sample construction and provides some sample characteristics. Section 4 analyzes the potential effects of firm efficiency and firm miss-valuation on the response to industry shifts identified by merger waves. Section 5 analyzes the agency and overconfidence explanations of response to industry shifts. Section 6 extends the analysis to the effect of informational asymmetries. Section 7 explores whether the access to external capital markets affects firms' response to industry shocks. Section 8 investigates the performance of firms that adopted different responses. I present the conclusions in section 9.

I. Literature review

Prior literature focuses on the analysis of the market for mergers and acquisitions as a response to industry shifts. The neoclassical theory contends that merger waves are caused by

shifts in the industry's economic, regulatory or technological competitive environment. In perfect markets and in the absence of informational asymmetries and agency problems or hubris, value maximizing managers of more efficient firms acquire the assets of less efficient firms. Capital constrains to expand by acquisitions are not relevant because, in the absence of informational asymmetries, managers of the most efficient firms can costlessly convey their true quality to external investors. In the absence of informational asymmetries, a fair transaction price is agreed upon between buyers and sellers, and markets will clear. More efficient firms thrive, less efficient firms shrink in size or disappear, and the final outcome is an improvement in overall industry efficiency. Empirical work supporting this view includes Mitchell and Mulherin (1996), Andrade, Mitchell, and Stafford (2001), Andrade and Stafford (2004), Maksimovic and Phillips (2001), Yang (2008) and Maksimovic et al., (2013).[3]

Under the neoclassical paradigm, responses to industry shifts other than the transfer of asset from more to less productive uses, are unexplained. Based on the neoclassical paradigm, I propose the following testable hypothesis:

Hypothesis 1: More efficient firms are more likely to expand operations by acquiring assets, rather than by forming alliances or by internal growth, to adapt to changes in the competitive environment triggered by industry shocks.

A second explanation for merger waves rests on market miss-valuation. Shleifer and Vishny (2003) propose that miss-valuation during periods of market irrationality causes merger waves. During periods of market overvaluation, firms with more overvalued equity acquire firms with less overvalued equity. Agency problems explain why target firms managers accept acquirers' overvalued equity. Rhodes-Kropf et al., (2005) reports that misvaluation caused by market inefficiency explains about 15% of the mergers, and industry shocks play an important

[3] The redeployment of underperforming assets towards more profitable is also hypothesized by the "Q-theory of mergers" (Servaes, 1991; Jovanovic and Rousseau, 2002). The Q-theory of mergers have been questioned by Rhodes-Kropf et al. (2008) who find that high (Tobin's Q) buys high, moderate buys moderate, and low buys low

role to explain merger activity. Rhodes-Kropf and Viswanathan (2004) contend that miss-valuation is not due to market irrationality, but to overestimation of potential synergies that are correlated with overall industry miss-valuation. In a test of these theories, Rhodes-Kropf et al., (2005) show that merger firms are more overvalued than non-merger firms, and bidders are more overvalued than targets. Targets accept being acquired with stock of overvalued bidders because the overall market is overvalued, and targets underestimate the miss-valuation of the overall industry. Maksimovic et al., (2013) find that both, efficiency and miss-valuation theories are important to explain the dynamics of merger waves.

Miss-valuation theories explain merger waves and the characteristics of the firms that are more likely to be acquirers or sellers of assets. Firms with higher levels of overvaluation should be acquirers of assets, and there is not a clear reason as to why overvalued firms should form alliances or grow internally. This argument can be formalized in the following testable hypothesis:

Hypothesis 2: Firms with higher degree of miss-valuation are more likely to expand operations by acquiring assets, rather than by forming alliances, or by internal growth, to adapt to changes in the competitive environment triggered by industry shifts.

Neoclassical and miss-valuation theories do not explain why some firms react to industry shocks by partnering in alliances or by growing internally. The different reactions to merger waves have different implications on the boundaries of the firm. This study contributes to our understanding of the factors that affect firm boundaries, a key topic of the theory of the firm proposed by Coase (1937). The principle of irrelevance of the organizational structure of institutional arrangements (Coase, 1937; 1960) implies that, in the absence of transaction costs, firms facing a wide industry shock should be indifferent to expanding through acquisitions, alliances or internal growth. These choices are the results of a complex trade-off of cost-

benefits, many of which are difficult to quantify and to test empirically.[4] To investigate firms' responses to industry shifts, I focus on the three main departures from the neoclassical paradigm: agency problems, informational asymmetries and financial constraints.

The work by Jensen (1986) and Roll (1986) has spawned a large body of literature on the relevance of agency problems and managerial overconfidence on the decision to expand a firm's operations. The market for corporate control is an important mechanism in the hands of value maximizer managers to reduce agency problems and to improve economic efficiency, but it can also be used by managers guided by self-interest or hubris/overconfidence to expand the assets under their control, with the subsequent potential destruction of economic value. Prior studies analyze the effect of agency problems to explain the existence and the wealth implications of merger waves. Gorton et al., (2009) assume that managers derive private benefits from control. Gorton et al., (2009) propose that defensive managers acquire other firms to avoid being acquired themselves, which leads to a self-reinforcing scenario of "eat-or-be eaten." Duchin and Schmidt (2013) find evidence that long-term performance of acquisitions during merger waves is significantly worse than in other periods because of agency problems induced by a lack of monitoring during the merger waves.

Agency and hubris/overconfidence arguments can also explain why some managers choose to use internally generated resources to invest in plant and equipment. Self-interested and overconfident managers can implement growth strategies financed with internal resources to extract private benefits from the assets under their control, instead of distributing these resources to shareholders. Self-interested managers are less likely to relinquish control over the assets in alliances, as they are subject to monitoring by partners. Cross-monitoring among partners reduces agency costs , which has been proposed as one of the reasons for the value created by

[4] For instance, in the decision to expand by acquisitions, managers should consider the cost of integration (Hennart and Reddy, 1997) and cost associated with lack of transparency and self-interested divisional managers that can distort the efficient allocation of renounces (Milgrom and Roberts, 1988). Conflict of interests inside firms has been proposed as explanations of control sharing to alliances (Robinson 2008), or in franchising (Brickley and Dark, 1987). Ownership sharing can results in gridlocks and coordination problems (Desai, Foley and Hines (2004), and ex-post opportunistic behaviors, such as "learning races" (Gulati and Singh, 1998). Integration costs, agency conflicts inside firms, coordination problems, or the threat of opportunism are important determinants of the choice to expand operations, but these factors are difficult to measure and their relevance is difficult to test empirically.

joint ventures relative to M&As (Mantecon, et al., 2012). A negative association between the presence of agency problems and the formation of alliances is also suggested by Robinson (2008), who proposes that projects with low probability of success but high pay-offs are better organized in alliances governed by enforceable contracts, than inside the firm where contracts are more difficult to implement and to enforce. Consistent with this view, Bodnaruk et al., (2013) propose that alliances are commitment devices to motivate divisional managers. Also consistent with the benefits of forming partnerships to reduce agency problems, Seru (2014) demonstrates that firms involved in acquisitions increase alliance intensity to account for the reduced research incentives in acquired targets.

I propose the following testable hypothesis based on this background literature.

Hypothesis 3. Agency problems and/or overconfidence increase the probability to expand the firms' boundaries by acquisitions or by internal growth relative to the alternatives of establishing alliances or not to expand operations, as the response to changes in the competitive environment triggered by industry shifts.

Informational asymmetries can also be an important factor to understand firms' response to industry shocks. The relevance of asymmetric information on investment decisions, as a departure from Miller and Modigliani's (1958) world of perfect and complete markets, has been extensively demonstrated (e.g. Greenwald et al., 1984; Myers and Majluf, 1984; Myers, 1984). Informational problems hinder the necessary level of liquidity to facilitate mergers waves (Harford, 2005; Schlingemann et al., 2002; Eisfeldt and Rampini, 2006). An indirect link between the level of informational asymmetries and the response to industry shifts is the negative impact of information asymmetries on the access to external capital markets. Maksimovic et al., (2013), provide evidence that public firms with better access to capital markets are more likely to participate in merger waves as buyers and sellers.

Informational problems can cause market failures (Akerlof, 1970), and affect response to industry shifts. Ownership sharing in alliances can be a viable transitional mechanism to solve

market failures caused by informational asymmetries, as the quality of the assets is revealed during the collaboration in the partnership (Mantecon, 2009). A positive association between informational asymmetries and the formation of alliances is also demonstrated by Lerner et al., (2003) who find that, in periods characterized by diminished public market financing, severe levels of informational asymmetries prompt young biotechnology firms to form alliances with larger firms. This research suggests that control-sharing in alliances is an effective mechanism available to managers of firms with high quality assets and high levels of informational asymmetries. Other group of firms, also suffering from high levels of informational asymmetries but with lower quality of assets, should be less likely to find partners to establish alliances, and more likely to sell the assets or to cease operations. Based on this discussion, I propose the following testable hypothesis:

Hypothesis 4: To adapt to changes in the competitive environment triggered by industry shifts, firms with lower levels of informational asymmetries are more likely to expand their operations by acquiring asset or by growing internally. Some firms with high levels of informational asymmetries but with high quality of operating assets are more likely to expand operations by forming alliances. Other firms with high levels of informational asymmetries but with lower quality of assets are more likely to sell these assets or to cease operations.

Firms' cost of capital, as a measure of the cost to access external capital markets, can also affect the repose to merger waves.[5] Prior literature analyzes the impact of financial constraints on the sensitivity to expand operations internally by investing in plant and equipment, (Kaplan and Zingales, 1997; Cleary, 1999; Fazzari et al., 2000; Chang et al., 2014). The cost of capital is an important link to explain the neoclassical paradigm of merger waves. Value maximizing

[5] Firms' efficiency arguments used to develop Hypothesis 1, agency based explanations used in hypothesis 3, and information asymmetries motives used in Hypotheses 4 affect the cost of capital and, thus, they are related to Hypothesis 5. Ceteris paribus, more efficient firms should have easier access to external capital markets. The effect of informational asymmetries on the cost of capital has been demonstrated in numerous studies (Stiglitz and Weiss, 1981; Diamond and Verrecchia, 1991; Verrecchia, 2001; Boyle and Guthrie, 2003). The effect of different proxies for agency problems on the cost of equity and debt have also found empirical support (Elyasiani et al. 2010; Chen et al., 2011; Attig, et al., 2013).

managers of more efficient firms (firms with more capacity to generate cash flows) should have lower cost of capital, and be more likely to expand operations by acquiring assets from less efficient firms. Maksimovic et al., (2013) find evidence supporting this neoclassical argument. Harford (1999) also shows that cash-rich firms are more likely to acquire assets than firms with less cash reserves. Costly access to liquidity favors the formation of alliances, as demonstrated by Lerner et al., (2003), who report that firms with high cost of access to external capital establish alliances with larger firms, presumably because these firms have better access to external financing.

This body of work demonstrates that, ceteris paribus, firms with a high cost of capital, face financial constrains to expand operations by acquisitions or by internal growth. These firms are more likely to collaborate in alliances, otherwise they may not be able to adapt to changes in industry shifts and they may be forced to sell assets or to cease operations if they do not find suitable buyers or partners to form alliances.

Based on the arguments proposed by this literature, I propose the following testable hypothesis.

Hypothesis 5: Firms with relatively lower cost of capital are more likely to expand their operations by acquisitions or by internal growth to adapt to changes in the competitive environment triggered by industry shifts. Some firms with higher cost of capital but with high quality operating assets are more likely to expand operations by establishing alliances. Other firms with higher cost of capital but with lower asset quality are more likely to sell these assets or to cease operations.

Firms' performance during merger waves can shed light on the factors that affect the response to industry shifts. Neoclassical theories argue that more efficient firms expand their boundaries by acquiring the asset of less productive firms. Thus, we should observe an increase in productivity when the assets are transferred from less to more efficient uses. However, the empirical evidence on efficiency improvements during merger waves is contradictory.

Consistent with the neoclassical theory, Maksimovic and Phillips (2001) and Maksimovic et al., (2013) report efficiency improvements for acquiring firms. However, Duchin and Schmidt (2013) find poor long-term stock and operating performances following acquisitions during merger waves.

Duchin and Schmidt (2013) argue that the poor performance of acquirers following merger waves can be due to agency-driven behavior and to poor monitoring. I contend, in Hypothesis 3, that agency motivations are less likely to be present in firms that form alliances than in firms that expand operations by acquisitions or by internal growth. This agency argument would imply a superior performance of firms that establish alliances, relative to firms that grow by acquisitions or by internal growth. The quality of less efficient firms should be revealed during merger waves as they would not be able to adapt to industry shifts, and consequently we should observe large declines in the market capitalization of these firms. To ascertain the validity of these arguments I proposed the following testable hypothesis:

Hypothesis 6. During the merger waves caused by triggered by industry shocks, firms that establish alliances should perform better than firms that grow by acquisitions or by internal growth investing in plant and equipment. Firms that do not expand operations should perform worse than firms that expand their operations.

II. Sample description and sample characteristics.

A. *Sample Description*

The sample used to test the hypotheses consists of 23 mergers waves in the period 1981-2000 described in Table 2 of Harford (2005). Following Harford's (2005) methodology, I expand the sample of merger waves to the period 2000-2006.[6] I extract all the mergers and tender-offers recorded by Thomson Financial's Securities Data Company (SDC) in the period 1998 - 2008. I

[6] Considering cross-border deals does not affect the results, but introduces specific motivations particular to inter-country consolidation or privatization waves.

restrict the sample to deals between U.S. acquirers and targets with a transaction value of at least $50 million. I consider that merger waves last for a period or two years, as in Mitchell and Mulherin (1996) and Harford (2005). I simulate 1000 distributions using the number of total deals in a given industry over the decade 1998-2008 by assigning each occurrence to each month with a probability 1/120. I compare this concentration with the actual concentration. If the concentration in the month with more bids is higher than the 95th percentile of the random distribution, I code this as a wave. I then search Lexis–Nexis for news reports to identify the reason for the wave. This procedure yields eight additional merger waves in the period 2000–2006. Information about starting dates and reasons for the waves' origin are provided in Appendix 1.

The final sample consists of 31 waves in the period 1990-2006, involving 5,444 firms with price information in CRSP and accounting information in COMPUSTAT.[7] In results not reported, I find a 90% increase in the volume of M&As activity (measured by the transaction value in 2007 constant dollars) from the two years prior to the wave to the two year wave-period. There is also an increase in the number of alliances and capital expenditures, although in a smaller magnitude: the number of alliances increase by 25% and capital expenditures, also measured in 2007 constant dollars, increase by 26%.

B. *Sample Characteristics*

I classify each firm in one of the following five groups according to the repose to industry shocks identified by merger waves. *M&A and Alliances* (about 17% of the sample) are firms that acquire assets and establish alliances during the merger wave. *M&As* (about 27% of the sample) are firms that acquire other firms' assets, but do not form alliances. *Alliances* (about 11% of the sample) contains firms that establish alliances but do not acquire other firms. *Internal Growth* (about 9% of sample) consists of firms that experience above the median industry growth in capital expenditures (CAPEX) during the merger wave, and do not acquire

[7] Harford (2005) identifies 35 merger waves. I exclude those starting prior to 1990 because information from Thomson Financial's Securities Data Company (SDC), needed to identify the M&As and JVs, is scarce prior to this year. Two other waves, one in the insurance and another in the banking industry, were also excluded because of the special characteristics of firms in these industries as well as regulatory constraints that can influence the response to merger waves.

assets or form alliances. Growth in CAPEX is computed as the percentage change in the average CAPEX two years prior to the start of the wave, to the average CAPEX during the wave. *No growth* (about 36% of the firms in the sample) are firms that do not engage in any growth strategy.

Table I presents the mean and median of firms' characteristics measured on the fiscal year prior to the start of the merger wave and winsorized at the 1st and 99th percentile to reduce the influence of outliers. For clarity in the exposition and for consistency with other tables in the paper, I report only the relative comparison of each group with the group *No growth*, but I also discuss other pairwise group comparisons when required by the analysis.

The rationality to analyze the firm characteristics in Table I is drawn from prior literature. Firm' size is likely to be an important factor to explain firms' response to merger waves as larger firms, with higher financing capacity and market power, are more likely than smaller firms to participate in merger waves, both as buyers and as sellers (Maksimovic, et al.,, 2013). Prior studies show that firm leverage is positively associated with financial constraints (Kaplan and Zingales, 1997; Lamont, et al. 2001). Financial constrains can limit firms' flexibility to adapt to the new competitive environment, can restrict the alternative to expand by acquisitions and may compel firms to either establish partnerships with cash-rich firms, to sell assets or to cease operations. Conversely, firms with more free-cash flows should be less financially constrained to engage in acquisitions (Harford, 1999), or to grow internally. Thus, we should observe that the amount of free cash flows increases the probability to expand operations by *M&As* and by internal growth relative to the other alternatives. The Tobin's Q can be used to test Hypotheses 1 and 4. The Q-theory of mergers proposes that high Tobin's Q firms buy low Q firms. [8] Thus, using Tobin's Q as a measure of performance, if Hypothesis 1 explains the data, we should observe a positive association between Tobin's Q and the probability to expand by acquisition. Tobin's Q has also been used as a measure of growth opportunities (Smith and Watts, 1992;

[8] The Q-theory of mergers has strong support (Servaes, 1991; Lang, Stulz, and Walkling, 1989; Andrade, et al., 2001, to cite a few). Recently, however, Rhodes-Kropf et al. (2008) question the Q-theory of mergers by uncovering an even stronger pattern than suggested by Rhodes-Kropf et al. (2005): high buys high, moderate buys moderate, and low buys low. On average, bidders and targets are less than a decile apart in market-to-book valuation.

Denis, 1994; Kole, 1997). Indeed, the Tobin's Q, computed as in Kaplan and Zingales (1997), is highly correlated with the market to book ratio, used to identify growth firms. Valuation uncertainty should be higher in firms with more value in growth opportunities relative to assets in place. Thus, if Hypothesis 4 is supported by the data, we should observe that firms with a high Tobin's Q should be more likely to establish partnership, relative to the other alternatives.

Table I also contrasts the return on assets (*ROA*) as a proxy for firm efficiency. Support for Hypothesis 1 would imply that firms that expand by acquisitions should exhibit higher levels of ROA. *Pre-wave Mkt return*, the one-year stock market return before the start of the wave, can offer information about the validity of both, Hypothesis 1 and 2: If a superior stock performance is positively associated with firm efficiency, then the neoclassical theory would suggest that firms with superior pre-wave returns should be more likely to expand by acquisitions. If larger pre-wave market returns indicate market miss-valuation, Hypothesis 2 would predict that firms with higher pre-wave returns should be more likely to expand by acquisitions. Thus, both hypotheses would yield the same prediction *Pre-wave Mkt return*, although for different motives.

Prior empirical work shows that, when compared with firms that do not pay dividends, dividend-paying firms are associated with superior past and future profitability (Fama and French, 2000), and with less financial constraints (e.g. Kaplan and Zingales, 1997; Johnson and Houston, 2000; White and Wu, 2006). Thus, I expect that dividend-paying firms have less uncertainty about future profitability and are less financially constrained than firms that do not pay dividends. Table I contrasts firms' level of research and development (R&D) expenses as a proxy for valuation uncertainty (e.g., Kamien et. al., 1992; Allen and Phillips 2000; Chan et al., 2001) to test Hypotheses 4.

The results presented in Table I are broadly consistent with Hypothesis 1 and Hypothesis 4. Firms that expand their operations by acquiring assets (firms in the groups *M&As and Alliances* and *M&As*) are significantly larger, perform better as measured by both in terms of the ROA and by the pre-wave stock returns, and are more likely to pay dividends than firms in the group *No Growth*. Firms that collaborate in alliances have the highest levels of *R&D*, *Tobin's Q* and pay less dividends than firms in the group *No Growth*. Firms in the group *Internal Growth*

are the smallest and experience the best stock performance prior to the wave. These firms are similar to firms in the group *No Growth* in terms of free-cash flows, R&D, dividends, and they occupy an intermediate position between firms in the group *M&As* and *Alliances* in performance and asymmetries of information.[9]

III. Firm Performance, Firm Relative Valuation, and the Response to Industry Shocks Identified by Merger Waves.

I use maximum-likelihood estimation of the following generic multinomial logistic model to analyze firms' responses to demand shocks:

$$Pr(response\ = i) = \frac{e^{\beta_i' x}}{\sum_{k=0}^{4} e^{\beta_k' x}}$$

Where *Pr* is the probability that a firm chooses response *I.* I categorized the responses in five groups: *M&A and Alliances, M&A, Alliances, Internal Growth*, *No growth.* B_j is a vector of coefficients and *X* represents the vector of explanatory variables used to test the hypotheses. Appendix I outlines the definitions and data sources for these explanatory variables.

To test Hypotheses 1 and 2, I estimate Model (1) using the maximum likelihood multinomial logistic regression analysis:

$$\begin{aligned} Response = {} & \beta_0 + \beta_1 Assets + \beta_2 Leverage + \beta_3 ROA + \beta_4 Free\ Cash\text{-}Flows + \beta_5 Pre\text{-}wave\text{-}stock\ return \\ & + \beta_6 Relative\ Valuation + \beta_7 Tobin's\ Q + \beta_8 R\&D\ to\ Sales + \beta_9 Dividends + \epsilon \end{aligned} \quad (1)$$

I report the coefficients in terms of the log-odds, which can be interpreted as the impact of the independent variable on the firm response to expand, relative to *No Growth*, the baseline group in all the tables. For the sake of intuition, I discuss the results in terms of the relative probabilities, reported in braces, which can be interpreted as odd ratios:

[9] The decision to expand or to sell has been previously analyzed (e.g. Maksimovic, Philips and Yang, 2013) and it is not the focus of the paper. In each group there are firms that are sold during the wave. In results not reported, I find that firms that are acquired have lower ROAs and Tobin's Q than firms that engage both in acquisitions and alliances, but exhibit a similar performance than firms in the group M&As. Target firms are smaller, have higher levels of R&D, pay less dividends and have lower levels of debt outstanding and poorer debt rating than acquirers. These results provide some evidence that target firms have more restricted access to external financing than buyers.

$$\frac{\Pr(response = i)}{\Pr(base\ response)} = e^{\beta_i' x}$$

Table II presents the estimated coefficient of model (1). The coefficient of *ROA* does not support Hypothesis 1. After controlling for other firms' characteristics, the *ROA* is negative, although not statistically significant, for the group of firms that expand by acquisitions. Additional analyses using M&As and *Alliances* as baseline groups, not reported in the paper, demonstrate that the pre-wave ROA does not affect the relative probability that firms expand by acquisitions or by establishing alliances. Similar findings are found when the return on equity instead of the ROA is used as the measure of operating performance.

The coefficient estimate of *Stock Performance* suggests that companies with better stock performance before the start of the wave are more likely to expand operations by acquisitions and by internal growth. A 1% increase in the adjusted pre-wave stock performance results in an expected increase in the probability to expand by acquisition, relative to firms that do not expand, by a factor of 1.862. This increase is significantly larger for the group *Internal Growth.* In results not reported, I replicate the analysis using *Alliances* as the base group. The results show that an increase in the pre-wave stock return raises the relative probabilities of the groups *M&A* and *Internal Growth*, relative to *Alliances*.

The positive and statistically significant coefficient of *Relative Valuation* is consistent with Hypothesis 2. *Relative Valuation*, a measure of firm specific overvaluation, is computed as in Rhodes-Kropft (2005) and Hoberg and Phillips (2010).[10] Table II shows that a one unit increase in *Relative Valuation* increases the relative probability to expand by M&As and alliances relative to *No-growth* by a factor of 1.257. In analysis, not reported, I find that firm-specific miss-valuation also increases the probability of the group *M&A and Alliances* relative to the groups *Alliances*

[10] *Following* Rhodes-Kropf et al., (2005) I estimate the model
$m_{it} = \alpha_{1jt}\, b_{it} + \alpha_{2jt}\, \mathrm{LN}(Positive\ NI)_{it} + \alpha_{3jt}\, I_{(<0)it} + \alpha_{4jt}\, Leverage_{it} + \alpha_{1jt}\, b_{it} + \varepsilon_{it;}$ where m is the natural log of the market value of equity[10], b is the natural log of the book value of equity; *Positive NI* is the absolute value of the net income; $I_{(<0)}$ is an indicator variable that identifies negative net income observations, and *Leverage* is the leverage ratio. Following the methodology in Hoberg and Phillips (2010), I estimate the parameters α in a period of 10 years starting the year before the wave. The estimated parameters for each industry are then used to compute $\hat{m}_{it}$, the predicted values of $m_{it,,}$. The unpredicted valuation of the firms prior to the wave, the *Relative Valuation*, is computed as the difference between m_{it} - $\hat{m}$it; this measure is also winsorized at the 1% and 99% level within each wave.

and *No-growth.* These finding suggest that firms that respond to industry shocks by acquiring corporate assets are overvalued, relative to firms that partner in alliances or firms that do not expand their operations.

An increase of the Tobin's Q increases the relative of probability of firms that form alliances, but not the relative probability of firms that acquire assets. This finding is consistent with Hypothesis 4, if *Tobin's Q* is a valid proxy for valuation uncertainty. The level of *R&D* also increases the relative probability for the group *Alliances* relative to *No Growth*, and in results not reported, relative to the all the other alternatives. *Dividends* have the contrary effect: An increase in dividends increases the odds for *M&As* relative to *Non-Growth*, but it declines the relative probability of firms partnering in alliances. The coefficients of *Tobin's Q, R&D* and *Dividends* provide preliminary support to Hypothesis 4.

The coefficients of the control variables in Table II yield similar conclusions to those reported in the univariate analysis in Table I. An increase in one unit of *Ln Assets* increases the relative odds for the group *M&A and Alliances* relative to *No Growth*, and in results not reported, relative to all the alternatives of expansion. Untabulated analysis also demonstrates that an increase in the firms' size decreases the probability of *Internal Growth* respect to all the groups. An increase in *Leverage* decreases the probability of all the alternatives of expansion relative to firms in the *No Growth* group, suggesting that high levels of leverage limit firms' ability to expand operations. The coefficient of *Free cash flows* only shows statistical significance for the group *No Growth*, indicating that firms with more free cash flows are more likely to use these resources to increase capital expenditures, relative to the other responses in merger waves.

IV. CEO Characteristics, CEO Compensation, Anti-Takeover Provisions and the Response to Industry Shocks Identified by Merger Waves.

To test Hypothesis 3, this section investigates the potential impact of several internal and external mechanisms of monitoring, on the response of firms to industry shocks.

A. *CEO Characteristics and Internal Mechanisms of Monitoring*

I analyze different characteristics used in prior studies to assess the divergence of interests between ownership and management, represented by the CEO as the main decision maker. Guay (1999) and Coles et. al., (2006) summarize existing literature demonstrating that CEOs' tenure is positively related to the CEOs level of entrenchment and to the CEOs' risk aversion. Brickley, et. al, (1997), Dahya, McConnell and Travlos (2002) report evidence consistent with the presence of conflicts of interest when the CEO is also the chair of the board. Activist shareholders, regulators and academicians have proposed separating the chair/CEOs roles. Fahlenbrach (2009), Von Lilienfeld and Ruenzi (2014) find evidence that the duality of CEOs/founder is positively associated with value-increasing corporate decisions. Based on this literature, the analysis includes the variables *Tenure*, the number of years as CEO of the firm, *Chairman*, to identify those boards chaired by the CEO and *Founder* to identify firms with CEOs that founded their firms.

Agency theory also suggests that managerial ownership reduces agency problems (i.e. Jensen and Meckling, 1976). I compute *CEO ownership* as the number of shares and the number of options owned by the CEO that are exercisable or will become exercisable within 60 days, divided by the number of shares outstanding.[11] Following the pioneering empirical study by Jensen and Murphy (1990), a rich body of literature has explored the impact of differences between cash and equity compensation on managerial risk aversion. Cash and bonus compensation can promote excessive risk taking. Guay (1999) argues that CEOs can be better diversified, and thus be less risk adverse, when they receive cash as compensation. Fahlenbrach and Stulz (2011) argue that cash bonus incentives can promote excessive risk taking because they receive high compensation in case of good results, but this compensation cannot go below zero for failure. Based on this literature, Cash *compensation*, the ratio of cash bonus to cash salary is included in the analysis.

[11] In results not reported I investigate a non-monotonic relationship between firm's value and managerial ownership (e.g. Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Coles, Lemmon, Meschke, 2012). I created dummies for different cut-offs or CEO ownership (10%, 20% and 25%) define entrenchment. None of these variables is significant in alternative estimations.

Managerial behavior is hypothesized to depend on changes in expected utility determined by changes in wealth (Coles, Lemmon, Meschke, 2012). The variable *Change in CEO wealth* (see Edmans et al. 2009), is the dollar change in CEO wealth for a 100 percentage point change in firm value, divided by annual flow compensation. Edmans et al. (2009) argue that this measure is independent of firm size and thus comparable across firms in time-series studies.

CEOs' overconfidence can lead them to overestimate future returns and underestimate risk. Malmendier and Tate (2008) report that the odds of making acquisitions are 65% higher if the CEO is classified as overconfident, and that these CEOs overpay in acquisitions. To assess CEOs' overconfidence, the variable *Overconfidence* equals 1 if the ratio of the average value per vested option to the average strike price equals or is greater than 67% in two or more years (see, for e.g., Malmendier et al., 2011; Kolasinski and Li, 2013; Humphery-Jenner, et al., 2015).

Table III, Panel A, reports the maximum-likelihood multinomial logit estimation of the basic Model (1), extended by these proxies for agency problems between CEO and shareholders.

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Tenure + \beta_{11} Chairman + \beta_{12} Founder + \beta_{13} CEO\ Ownership + \beta_{14} Cash\ Compensation + \beta_{15} Change\ in\ CEO\ wealth + \beta_{16} Overconfidence + \epsilon \quad (2)$$

For the sake of simplicity, I do not report the coefficient estimates of the basic Model (1), as they are already reported in Table II, and they hinder the clarity of the exposition.

The results in Table III show modest potential effects of agency-related characteristics on the response to merger waves. CEO's tenure, the CEO's status as chair of the board, the CEO's percentage ownership in the firm, and the CEO's wealth-to-performance sensitivity (WPS) do not affect the relative probability of the different responses to industry shocks.

One of the few statistically significant coefficients is *Founder*, in models (1) and (3). The relative probability for the group *Alliances* relative to *No Growth* increases by a factor of 3.517, and by a factor of 2.664 for the group *M&As and Alliances*, when the CEO is the firm's founder. To further distinguish the group of alliances and acquisitions, I replicate the analysis using *Alliances* as the baseline group. The estimation indicates that the founder in an executive

position increases the relative probability to enter in alliances relative to acquiring corporate assets during merger waves.

Change in CEO wealth increases the multinomial log-odds for the group of firms that engage in alliances relative to *No Growth*. I estimated Model (2) using *Alliances* as the baseline. The results, not reported, show that an increase in *Change in CEO* increases the relative probability of *Alliances*, relative to *M&As*, but not relative to *Internal growth*. These findings suggest lower levels of agency problems in firms that establish alliances than in firms that acquire assets, finding that offers support to Hypothesis 3.

The results in Panel A, Table III, show that the coefficient *Overconfidence* is positive and significant for the group *M&As and Alliances*. The probability of firms in the group *M&As and Alliances,* relative to *No Growth*, increases by a factor of 1.709 when the CEO is identified as overconfident. In result not reported, I find no evidence that overconfidence influences the relative probability of firms engaging in acquisitions versus alliances, or versus internal growth.

Robinson (2008) proposes that alliances can solve agency problems that exist inside corporations. Consistent with Robinson's (2008) argument, Bodnaruk et. al., (2013) find that the ratio of alliances to CAPX and to M&As increases with the Gompers' et al., (2003) g-index. I extend this analysis in the context of mergers waves triggered by industry shocks, by including *High g-index* in Equation (1):

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}\, High\ g\text{-}index + \epsilon \qquad (3)$$

The estimation of this model, reported in Panel B, Table III, shows that *High g-Index* lacks statistical significance in all the modes, finding that demonstrates that there is not a significant impact of the g-index on the relative probability of the different alternative reactions to industry shifts.

I also analyze the impact of the Bebchuk et al., (2009) entrenchment index (e-index) by estimating the model[12]:

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}\, High\ e\text{-}index + \epsilon \quad (4)$$

The results in Panel C, Table III, show that high-e-index increases the relative probability of *M&As*, relative to firms in the *No?-growth firms*, by a factor of 1.382. I estimate Model (4) using the group *Alliances* as the reference group to replicate the analysis in Bodnaruk, et al., (2013). Contrary to the conclusions in Bodnaruk et, al., (2013), results not reported in the manuscript but available from the authors upon request, indicate that neither the g-index nor the e-index have a significant impact on the likelihood of adopting alliances versus the other forms of expansion during merger waves.

It is important to note that the g-index and the e-index are measures of managerial entrenchment, and measures of agency problems between managers and shareholders, whereas Robinson's (2008) theory investigates agency conflicts inside corporations. One proxy for conflicts of interest inside a firm is its number of business segments (Bodnaruk et al., 2005, Seru, 2014). In results not reported, I expand Model (1) by the natural log of the number of the firm's segments before the start of the wave, and also with a dummy variable that identifies multi-segment firms. In results not reported, I find that, ceteris paribus, the number of operating segments has no statistical power to explain the response to industry shifts.

B. Institutional Ownership and the Response to Industry Shocks.

An extensive body of theoretical and empirical work demonstrates that institutional investors have the ability and the incentives to monitor management (e.g. Brickley et al. 1988, Kahn and Winton, 1998; Maug, 1998; Gilan and Starks, 2000; Hartzell and Starks, 2003;

[12] Gompers et al., (2003) considers the 24 provisions followed by the Investor Responsibility Research Center (IRRC) whereas Bebchuk et al., (2009) find that only six provisions out of the 24 provisions are correlated with firm valuation. Following other studies I fill up the rest of the years with the value of the indexes of the next year with available data.

Aggarwal, et. al., 2011). In the context of M&As, Chen et al., (2007) report that the presence of independent institutions is associated with better post-merger abnormal returns. Ferreira et al., (2010), find that foreign institutional ownership increases the probability of successful cross-border M&As.

I collect information from Thomson Reuters on the holdings of common stock by institutional investors with more than $100 million of assets under management reported in form 13F fillings. Following Chen et al., (2007), I only report *Inst. Ownership* (the percentage of institutional ownership held by the five largest institutional investors, relative to the total number of shares outstanding) as the measure of institutional ownership concentration. The analysis yields similar results if I analyze the percentage ownership by largest institutional investor, or the ownership by all institutions with at least 5% of the shares outstanding.

Maximum-likelihood multinomial logit is used to estimate the basic Model (1), extended by, *Inst. Ownership*:

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Inst.\ ownership + \epsilon \quad (5)$$

The results in Table IV, Panel A, show that an increase by 1% in the percentage of institutional ownership, increases the relative probability of the group *M&As* relative to *No Growth,* by a factor of 2.984. To further contrast the groups *M&As* and *Alliances*, I estimate Equation (5) using *Alliances* as the baseline. The results show that an increase in institutional ownership increases the expected probability for the group *M&As* relative to the group *Alliances* by a factor of 2.017.

Almazan et al. (2005) and Chen et al., (2007) find that independent investment advisors and investment companies are more active monitors than banks and insurance companies. Based on this work, Panel B in Table IV classifies institutions into active and passive investors. The results in Panel B indicate that the presence of both, active and passive institutional investors increases the relative probability of the group *M&As* relative to the group *No Growth*.

In results not reported, I estimate the model using *Alliances* and *Internal-Growth* as baseline groups. Ceteris paribus, the presence of active institutional ownership increases the

relative probability for the group *M&As* relative to the group *Alliances* by a factor of 4.286 ($p < 0.001$), whereas the presence of passive investors does not affect the choice between *M&As* and *Alliances*. These findings suggest that firms that expand by acquisitions have lower levels of agency problems than firms that form alliance, which does not support Hypothesis 3.

Taken together, the results from this section offer little support to Hypotheses 3. Only a few proxies for agency problems affect firms' response to industry shifts, and these variables offer a vague picture of the impact of agency problems on the response to industry shocks. CEOs' overconfidence increases the probability that firms expand by both, alliances and acquisitions, but only relative to firms that do not grow. The coefficients of *Founder* and *Change in CEO* suggest lower agency problems in firms that establish alliances than in firms that expand by acquisitions. However, the effect of the presence of institutional investors, suggests that firms that acquire assets have lower levels of agency problems than firms that form alliances.

V. Informational Asymmetries and the Response to Industry Shocks.

The results in Table II show that an increase in the level of *Tobin's Q*, *R&D* and *Dividends* (proxies for a firm's valuation uncertainty), increases the relative probability to establish alliances relative to all the other responses, result that offers support to Hypothesis 4. This section provides further tests of Hypothesis 4 using the dispersion in analysts' EPS forecast and the errors in analysts' EPS forecasts as proxies for informational asymmetries.

I collect EPS forecasts from the Institutional Brokers Estimate System (IBES) database. I compute *EPS dispersion* as the standard deviation of EPS forecasts divided by the absolute value of the mean EPS forecast, a measure used in prior literature as a measure of uncertainty (e.g. Avramov et al., 2009).

Following Hong and Kubic (2003), I compute the absolute value of the EPS forecasting error (ABSPE) as the absolute value of $FE_{ijt} = \frac{F_{ijt} - A_j}{P_{jt}}$, where F_{ijt} is the EPS forecast by analyst i for company j on day t, A_{ijt} is the actual EPS of company and P_{jt} is the firm closing stock price seven days before the forecasts.

Table V, Panel A, presents the maximum-likelihood multinomial logit estimation of basic Model (1) extended by *EPS dispersion.*

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} EPS\ dispersion + \epsilon \quad (6)$$

The results broadly support Hypothesis 4. *EPS dispersion* reduces the expected probability that firms acquire assets relative to firms in the group *No-growth*. Ceteris paribus, the risk ratio of the group *M&As* relative to *No-growth*, is expected to increase by a factor of 0.591 when EPS dispersion increases by 1%.

Panel B replicates the analysis using *Prediction Error.* I estimate the model (7):

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} EPS\ Prediction\ Error + \epsilon \quad (7)$$

The results from this estimation show that, relative to firms in the *No Growth* group, an increase in one unit of analysts' errors in EPS forecast reduces the relative probability that firms acquire assets or grow internally (by a factor of 0.779 and 0.541 respectively), and increase the relative probability that firms establish alliances by a factor of 1.314. In results not reported, I replicate the analysis using *Alliances* as the baseline. Consistent with Hypothesis 4, the level of *EPS dispersion* increases the relative probability of Alliances relative to *M&As*.

VI. Cost of Capital and the Response to Industry Shocks Identified by Merger Waves.

This section provides several tests of Hypothesis 5. Section 7.1 uses different measures of access to external debt markets, and section 7.2 investigates the cost of equity.

A. The Cost of Debt and the Response to Merger Waves

To test Hypothesis 5, I estimate basic Model (1) extended by two measures that are highly correlated with the firm's cost of debt: the existence of public debt outstanding, and the S&P debt ratings (e.g. Anderson et al., 2003; Faulkender and Petersen, 2006).

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} With\ debt\ rating + \epsilon \quad (8)$$

The results in Table VI, Panel A, demonstrate that having public debt outstanding increases the probability that firms expand through acquisitions by a factor of 2.011, relative to firms in the group *No-Growth*. In results not reported, I find that public debt outstanding increases the relative probability of the group *M&As* relative to *Alliances,* but no relative to *Internal Growth*.

A second proxy for cost of debt, *Numeric debt rating,* is computed by assigning a numerical values to the S&P credit ratings (e.g. , Anderson et al., 2003) with the highest value of 23 for the best credit rating of AAA+=23, and the lowest value 1 for D credit ratings.

Table VI Panel B reports the estimation of Model (9):

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Numeric\ debt\ rating + € \quad (9)$$

An increase in the numeric credit rating increases the relative probability for all the groups, relative to *No-growth*, except *Alliances*. Untabulated results show that increase in the numeric credit rating increases the relative probability of *M&As* versus *Alliances*, but not respect to *Internal Growth*.

A third and direct measure of the cost to access to external debt market is the amount and cost of bank loans arranged during merge waves. Bank loan spreads and loan sizes are collected from the Thomson Reuters Securities Data Company (SDC), Global new Issues database. *Loan spreads* are calculated as the basis points over a benchmark rate, 6-month LIBOR, plus annual fees paid to lenders.

Panel C, Table VI, presents the estimation of the following model:

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Loan\ Amount + \beta_{11} Cost\ of\ debt + € \quad (10)$$

The results demonstrate that the amount of bank loans increases the odds of the group *M&As* and *Internal Growth* relative to *Alliances* and *No-Growth*. In specific, an increase in a unit of *Loan amount* increases the probability of the group *M&As,* relative to the group *No-Growth,* by a factor of 1.248. A similar impact is found for the relative probability of *Internal growth*.

Panel C also shows that loan spreads have a negative effect on the relative probability of the group *M&As* relative to *No-Growth.* The impact of the expected spread on the relative response to grow is also negative, although only marginally significant (t=1.74; p=0.08). In results not reported, estimating Model (9) using the group *Alliances* as the baseline group, I find that a decline in bank loan spreads, decreases the probability of *M&As* relative to *Alliances*.

Taken together, the results in this section suggest that the access to external capital markets of debt is an important factor to explain the response to merger waves, and provide support to Hypotheses 5.

B. Implied Cost of Equity and the Response to Merger Waves

To further establish a link between cost of capital and the response to merger waves, I estimate firms' implied cost of equity capital (ICC) using alternative approaches. First I estimate the ICC as in Gebhardt et al., (2001). This measure of cost of capital has been used to analyze growth expectations (Lee, et al., 2009) and the effect of diversification (Hann et al., 2013). This model estimates the cost of equity capital implied in the prices, using analyst forecast to predict future cash flows:

$$P_0 = B_0 + B_0\frac{(FROE_1 - r)}{(1+r)} + B_1\frac{(FROE_2 - r)}{(1+r)^2} + B_2\frac{(FROE_3 - r)}{(1+r)^3} + \cdots$$
$$+\ B_{11}\frac{(FROE_{12} - r)}{r(1+r)^2} + B_{12}\frac{(FROE_2 - r)}{r(1+r)^2}$$

I estimate Basic Equation (1) expanded by *GLS Cost of Equity*:

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}\ GLS\ Cost\ of\ Equity + €\qquad (11)$$

The results in Table VI, Panel D, show that the coefficient of *GLS Cost of Equity* is negative in all the groups, but it is only statistically significant for the groups of firms that expand through acquisitions. Given an increase of 1% in the ICC, the relative probability of *M&As and Alliances* is expected to decline by a factor of 0.029 relative to the group *No-Growth*.

To contrast the group *M&As* and the rest of the groups, I estimate Model (11) using different alternatives of expansion as the baseline groups. These untabulated analyses fail to demonstrate a significant impact of the cost of capital on the relative odds of adopting any of the alternatives of expansion.

Hou et al., (2012) demonstrate that cross-sectional models to estimate future cash flows are superior, in terms of forecast bias, to models that use analysts' predictions of earnings. The ICC using the Hou's et al., (2012) model is also available for all the firms with the necessary accounting information, while the Gebhardt et al. (2001) is only available for firms with information in IBES.

Following Hou's et al., (2012), I compute the *HDZ Cost of Equity* as the equal-weighted average of the five ICC estimates from the following models: Gordon and Gordon (1997), Claus and Thomas (2001), Gebhardt et al. (2001) and Easton (2004); Ohlson and Juettner- Nauroth, (2005).

$$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} HDZ\ Cost\ of\ Equity + \epsilon \quad (12)$$

The results in Table VI, Panel E, indicate that an increase in the *HDZ Cost of Equity* reduces the probability of all alternatives of expansion relative to *No Growth*. Estimating equation (12) using the different alternatives of expansion as baselines demonstrates that *HDZ Cost of Equity* does not have significant impact on the relative forms of expansion.

To summarize the findings in this section, higher costs of equity and debt increase the probability that firms do not expand during merger waves. A high cost of debt increases the relative probability that firms establish alliances, relative to other forms of expansion, whereas the cost of equity does not affect these relative probabilities. Taken together, these results suggest that the access to external capital markets is an important factor to explain the response to industry shocks, and provide support to Hypothesis 5.

VII. Firm Performance During Industry Shocks Identified by Merger Waves

This section presents different measures of performance to test Hypothesis 6 that firms that respond to industry shifts by acquiring assets or by internal growth should perform worse

than firms establish alliances. Firms that do not expand operations should perform poorly relative to firms that expand operations.

A. The Fate of the Firms During Industry Shocks Identified.

The number of firms acquired or delisted during merger waves offers some initial clues to understand the performance of firms during merger waves. I used the CRSP delisting codes to identify firms that are alive (delisting code is100) at the end of the merger wave; firms that merge (delisting codes 200-290), and firms that are liquidated or dropped from the markets (delisting codes 400-591) during merger waves.

Table VII, Panel A, highlights the sharp differences in the fate of the firms by their response to industry shifts. About 90% of the firms that engage in acquisitions remain listed in the stock markets at the end of the wave, whereas only 68.67% of firms that did not expand operations remain alive. About 12.73% of the firms operating before the wave were acquired during the wave. The percentage of firms acquired is about three times larger for firms in the group *No-Growth* than for firms in the group *M&A and Alliances*. *M&As* is the group with less firms acquired (6.49%). *M&As* is also the group with less firms dropped or delisted from the market, (1.60%), six times lower than for the group *No Growth* (10.84%). The groups *Alliances* and *Internal Growth* occupy intermediate positions: More firms in the group *Alliances* are acquired during the wave, while a slightly larger percentage of firms in the group *Internal Growth* are delisted from the stock markets.

B. The Accounting Performance of Firms During Industry Shocks.

To further test Hypothesis 6, I compute two measures of accounting performance proposed by Barber and Lyon (1996): ROA and cash-flow return on assets (CFROA):

$$ROA_t = \frac{OIBDP_t}{\left(AT_t + AT_{t-1}\right)/2}$$

$$CFROA_t = \frac{OIBDP_t - \Delta RECT_t - \Delta INVT_t - \Delta ACO_t + \Delta AP_t + \Delta LCO_t}{(AT_t + AT_{t-1})/2}$$

Where *OIBPT* is operating income before depreciation, interest, and taxes, *AT* is total assets, *RECT* is accounts receivable, *INVT* is inventory, *ACO* is other current assets, *AP* is accounts payable, *LCO* is other current liabilities, and Δ denotes the change between time t and time t -1.

Following Barber and Lyon (1996), I compute a firm's expected performance, $E(P_{it})$ as its past performance plus the change in performance for firms in the same industry.

$$E(P_{it}) = P_{i,t-1} + (I_{it} - I_{it-1})$$

Where P_{it} and $P_{i,t-1}$ are the performance of firm *i* in year *t* and in year *t-1*, I_{it} denotes the median performance of the Fama and French (1997) industry classification. The Abnormal performance is then defined as the actual performance minus the expected performance. $ABP_{it} = P_{it} - E(P_{it})$.

The results in Table VII, panel B, present the median and median changes in operating performance from the year before the start of the wave to the end of the wave. The results provide mixed support to Hypothesis 6. Contrary to the prediction in Hypothesis 6, the operating performance of firms in the group *No Growth* is similar to the performance of firms in other groups. The group *M&As* exhibits the worst accounting operating performance and firms that establish alliances experience the best accounting performance with 2.06% (1.791%) average (median) *Abnormal ROA*. *Alliances* is also the only group with positive and statistically significant improvement in *CFROA*. Tests of differences in means and medians (not reported) of *Abnormal ROA* and *Abnormal CFROA* demonstrate a better performance (both in terms of ROA and CFROA) for the group *Alliances* than for all the other groups. These findings provide support to Hypothesis 6.

C. The Stock Performance of Firms During Industry Shocks.

In a preliminary analysis, I explore the change in market capitalization of the different responses to industry shifts. In untabulated results, I find a significant increase in market

capitalization from the day of the start of the wave to 2 years after the start. The market value of the firms in our sample (in 2007 dollars) increase by 47.3% during the wave, 10.27% more than the change in value of all firms listed in CRSP during the same period. The different responses to industry shifts exhibit different changes in market capitalization: firms in the group *No growth* increased in market capitalization by 5%; firms *M&As and Alliances* by 57.7%; firms in *M&As* by 41.3%; firms in the group *Alliances* by 36.1% and firms in the group *Internal Growth* by 61.20%. The overall increase in value demonstrates that industry shocks increase the market capitalization of all firms in the industry. However, an increase in overall industry capitalization is not informative of the changes in value associated with the different responses to industry shifts. The market capitalization of acquirers will increase as a result of the acquisition, even if acquirer's shareholders experience wealth losses if the firm overpays for the target's assets.

Panel C in Table VII reports the market adjusted returns and the holding period excess returns computed using the Fama and French's (1993) three-factor model, for the period starting one month before the wave and ending two years after the start of the wave.

The results offer support to Hypothesis 6. The lowest market adjusted returns accrue to investors of firms that did not expand during the merger waves. Only investors of firms that expand by forming alliances experience above market returns. Firms that establish alliances experience the best performance also in a risk adjusted basis. The argument that cross-monitoring among partners ameliorate agency problems explains the superior performance of firms that establish alliances.

The poor performance of firms in the group *M&As* in Panels B and C does not support the neoclassical theory of merger waves that assets flow from less to more efficient firms. The poor performance of firms that expand through acquisitions, together with the findings in Table III, suggest that managerial overconfidence is an important factor to explain why firms expand by acquisitions. The poor stock performance of firms in the group *M&As* is also consistent with miss-valuation of these firms prior to the wave, and the subsequent reversion to correct values during the wave.

VIII. Conclusion

I investigate why, in response to industry shocks, some firms expand their boundaries by acquiring assets, other firms increase their investments in plant and equipment, other firms form alliances, and yet other firms do not expand operations. By expanding the set of responses to industry shifts, this analysis offers a richer context to investigate the dynamics in merger waves. The analysis of the different alternatives to respond to industry shocks is also relevant to determine the firm characteristics that determine the boundaries of firm' operations, a central topic of research in financial economics pioneered by Coase (1937) and later operationalized by Williamson (1975; 1979).

I find that firm-specific miss-valuation increases the relative probability to acquire assets, a finding that provides support to miss-valuation theories of merger waves. The results from the analysis do not offer support to neoclassical explanations of merger waves. The findings also indicate that firm size, the presence of institutional investors, and compensation schemes that incentivize CEO risk taking are important factors to explain why firms acquire assets as a response to industry shifts. The proxies for agency problems and overconfidence are not relevant to explain the relative probabilities of acquiring assets. The analysis suggests that firms that acquire assets have better access to external debt markets stressing the importance of liquidity to adapt to swift changes in the competitive environment.

Firms that expand their boundaries by increasing capital expenditures have relatively higher levels of free-cash flows. Firms that grow internally share several characteristics with firm that acquire assets: both groups of firms have better pre-wave stock performance and cheaper access to public debt markets than firms that form alliances or firms that do not grow. Firms that grow internally, however, are significantly smaller, and have lower levels of relative miss-valuation and institutional ownership than firms that grow by acquisitions.

A high level of informational asymmetries is the main firm characteristic that explains why firms share control of the assets in alliances. Firms that establish alliances have a higher cost of debt than firms that expand by acquisitions or by internal growth, perhaps as a consequence of

their high levels of informational asymmetries. The findings do not support agency explanations to the formation of alliances.

Firms that do not expand their operations share similitudes with the group of firms that form alliances: both groups of firms have a higher cost of capital than the group of firms that expand via acquisitions or by internal growth. Firms that do not expand operations, however, have significantly lower degrees of informational asymmetries and exhibit inferior operating and stock performances than firms that establish alliances. The findings suggest that firms that do not grow and firms that form alliances have costly access to financial markets, but firms that form alliances are more efficient.

The operating and stock performances of firms during merger waves demonstrate that firms that grow by acquisitions experience poor stock and operating performances. The poor performance of acquirers does not support the neoclassical theory of merger waves, and is consistent with the presence of agency problems in a context of lax monitoring during the merger waves (Duchin and Schmidt, 2013). Firms that establish alliances experience better performance than other firms. The results suggest that firms that form alliances have some quality assets but informational asymmetries hamper the transmission of this quality to external capital markets or to potential acquirers. This analysis highlights the relevance of alliances as mechanisms to reduce the consequences of market failures caused by informational asymmetries. The superior performance of firms that establish alliances is also consistent with the benefits from cross-monitoring that takes place inside the alliances (Robinson, 2008). Consistent with the finding that firms that do not expand their boundaries suffer from high cost of capital, which should hinder their ability to adapt to changes in the competitive environment, these firms exhibit a poor performance during the wave and are less likely to remain operative at the end of the merger waves.

References

Aggarwal, Reena, Isil Erel, Miguel Ferreira, and Pedro Matos, 2011, Does governance travel around the world? Evidence from Institutional Investors, *Journal of Financial Economics* 100, 154–182.

Akerlof, A. George, 1970, Market for lemons: Quality uncertainty and market mechanism, *Quarterly Journal of Economics* 84, 488–500.

Allen, Jeffrey W., and Gordon M. Phillips., 2000, Corporate equity ownership, strategic alliances, and product market relationships, *Journal of Finance* 55, 2791–2816.

Almazan, Andres, Jay C. Hartzell, and Laura T. Starks, 2005, Active institutional shareholders and costs of monitoring: evidence from executive compensation, Financial Management 34, 5–34.

Anderson, Ronald C., Sattar A. Mansi, and David M. Reeb, 2003, Founding family ownership and the agency costs of debt, *Journal of Financial Economics* 68, 263–287.

Andrade, Gregor, Mark L.Mitchell, and Erik Stafford,2001, New evidence and perspective on mergers, *Journal of Economic Perspectives* 15, 103–120.

Andrade, Gregor, and Stafford, Erik, 2004, Investigating the economic role of mergers, *Journal of Corporate Finance* 10, 1–36

Attig Najah., Sean Cleary, Sadok El Ghoul, and Omrane Guedhami, 2013, Institutional investment horizons and the cost of equity capital, *Financial Management* 42, 441–477.

Avramov, Doron, Tarun Chordiab, Gergana Jostova, and Alexander Philipov, 2009, Dispersion in analysts' earnings forecasts and credit rating, *Journal of Financial Economics* 91, 83–101.

Barber, Brad M., and John D. Lyon, 1996, Detecting abnormal operating performance: the empirical power and specification of test statistics, *Journal of Financial Economics* 41, 359–399.

Bebchuk, Lucian A., Alma Cohen, and Allen Ferrel, 2009, What matters in corporate governance? *Review of Financial Studies 22, 783–827*

Bodnaruk, Andriy, Massimo Massa, and Andrei Simonov, 2013, Alliances and corporate governance, *Journal of Financial Economics* 107, 671–693.

Boyle, Glenn W., and Graeme A. Guthrie, 2003, Investment, uncertainty, and liquidity, *Journal of Finance* 58, 2143–2166.

Brickley, James A., and Frederick H. Dark, 1987, The choice of organizational form the case of franchising, *Journal of Financial Economics* 18, 401–420.

Brickley, James A., Ronald C. Lease, and Clifford W. Smith Jr., 1988, Ownership structure and voting on antitakeover amendments, *Journal of Financial Economics* 20, 267–291.

Brickley, James, A., Jeffrey L. Coles, and Gregg Jarrell, 1997, Leadership structure: Separating the CEO and chairman of the board, *Journal of Corporate Finance*, 3, 189–220.

Chang, Xin, Sudipto Dasgupta, George Wong, and Jiaquan Yao, 2014, Cash–flow ssensitivities and the allocation of internal cash flow, *Review of Financial Studies*, 27, 3628–3657.

Chen, Xin, Jarrad Harford, and Kai Li, 2007, Monitoring: which institutions matter? *Journal of Financial Economics* 86, 279–305.

Chen, Kevin C. W. Zhihong Chen, and K. C. John Wei, 2011, Agency costs of free cash flow and the effect of shareholder rights on the implied cost of equity capital, *Journal of Financial and Quantitaive and Analysis* 46, 171–207.

Claus, James, and Jacob Thomas, 2001, Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets, *Journal of Finance* 56, 1629–1666.

Cleary, Sean, 1999, The relationship between firm investment and financial status, *Journal of Finance* 54, 673–692.

Coase, Ronald.H., 1937, The nature of the firm, *Econometrica* 4, 386–405.

Coase, Ronald H., 1998, The new institutional economics, *The American Economic Review* 88, 72–74.

Coase, Ronald H., 1960, The problem of social cost, *Journal of Law and Economics* 3, 1–44.

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen,, 2006, Managerial incentives and risk-taking, *Journal of Financial Economics* 79, 431–68.

Coles, Jeffrey L., Michael L. Lemmon, and Felix J. Meschke, 2012, Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate performance, *Journal of Financial Economics* 103, 149–168.

Dahya, Jay, John J. McConnell, and Nickolaos G. Travlos, 2002, The cadbury committee, corporate performance, and top management turnover, *Journal of Finance* 67, 461–483.

Denis, David J., 1994, Investment opportunities and the market reaction to equity offerings, *Journal of Finance and Quantitative Analysis* 29, 159–177.

Desai, Mihir A., Fritz C. Foley, and James R. Hines, 2004, The Costs of Shared Ownership: Evidence from International Joint Ventures, *Journal of Financial Economics* 73, 323–374.

Diamond, Douglas W., Robert E. Verrecchia,1991, Disclosure, liquidity and the cost of capital, *Journal of Finance* 46, 1325–1359.

Duchin, Ran, and Breno Schmidt, 2013, Riding the merger wave: Uncertainty, reduced monitoring, and bad acquisitions, *Journal of Financial Economics* 107,69–88.

Easton, Peter, 2004, PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital, *The Accounting Review* 79, 73–95.

Edmans, Alex, Xavier Gabaix, and Augustin Landier, 2009, A multiplicative model of optimal CEO incentives in market equilibrium, *Review of Financial Studies* 22, 4881–4917.

Eisfeldt, Andrea L., and Adriano A. Rampini, 2006, Capital reallocation and liquidity, *Journal of Monetary Economics*, 53, 369–399.

Elfenbein, Daniel W., and Josh Lerner, 2003, Ownership and control rights in Internet portal alliances, *RAND Journal of Economics* 34, 356–369.

Elyasiani, Elyas, Jingyi Jia, and Connie X. Mao, 2010, Institutional ownership stability and the cost of debt, *Journal of Financial Markets* 13, 475–500.

Fahlenbrach, Rüdiger , 2009, Founder-CEOs, investment decisions, and stock market performance, *Journal of Financial and Quantitative Analysis* 44, 439–466.

Fahlenbrach, Rüdiger, and René M. Stulz, 2011, Bank CEO Incentives and the credit crisis, *Journal of Financial Economics* 99, 11–26.

Fama, Eugene, and Kenneth French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

Fama, Eugene , and Kenneth French,1997, Industry costs of equity, *Journal of Financial Economics* 43, 153–193.

Fama, Eugene F., and Kenneth R., French, 2000, Forecasting profitability and earnings, *Journal of Business* 73, 161–175.

Faulkender, Michael,and Mitchell A. Petersen, ,2006, Does the source of capital affect capital structure?, *Review of Financial Studies*19, 45–79.

Fazzari, Steven, R., Glenn Hubbard, and Bruce Petersen, 2000, Financing constraints and corporate investment: Response to Kaplan and Zingales, *The Quarterly Journal of Economics*115, 695–705.

Ferreira, Miguel A., Massimo Massa, Pedro Matos, 2010, Shareholders at the gate? Institutional investors and cross-border mergers and acquisitions, *The Review of Financial Studies* 23, 601–644.

Gebhardt, William, Charles M.C. Lee, and Bhaskaran Swaminathan, 2001, Toward an implied cost of capital, *Journal of Accounting Research* 39,135–176.

Gillan, Stuart L., and Laura T. Starks., 2000, Corporate governance proposals and shareholder activism: The role of institutional investors, *Journal of financial Economics* 57, 275–305.

Gompers, Paul A., Joy L. Ishii, and Andrew Metrick, 2003, Corporate Governance and Equity Prices, *Quarterly Journal of Economics* 118, 107–155.

Gordon, Joseph R., and Myron Gordon, 1997, The finite horizon expected return model, *Financial Analysts Journal* 53, 52–61.

Gorton, Gary, Kahl Matthias, and Richard J. Rosen, 2009, Eat or be eaten: A theory of mergers and firm size, *Journal of Finance* 64, 1291–1344.

Greenwald, Bruce, Joseph E. Stiglitz, and Andrew Weiss, 1984, Informational imperfections on the capital market and macro-economic fluctuations, *American Economic Review* 74, 194–199.

Guay, Wayne, 1999. The sensitivity of CEO wealth to equity risk: an analysis of the magnitude and determinants, *Journal of Financial Economics* 53, 43–71.

Gulati, Ranjay, and Harbir Singh, 1998, The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances, *Administrative Science Quarterly* 43,781–814.

Hann, Rebecca N., Maria Ogneva, and Oguzhan Ozbas, 2013, Corporate diversification and the cost of capital, *Journal of Finance*, 68,1961–1999.

Harford, Jarrad, 1999, Corporate cash reserves and acquisitions, *Journal of Finance*, 54, 1969 – 1997.

Harford, Jarrad, 2005, Mergers and acquisitions; Takeover; Merger waves; Behavioral; Capital liquidity, Journal of Financial Economics 77, 529 – 560.

Hartzell, Jay C., and Laura T. Starks, 2003, Institutional investors and executive compensation, *Journal of Finance* 58, 2351–2374.

Hoberg, Gerard, and Gordon Phillips, 2010, Real and financial industry booms and busts, *Journal of Finance 65*, 45–86.

Holmstrom, Bengt, and Tirole, Jean, 1989, "The theory of the firm," in Richard Schmalensee and Robert D. Willig, eds.: *Handbook of Industrial Organization* (Amsterdam: North-Holland), 61–128.

Hong, Harrison, and Jeffrey D. Kubik, 2003, Analyzing the analysts: Career concerns and biased earnings forecasts, *Journal of Finance* 58, 313–351.

Hou, Kewei, Mathijs A.van Dijk, and Yinglei Zhang, 2012, The implied cost of capital: A new approach, *Journal of Accounting and Economics* 53, 504–526.

Humphery-Jenner, Mark, Ling Lei Lisic, Vikram Nanda, Sabatino Silveri, 2015, Executive overconfidence and compensation structure, *Journal of Financial Economics*, Forthcoming,

Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323–329.

Jensen, Michael C., and Kevin J. Murphy, 1990, Performance pay and top management incentives, *Journal of Political Economy* 98, 225–264.

Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics*, 3, 305–360

Johnson, Shane, and Mark B. Houston, 2000, A reexamination of the motives and gains in joint ventures, *Journal of Financial and Quantitative Analysis* 35, 67–85.

Jovanovic, Boyan, and Peter L. Rousseau, 2002, The Q-theory of mergers, *The American Economic Review* 92,198–204.

Kahn, Charles, and Andrew Winton, 1998, Ownership structure, speculation, and shareholder intervention, *Journal of Finance* 53, 99–129.

Kamien, Morton I., Eitan Muller, and Israel Zang, 1992, Research joint ventures and research and development cartels, *American Economic Review* 82, 1293–1306.

Kaplan, Steven N., and Luigi Zingales, 1997, Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics* 115, 707–712.

Kolasinski, Adam C., and Xu Li, 2013, Can strong boards and trading their own firm's stock help CEOs make better decisions? Evidence from acquisitions by overconfident CEOs, *Journal of Financial and Quantitative Analysis* 48, 1173–1206.

Kole, Stacey, 1997, The complexity of compensation contracts, *Journal of Financial Economics* 43,79–104.

Lamont, Owen, Christopher Polk, and Jesús Saaá-Requejo, 2001, Financial constraints and stock returns, *Review of Financial Studies* 14, 529–554.

Lang, Larry H.P., René M. Stulz, and Ralph A.Walkling,1989, Managerial performance, Tobin's Q, and the gains from successful tender offers, *Journal of Financial Economics* 24, 137–154.

Lee, Charles, David Ng, and Bhaskaran Swaminathan, 2009, Testing international asset pricing models using implied costs of capital, *Journal of Financial and Quantitative Analysis* 44, 307–335.

Lerner, Josh, Hilary Shane, and Alexander Tsai, 2003, Do equity financing cycles matter? Evidence from biotechnology, *Journal of Financial Economics* 67, 411–446.

Maksimovic, Vojislav, and Gordon Phillips, 2001, The market for corporate assets: Who engages in mergers and asset sales and are there efficiency gains?, *Journal of Finance* 56, 2019–2065.

Maksimovic, Vojislav, Phillips, Gordon M and Liu Yang, 2013, Private and public merger waves, *Journal of Finance* 68, 2177–2217.

Malmendier, Ulrike, and Geoffrey Tate, 2008, Who makes acquisitions? CEO overconfidence and the market's reaction, *Journal of Financial Economics* 89, 20–43.

Malmendier, Ulrike, Geoffrey Tate, and Jon Yan, 2011, Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policies, *Journal of Finance* 66, 1687–1733.

Mantecon, Tomas, Mitigating risks in cross-border acquisitions, 2009, Journal *of Banking and Finance*, 33, 640–651.

Mantecon, Tomas, Ian, Liu and Fei Gao, 2012, Empirical evidence of the value of monitoring in joint ownership, *Journal of Banking and Finance* 36, 1045–1056.

Mantecon, Tomas, Kyojik R. Song, Haowen Luo, 2015, The control and performance of joint ventures, *Financial Management*, forthcoming.

Maug, Ernst, 1998, Large shareholders as monitors: Is there a trade-off between liquidity and control? *Journal of Finance* 53, 65–98.

McConnell, John, and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27, 595–612.

Milgrom, Paul, and John Roberts, 1988, An Economic Approach to Influence Activities in Organizations, *American Journal of Sociology* 94, S154–S179.

Mitchell, Mark L., and Harold J. Mulherin, 1996, The impact of industry shocks on takeover and restructuring activity, *Journal of Financial Economics* 41, 193–229.

Modigliani, Franco, and Merton H. Miller, 1958, The cost of capital, corporation finance, and the theory of investment, *American Economic Review* 48, 261–297.

Morck, Randall, Andrei Shleifer, and Robert Vishny, 1988, Management ownership and market valuation: An empirical analysis, *Journal of Financial Economics* 20, 293–315.

Myers, Stewart C., 1984, The capital structure puzzle, *Journal of Finance* 39, 575–592.

Myers, Stewart C., and Nicholas Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187–221.

Ohlson, James, Beate Juettner-Nauroth, 2005, Expected EPS and EPS growth as determinants of value, *Review of Accounting Studies* 10, 349–365.

Robinson, David T., 2008, Strategic alliances and the boundaries of the firm, *Review of Financial Studies* 21, 649–681.

Rhodes-Kropf, Matthew, and S. Viswanathan, 2004, Market valuation and merger waves, *Journal of Finance* 59, 2685–2718.

Rhodes-Kropf, Matthew, David T. Robinson, and S. Viswanathan, 2005, Valuation waves and merger activity: The empirical evidence, *Journal of Financial Economics* 77, 561–603.

Rhodes-Kropf, Matthew, David T. Robinson, 2008, The market for mergers and the boundaries of the firm, *Journal of Finance* 63, 1169–1121.

Roll, Richard, 1986, The hubris hypothesis of corporate takeovers, *Journal of Business* 59, 197–216.

Seru, Amit, 2014, Firm boundaries matter: Evidence from conglomerates and R&D activity, *Journal of Financial Economics* 111, 381–405.

Servaes, Henri, 1991, Tobin's Q and the Gains from Takeovers, *Journal of Finance* 46, 409–419.

Shleifer, Andrei, and Robert W. Vishny, 2003, Stock market driven acquisitions, *Journal of Financial Economics* 70, 295–311.

Schlingemann, Frederik, P., René M. Stulz, and Ralph A. Walkling, 2002, Divestitures and the liquidity of the market for corporate assets, *Journal of Financial Economics* 64, 117–144.

Smith, Clifford W., and Ross L. Watts, 1992, The investment opportunity set and corporate financing, dividend, and compensation policies, *Journal of Financial Economics* 32, 263–292.

Stiglitz, Joseph E., and Andrew Weiss, 1981, Credit rationing in markets with imperfect information, *American Economic Review* 71, 393–410.

Verrecchia, Robert E., 2001, Essays on disclosure, *Journal of Accounting and Economics* 32, 97–180.

Von Lilienfeld-Toal, Ulf, and Stefan Ruenzi, 2014, CEO ownership, stock market performance, and managerial discretion, *Journal of Finance*, 69, 1013–1050.

Yang, Liu, 2008, The real determinants of asset sales, *Journal of Finance* 63, 2231–2262.

Whited, Toni, and Guojun Wu, 2006, Financial constraints risk, *Review of Financial Studies* 19, 531–559.

Williamson, Oliver E., 1975, Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization, (Free Press, New York, NY).

Williamson, Oliver E., 1979, Transaction Cost Economics: The Governance of Contractual Relations, *Journal of Law and Economics* 22, 233–261.

Table I
Main Sample Characteristics

The Table presents the means and medians (in parentheses) of firm characteristics that constitute basic Model (1). These variables are measured on the fiscal year prior to the start of the merger wave and are and winsorized at the 1st and 99th percentile to reduce the influence of outliers. Appendix 2 outlines the definitions and data sources for these variables. Firms are classified into the following groups accordingly to their response to industry shocks: *M&A and Alliances* are firms that acquire other firms' assets and also form alliances. *M&A* are firms that acquire other firms' assets, but do not establish alliances. *Alliances* are firms that form alliances, but do not acquire other firms' assets. *Internal Growth* are firms that do not acquire assets or form alliances, but experience above the median industry growth in capital expenditures (CAPEX). *No growth* are firms that do not expand by acquisitions, alliances or internal growth. The Table contrasts the mean and median statistics of each group relative to the *No Growth* group using the t-test of difference in means and the non-parametric Wilcoxon-Mann-Whitney to further test the equality of the underlying distributions of each group with the group *No Growth.*. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

	Sample N=5544 (1)	*M&A and Alliances* N=918 (1)	*M&A* N=1530 (2)	*Alliances* N=573 (3)	*Internal Growth* N=473 (4)	*No Growth* N=1950 (5)	t-test (Wilcoxon) (1)-(5)	t-test (Wilcoxon) (2)-(5)	t-test (Wilcoxon) (3)-(5)	t-test (Wilcoxon) (4)-(5)
Assets	2047.68 (152.782)	6009.07 (725.850)	1684.84 (215.381)	1379.40 (93.138)	444.18 (74.830)	1109.26 (113.16)	18.05*** (18.53)***	3.92*** (8.20)***	1.44 (0.59)	5.95*** (5.08)***
Leverage (%)	46.589 (46.373)	47.741 (47.844)	49.741 (49.751)	37.281 (37.430)	36.910 (36.940)	48.075 (48.237)	1.01 (0.69)	0.53 (1.41)	5.42*** (5.93)***	6.70*** (6.79)***
Free cash flows (%)	-8.457 (-2.053)	-4.336 (0.499)	-5.035 (0.499)	-17.538 (-0.782)	-9.398 (-9.088)	-10.001 (-3.001)	6.20*** (9.37)***	7.01*** (7.46)***	6.69*** (5.78)***	0.66 (1.57)
Tobin's Q	2.396 (1.669)	2.766 (1.974)	2.0901 (1.560)	3.073 (2.114)	2.943 (2.034)	2.1264 (1.485)	8.33*** (12.09)***	0.62 (2.93)***	10.05*** (10.83)***	8.02*** (8.69)***
ROA (%)	2.826 (10.184)	7.5116 (12.915)	7.3871 (11.936)	-7.902 (2.330)	-3.1949 (8.545)	1.8772 (9.213)	5.98*** (9.25)***	7.30*** (8.42)***	7.87*** (7.84)***	3.77*** (1.81)*
Pre-wave Mkt return	-12.264 (-16.364)	-1.059 (-4.643)	-5.101 -9.218)	-22.144 (-30.556)	0.438 (-6.144)	-22.753 (-28.657)	12.37*** (12.73)***	11.82*** (12.39)***	0.30 (0.28)	10.05*** (9.22)**
R&D (%)	17.830 (0.000)	18.498 (0.000)	6.993 (0.000)	45.64 (11.270)	21.81 (0.000)	16.627 (0.000)	1.05 (8.64)***	6.07*** (6.66)***	8.62*** (15.57)***	1.88* (0.03)
Dividends	0.3291 (0.000)	0.4412 (0.000)	0.3927 (0.000)	0.1748 (0.000)	0.2519 (0.000)	0.2940 (0.000)	7.74*** (7.91)***	6.27*** (6.24)***	5.89*** (5.86)***	1.94* (1.88)*

Table II
Firm Performance, Firm Relative Valuation, and the Response to Industry Shocks

The Table presents the maximum-likelihood multinomial logit model estimation of Equation (1):
$Response = \sum_{i=1}^{i=9} \beta_i X_{iji} + € = \beta_0 + \beta_1 Assets + \beta_2 Leverage + \beta_3 ROA + \beta_4 Free\ Cash\text{-}Flows + \beta_5 Pre\text{-}wave\text{-}stock\ return + \beta_6 Relatie\ Valuation + \beta_7 Tobin's\ Q + \beta_8 R\&D\ to\ Sales + \beta_9 Dividends + €$
Firms are classified into 5 groups according to their response to merger waves: *M&A and Alliances, M&A, Alliances, Internal Growth* and *No growth*. Appendix 2 outlines the definitions and data sources for the responses and for the independent variables. The Table reports the estimated coefficients in terms of the log-odds and, in braces, the effect of the change on one unit of the dependent variable on the probabilities of each group relative to *No Growth*, the baseline group in the estimation. Goodness-of-fit is measured by McFadden's pseudo-R^2. *t-values*, reported in absolute values in parentheses, are computed using robust standard errors clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
Constant	-3.629*** {0.026} (7.36)	-0.271* {0.762} (1.74)	-2.306*** {0.099} (6.15)	-0.382 {0.682} (1.55)
Ln Assets	0.548*** {1.730} (10.99)	0.081*** {1.085} (2.85)	0.228*** {1.256} (5.28)	-0.120*** {0.886} (3.70)
Leverage	-1.448*** {0.235} (3.82)	-0.403* {0.668} (1.67)	-0.853*** {0.425} (2.84)	-1.001*** {0.367} (3.79)
Free cash flows	0.381 {1.463} (0.94)	0.335 {1.398} (0.89)	-0.074 {0.928} (0.21)	1.638*** {5.148} (4.75)
ROA	-0.587 {0.542} (1.39)	-0.426 {0.652} (1.51)	-0.438 {0.645} (1.43)	-1.052*** {0.349} (4.49)
Tobin's Q	0.209*** {1.232} (5.10)	-0.034 {0.966} (1.04)	0.136*** {1.145} (3.33)	0.072 {1.075} (1.46)
Pre-wave Stock returns	0.587** {1.798} (2.08)	0.622*** {1.862} (8.00)	0.001 {1.001} (0.01)	0.959*** {2.610} (6.29)
Relative Valuation	0.229** {1.257} (1.99)	0.333*** {1.395} (4.12)	0.118 {1.125} (1.30)	0.193 {1.213} (1.50)
R&D	0.266* {1.304} (1.88)	-0.675*** {0.508} (5.24)	0.501*** {1.650} (4.54)	0.096 {1.101} (0.53)
Dividends	-0.259 {0.771} (1.50)	0.101 {1.106} (1.50)	-0.743*** {0.475} (5.44)	0.078 {1.081} (0.53)
Obs	5444			
Wald χ^2/*p*-value	1325.12 / ($p < 0.01$)			
Pseudo-R^2	0.0826			

Table III

CEO Characteristics, CEO Compensation, Anti-Takeover Provisions and the Response to Industry Shocks

Panel A expands Model (1) by adding CEO characteristics and CEO compensation. Panel B expands Model (1) by adding the Gompers et. al., (2003) e-index. Panel C expands Model (1) by adding the Bebchuk et al., (2009) b-index. For clarity of exposition I do not present the estimates of the coefficients in the basic Model (1), reported in Table II. Firms are classified into the following groups according to their response to merger waves: *M&A and Alliances*, *M&A*, *Alliances*, *Internal Growth* and *No growth*. Appendix 2 outlines the definitions and data sources for the responses and for the independent variables. The Table reports the estimated coefficients in terms of the log-odds. In braces is the effect of the change on one unit of the dependent variable on relative on the probabilities of each group relative to the No Growth', the baseline group in the estimation. Goodness-of-fit is measured by McFadden's pseudo-R^2. *t-values*, reported in absolute values in parentheses, are computed using robust standard errors clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A Response = $\sum_{i=0}^{i=9}$ $\beta_i X_{ij}$ + β_{10}*Tenure* + β_{11}*Chairman* + β_{12}*Founder* + β_{13}*CEO Ownership* + β_{14}*Cash Compensation* + β_{15}*Change in CEO wealth* + β_{16}*Overconfidence* + ϵ				
	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
Tenure	0.028 {1.029} (0.25)	-0.014 {0.985} (0.17)	0.114 {1.121} (0.61)	0.130 {1.139} (0.60)
Founder	0.979** {2.664} (2.56)	0.617 {1.853} (1.15)	1.257*** {3.517} (2.98)	-0.470 {0.624} (0.38)
Chairman	0.263 {1.301} (1.24)	0.135 {1.145} (0.78)	-0.062 {0.939} (0.36)	0.382 {1.465} (1.54)
CEO ownership	0.126 {1.134} (1.10)	0.140 {1.151} (1.31)	-0.037 {0.962} (0.23)	0.027 {1.027} (0.3)
Cash Compensation	0.278 {1.321} (1.54)	0.577*** {1.781} (3.99)	0.202 {1.223} (1.04)	0.346** {1.414} (2.08)
Change in CEO wealth	0.999 {0.992} (0.36)	0.001 {1.001} (0.16)	-0.004** {0.996} (2.13)	-0.003 {0.997} (0.73)
Overconfidence	0.536*** {1.709} (2.50)	0.220 {1.246} (1.14)	0.240 {1.271} (0.88)	0.289 {1.335} (1.08)
Obs	1260			
Wald χ^2/*p*-value	393.66 / (p < 0.01)			
Pseudo-R^2	0.1097			
Panel B: Response = $\sum_{i=0}^{i=9}$ $\beta_i X_{ij}$ + β_{10} *High g-index* + ϵ				
	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
High G-Index	0.153 {1.165} (0.83)	0.144 {1.155} (0.93)	0.123 {1.130} (0.50)	0.323 {1.382} (0.77)
Obs	1304			
Wald χ^2/*p*-value	407.28 / (p < 0.01)			
Pseudo-R^2	0.1088			
Panel C: Response = $\sum_{i=0}^{i=9}$ $\beta_i X_{ij}$ + β_{10} *High e-index* + ϵ				
High e-Index	0.238 {1.269} (1.55)	0.323** {1.382} (2.54)	0.150 {1.162} (0.63)	-0.114 {0.891} (0.36)
Obs	1342			
Wald χ^2/*p*-value	432.24 / (p < 0.01)			
Pseudo-R^2	0.1137			

Table IV
Institutional Ownership and the Response to Industry Shocks

To investigate the potential impact of the presence of institutional ownership on the response to merger waves this Table presents of the maximum-likelihood multinomial logit model estimation of the different extensions to Equation (1): $Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \epsilon = \beta_0 + \beta_1 Assets + \beta_2 Leverage + \beta_3 ROA + \beta_4 Free\ Cash\text{-}Flows + \beta_5 Pre\text{-}wave\text{-}stock\ return + \beta_6 Relatie\ Valuation + \beta_7 Tobin's\ Q + \beta_8 R\&D\ to\ Sales + \beta_9 Dividends + \epsilon$

Panel A expands Model (1) by adding the percentage institutional ownership. Panel B divides institutional ownership into active and passive institutions. For clarity of exposition I do not present the estimates of the coefficients in the basic Model (1), reported in Table II. Firms are classified into the following groups accordingly to their response to merger waves: *M&A and Alliances*, *M&A*, *Alliances*, *Internal Growth* and *No growth*. Appendix 2 outlines the definitions and data sources for the responses and for the independent variables. The Table reports the estimated coefficients in terms of the log-odds. In braces is the effect of the change on one unit of the dependent variable on relative on the probabilities of each group relative to the No Growth', the baseline group in the estimation.

Goodness-of-fit is measured by McFadden's pseudo-R^2. *t-values*, reported in absolute values in parentheses, are computed using robust standard errors clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Response $= \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Inst.\ ownership + \epsilon$				
	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
Institutional ownership %	0.880*** {2.412} (3.85)	1.093*** {2.984} (4.35)	0.371* {1.449} (1.70)	0.131 {1.140} (0.52)
Obs	5348			
Wald χ^2/*p*-value	1360.89 /($p < 0.01$)			
Pseudo-R^2	0.0863			
Panel B: Response $= \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} Active\ Inst.\ Ownership + \beta_{11} Pasive\ Inst.\ Ownership + \epsilon$				
Active Institutional ownership %	1.455*** {4.286} (2.86)	1.086*** {2.964} (3.22)	0.205 {1.227} (0.43)	-0.222 {0.800} (0.80)
Passive Institutional ownership %	0.158 {1.172} (0.33)	0.824*** {2.279} (2.83)	0.5530 {1.738} (1.20)	0.203 {1.225} (0.36)
Obs	5152			
Wald χ^2/*p*-value	1339.84 /($p < 0.01$)			
Pseudo-R^2	0.0875			

Table V
Informational Asymmetries and the Response to Industry Shocks

To investigate the potential impact of informational asymmetries to the response to industry shocks, this Table presents the maximum-likelihood multinomial logit model estimation of the different extensions to Equation (1):
$Response = \sum_{i=0}^{i=9} \beta_i X_{ij} + \epsilon = \beta_0 + \beta_1 Assets + \beta_2 Leverage + \beta_3 ROA + \beta_4 Free\ Cash\text{-}Flows + \beta_5 Pre\text{-}wave\text{-}stock\ return + \beta_6 Relatie\ Valuation + \beta_7 Tobin's\ Q + \beta_8 R\&D\ to\ Sales + \beta_9 Dividends + \epsilon$
Panel A expands Model (1) by adding the dispersion in EPS forecast. Panel B expands Model (1) by adding the absolute of EPS forecast errors. For clarity of exposition I do not present the estimates of the coefficients in the basic Model (1), reported in Table II. Firms are classified into the following groups accordingly to their response to merger waves: *M&A and Alliances, M&A, Alliances, Internal Growth* and *No growth*. Appendix 2 outlines the definitions and data sources for the responses and for the independent variables. The Table reports the estimated coefficients in terms of the log-odds. In braces is the effect of the change on one unit of the dependent variable on relative on the probabilities of each group relative to the No Growth', the baseline group in the estimation.
Goodness-of-fit is measured by McFadden's pseudo-R^2. *t-values*, reported in absolute values in parentheses, are computed using robust standard errors clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Response $= \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} EPS\ Dispersion + \epsilon$				
	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
EPS dispersion	-0.286** {0.751} (2.30)	-0.524*** {0.591} (5.220)	0.1378 {1.147} (1.03)	-0.181 {0.834} (1.11)
Obs	3252			
Wald χ^2/*p*-value	808.37 / ($p < 0.01$)			
Pseudo-R^2	0.0834			
Panel B: Response $= \sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10} EPS\ Prediction\ Error + \epsilon$				
EPS prediction error	-0.154* {0.856} (1.73)	-0.249*** {0.779} (2.57)	0.273*** {1.314} (2.50)	-0.612*** {0.541} (4.216)
Obs	3732			
Wald χ^2/*p*-value	948.47 /($p < 0.01$)			
Pseudo-R^2	0.842			

Table VI
Firm Cost of Debt and Equity Capital and the Response to Industry Shocks

This Table presents the multinomial logit model estimation of the different extensions to Equation (1) expanded by different proxies for firms' cost of debt and equity. Panel A identifies whether the firm has public debt outstanding. Panel B adds the analysis of the credit rating of the debt. Panel C analyzes the amount and the cost of bank loans; Panel D includes the implied cost of capital. For clarity of exposition I do not present the estimates of the coefficients in the basic Model (1), reported in Table II. Firms are classified into the following groups accordingly to their response to merger waves: *M&A and Alliances, M&A, Alliances, Internal Growth* and *No growth.* Appendix 2 outlines the definitions and data sources for the responses and for the independent variables. The Table reports the estimated coefficients in terms of the log-odds. In braces is the effect of the change on one unit of the dependent variable on relative on the probabilities of each group relative to the No Growth', the baseline group in the estimation. Goodness-of-fit is measured by McFadden's pseudo-R^2. Standard errors are clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. *t-values*, reported in absolute values in parentheses, are computed using robust standard errors clustered by merger waves to account for market-wide factors that induce correlation between firms during the wave. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A Response = $\sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}$*With debt rating* $+ \epsilon$				
	M&A and Alliances (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)
With debt rating	0.526*** {1.692} (3.34)	0.698*** {2.011} (9.69)	0.263 {1.301} (1.62)	0.523*** {1.688} (4.47)
Obs	5444			
Wald χ^2/*p*-value	1431.07 / (p < 0.01)			
Pseudo-R^2	0.0892			
Panel B Response = $\sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}$*Numeric debt rating* $+ \epsilon$				
Numeric debt rating	0.051*** {1.053} (3.78)	0.067*** {1.069} (6.58)	0.002 {1.002} (0.10)	0.037*** {1.037} (2.57)
Obs	5444			
Wald χ^2/*p*-value	1398 / (p < 0.01)			
Pseudo-R^2	0.0871			
Panel C Response = $\sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}$*Loan Amount* $+ \beta_{11}$*Cost of debt* $+ \epsilon$				
Loan Amount	0.221*** {1.248} (4.45)	0.315*** {1.370} (7.00)	0.040 {1.041} (0.61)	0.248*** {1.282} (3.20)
Cost of Debt	-0.001 {0.998} (0.89)	-0.002*** {0.997} (3.78)	0.001 {1.001} (0.67)	-0.002* {0.997} (1.74)
Obs	2322			
Wald χ^2/*p*-value	636.35 / (p < 0.01)			
Pseudo-R^2	0.0953			
Panel D Response = $\sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}$*GLS Cost of Equity* $+ \epsilon$				
GBS Cost of Equity	-3.557*** {0.029} (2.88)	-1.644*** {0.193} (3.48)	-1.949* {0.142} (1.64)	-1.625 {0.196} (1.04)
Obs	2692			
Wald χ^2/*p*-value	653.16 / (p < 0.01)			
Pseudo-R^2	0.0824			
Panel E Response = $\sum_{i=0}^{i=9} \beta_i X_{ij} + \beta_{10}$*HDZ Cost of Equity* $+ \epsilon$				
HDZ Cost of Equity	-0.3599*** {0.6977} (3.69)	-0.3510*** {0.7039} (2.69)	-0.3983** {0.6710} (2.42)	-0.2406 {0.7861} (0.88)
Obs	3981			
Wald χ^2/*p*-value	103383 / (p < 0.01)			
Pseudo-R^2	0.0777			

Table VII
Firm Performance during Industry Shocks

This Table presents three analyses of the performance of firms during the merger wave. Panel A presents the percentage of firms that are liquidated or dropped from the markets during the wave, or remain alive at the end of the wave. Panel B reports the mean (median) adjusted returns on assets (ROA) and cash-flow return on assets (CFROA) computed using the Barber and Lyon's (1996) methodology. Panel C reports the means (median) 2-year market adjusted buy-hold returns, and the excess returns obtained from the Fama and French's (1993) 3-factor model. The parameters of the model are estimated in the pre-event interval, -730 to -30, where day 0 is the start of the wave; value-weighted CRSP daily market returns are used as the proxies for market returns. These measures of performance are reported for the overall sample and for each group of firms classified by their response to merger waves: *M&A and Alliances* are firms that acquire other firms' assets and also form alliances. *M&A* are firms that acquire other firms' assets, but do not establish alliances. *Alliances* are firms that form alliances, but do not acquire other firms' assets. *Internal Growth* are firms that do not acquire assets or form alliances, but experience above the median industry growth in capital expenditures (CAPEX). *No growth* are firms that do not expand by acquisitions, alliances or internal growth.
Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%

Panel A: Percentage of the firms with information the year before the merger wave that are liquidated or dropped from the markets or remain alive during the wave						
	Total	*M&A and Alliances* (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)	No Growth
Merged	12.73	7.21	6.49	13.46	9.84	20.49
Dropped or delisted	6.40	1.60	3.51	6.12	6.45	10.84
Alive	80.87	91.19	90.00	80.42	83.71	68.67
Panel B: Mean (median) adjusted returns on assets (ROA) and cash-flow return on assets (CFROA) computed using the Barber and Lyon's (1996) methodology						
Accounting performance	Total	*M&A and Alliances* (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)	No Growth
Abnormal ROA	0.172 (0.621)	0.073 (0.779)	-0.0043 (0.016)	2.060** (1.791)**	1.047 (0.845)	0.107 (0.699)
Abnormal CFROA	0.332 (0.319)	-0.045 (0.079)	-0.313 (-0.124)	1.830** (1.075)**	0.722 (0.446)	0.471 (0.568)
Panel C: Means (median) 2-year market adjusted buy-hold returns, and the excess returns obtained from the Fama and French's (1993) three-factor model of the firms during the wave						
Stock performance	Total	*M&A and Alliances* (1)	*M&A* (2)	*Alliances* (3)	*Internal Growth* (4)	No Growth
Market adjusted excess returns (%)	-2.753 (-12.700)	11.763 (-2.870)	-5.222 (-12.961)	9.31 (-3.331)	-3.343 (-17.562)	-10.865 (-18.015)
Fama and French's (1993) excess returns (%)	-7.213 (-33.746)	2.922 (-26.681)	-15.921 (-40.825)	19.331 (-22.715)	-26.865 (-68.639)	-8.623 (-29.851)

Appendix 1

This Table reports eight merger waves in the period 2000 - 2006 identified using the same procedure as in Harford (2005).

Industry	Date wave started and reason given
Drugs - Pharmaceutical Products	November, 2004 Consolidation to achieve economies of scale, pricing power and access to new products and cost savings.
Mines Non-Metallic and Industrial Metal Mining	December, 2004 Nickel demand is expected to increase primarily as a result of strong stainless steel output growth in China, and mergers and acquisitions is an increasingly important theme in the mining sector
Beer & Liquor	March, 2005, Global consolidation in the industry to achieve economies of scale both in production and purchasing
Steel Works Etc	April, 2005 Consolidation intended to reduce excess capacity at a time when production remains high even as demand appears to fall.
Gold Precious Metals	April, 2005, Base-metal inventories on the London Metals Exchange are nearly depleted while China and India continue to crave commodities to fuel their expanding economies. Provoking an increase in prices
Utilities	May, 2005 Consolidation caused by narrowing margins for power generation and an increasingly liberalized electricity, in a tight sector facing high fuel prices
Healthcare	July, 2005 To cope with dwindling research pipelines and health management groups seek scale as a foil against rising costs.
Oil - Petroleum and Natural Gas	July, 2005 Search for reserves in the context of increases prices.

Appendix 2

Description of the variables used in the study

Panel A. Firms are classified into the following groups according to their response to merger waves		
Variable Name	**Description**	**Source**
M&A and Alliances	Firms that acquire other firms' assets and also form alliances	Thomson Financial's Securities Data Company (SDC)
M&A	Firms that form alliances, but do not acquire other firms' assets	SDC
Alliances	Firms that acquire other firms' assets, but do not establish alliances	SDC
Internal Growth	Firms that do not acquire assets or form alliances, but experience above the median industry growth in capital expenditures (CAPEX)	SDC
No growth	Firms that do not expand by acquisitions, alliances or internal growth	SDC
Panel B. Firm Characteristics		
Variable Name	**Description**	**Source**
Ln Assets	The natural log of the firm's total assets, converted into constant 2007 dollars using the U.S. CPI.	Compustat
Leverage	The ratio of the book value of short- and long-term debt to the book value of total assets	Compustat
ROA	The average of the two-year pre-wave return on assets (ROA), computed as the operating income before depreciation, divided by the average of this and prior year assets.	Compustat
Free cash flows	The ratio of cash flow from operating activities less cash dividends and capital expenditures divided by total assets of the firm.	Compustat
Relative valuation	The Firm specific error computed as in Rhodes-Kropft (2005) and Hoberg and Phillips (2010)	Compustat
Pre-wave Stock returns	The one-year buy-and-hold return ending one month before the start of the wave, adjusted by CRSP value-weighted market returns	CRSP
Tobin's Q	The book value of assets plus the market value of common equity less the sum of the book value of common equity (item 60) and balance sheet deferred taxes (item 74), divided by the book value of assets (item 6).	Compustat
R&D	The Maxi of 0 and the ratio of the R&D expenses to the sales. Following other studies, I set R&D equal to zero when it is missing in Compustat.	Compustat
Dividends	Equals one if the firm has paid dividends in the three years prior to the formation of the JV, and zero otherwise	Compustat
Panel C. Measures of Agency Problems		
Variable Name	**Description**	**Source**
Age	The age of the CEO	Execucomp
Tenure	The number of years as CEO of the firm	Execucomp
Chairman	Equals 1 if the CEO is also the chairman of the board	Execucomp
Founder	Equals 1 if the CEO is also the founder	Execucomp
Pct. ownership	The fraction of shares held by the CEO;	Execucomp
Cash Compensation	The sum of the Execucomp fields (BONUS, LTIP, and NONEQ_INCENT)/ TDC1	Execucomp
Change in CEO wealth	The dollar change in CEO wealth for a 100 % point change in firm value, divided by annual flow compensation.	From Alex Edmans' web page. http://alexedmans.com/data/
Overconfidence	Equals one if the ratio of the average value per vested option to the average strike price equals or is greater than 67% in two or more years	Execucomp

High e-Index	Equals one for values above the median of the entrenchment e-index, and zero otherwise.	Lucian Bebchuk's web page: http://www.law.harvard.edu/faculty/bebchuk/data.shtml
High g-Index	Equals one for values above the median of the G-index, and zero otherwise	Andrew Metrick's web page: http://faculty.som.yale.edu/andrewmetrick/data.html
Institutional ownership	The percentage of institutional ownership held the five largest institutional investors.	Thomson Reuters
Active institutions	The percentage of total institutional ownership held by investment advisers and investment companies that are among the five largest institutional investors.	Thomson Reuters
Passive institutions	The percentage of total institutional ownership held by bank trust departments and insurance companies that are among the five largest institutional investors.	Thomson Reuters

Panel D. Measures of Informational Asymmetries

Variable Name	Description	Source
EPS forecasting error	Equals one if the standard deviation of prediction errors (STDPE), is more than the median STDPE, and zero otherwise. STDPE is the standard deviation of the analysis EPS forecast for the year before the wave.	I/B/E/S
EPS forecast-Dispersion	Equals one if the absolute prediction error (ABSPE), is more than the median ABSPE. ABSPE is the absolute value of the difference between the mean analysts' forecasts and the actual EPS forecast for the year before the wave, divided by the closing price seven days before the forecast	I/B/E/S

Panel E. Measures of Cost of Capital

Variable Name	Description	Source
Public debt	Equals one if the firm has public debt outstanding	Compustat
Numeric rating	Assigns a numerical value to the S&P ratings as follows: AAA+=23, AAA = 22, AA+ = 21, AA = 20, AA− = 19, A + = 18, A = 17, A− = 16, BBB+ = 15, BBB = 14, BBB− = 13, BB+ = 12, BB = 11, BB− = 10, B+ = 9, B =8, B− = 7, CCC+ = 6, CCC = 5, CCC− = 4, CC = 3, C = 2, and D = 1	Compustat
Loan Spread	Loan rate minus base rate, where the base rate is the monthly average 6-month LIBOR.	Thomson Reuters
Loan Amount	The log of loan amount at the facility (deal) level.	Thomson Reuters
Implied cost of equity	The cost of capital implied in the prices, computed using the Gebhardt and Swaminathan's (2001) model.	CRSP/Compustat